HIV/AIDS in China

Epidemiology, Prevention and Treatment

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Introduction

Over the last three decades, China has experienced rapid social and economic transitions. During this period, China has moved from a closed country to an open country and moved from one of least developed countries in the early 1980s to now having the second largest gross domestic product (GDP) in the world. The rapid developments in aviation domestically and internationally, highways, and railway, including speed trains, have facilitated the movement of large numbers of people internally and externally. Housing in cities has moved from primarily being publicly owned to now completely privately owned. China has shifted from a purely socialist to now a more capitalist-like country. China has risen from being a low-income country (1987–1996) with all its people equally poor to a lower-middle-income country (1997–2009) and today an upper-middle-income country (2010–2017, The World Bank 2018), with many billionaires and millions of poor people. The rich have become richer, and the gap between the rich and the poor has widened significantly.

Social and economic changes have brought large population movements. For example, Shenzhen was once a very small fishing village with less than a thousand people, but thanks to its strategic location on the northern border of Hong Kong, it has developed into one of the richest and most well-developed cities in China with more than 20 million people and many large international companies. Many of China's small cities have become bigger cities. Many of China's youth and young adults have moved from rural villages to urban cities. The social norms and lifestyles of Chinese people have significantly changed. Drug use has returned to China, and the resurgence of traditional opioid drugs has quickly evolved into polydrug use and use of synthetic, stimulant "club drugs" (Sun et al. 2014; Zhao et al. 2004). Promiscuity and risky sexual behavior have also returned—now, almost half of China's population (47% overall, 57% of men and 37% of women) is estimated to have multiple sexual partners in their lifetimes (Huang et al. 2014), 4.5% of women and 11.5% of men reported engaging in noncommercial extramarital sex, and 5.5% of men reported commercial sex in past 12 months (Zhang et al. 2012).

Not surprisingly, dozens of outbreaks of emerging and reemerging infectious diseases have recently occurred in China, including severe acute respiratory syndrome (SARS), coronavirus (Cheng et al. 2007), *Streptococcus suis* (Feng et al. 2014), syphilis (Chen et al. 2011), avian flu (Parry 2013), and severe fever

with thrombocytopenia virus (SFTSV) (Li 2013). Most came fast and disappeared quickly. However, human immunodeficiency virus (HIV) came to China and has not left (Cui et al. 2016; Pisani and Zhang 2017; Zeng et al. 1986).

Unique Epidemics of HIV/AIDS in China

The epidemiology of HIV/AIDS in China is quite unique. Five years after the first cases of acquired immunodeficiency syndrome (AIDS) were reported by the US Centers for Disease Control and Prevention (CDC), the first AIDS case was found in China—a foreign traveler in 1985.

Neither the government officials nor the public believed that HIV/AIDS would become a public health threat in China. However, scientists did not believe that there were no HIV infections in China. Virologists and epidemiologists started to search and finally found the first cases of HIV infection among four patients with hemophilia who had used imported factor VIII from a US pharmaceutical company in 1983 (Zeng et al. 1986). Although this important scientific finding did not change the perceptions of the risk of an HIV epidemic in China, it did highlight the importance of ensuring the safety of blood products, which spurred the Chinese Government to immediately issue a new policy banning the importation of all blood products.

Thus, in the mid-1980s, China was still very "clean"—there was almost no drug use, almost no or at least no visible commercial sex, and no overt homosexual activity. The links between drug use and risky sex and HIV infection were based on US epidemiological data. The Chinese still believed that an HIV epidemic could not possibly happen on their soil. So, when the first HIV outbreak was accidentally found among people who inject drugs (PWID) in Ruili, Dehong Prefecture, Yunnan Province, in 1989, scientists, public health specialists, government officials, and the public were all shocked. On the one hand, it was only 146 cases. On the other hand, 146 was a sudden, huge jump from zero. Either way, the Chinese could not accept it.

After the identification of this first outbreak, two false beliefs that were common among the government officials and public health specialists caused several lost opportunities to control the then-small-scale HIV/AIDS epidemic in its early stages. The first of these was that China was not a drug-consuming country. Rather, police and public security officials believed that China was just another country on the route that smugglers used to traffic drugs from the "Golden Triangle" to the West. This misperception led Chinese officials and public health leaders to believe that only a very small number of people in a very small border region could be affected and, therefore, it should not cause much concern. The second false belief was that the geography where the outbreak occurred would naturally contain it. The 146 HIV cases were found in the far end of the southwest corner of the country in a remote, rural area, where infrastructure was poor and travel over distances was difficult and very slow. People who lived there were generally considered isolated from the rest of China. This misperception led Chinese officials and health and public health leaders to believe that the epidemic would not spread and become a national threat and, similarly therefore, it should not cause much concern.

Unfortunately, these beliefs were wrong. The number of drug users increased rapidly along drug trafficking routes from Myanmar to Dehong, where the outbreak was found, to central Yunnan Province, and to the neighboring provinces, including Guangxi, Sichuan, Guangdong, and others. HIV infection also increased and spread, albeit more gradually, among drug users in these same areas where drug trafficking and drug use were increasing and spreading. By 1995, just 6 years after the outbreak was found, more than 50% of counties in Yunnan had reported HIV infections among PWID. Even worse, HIV infection was being observed among drug users in Sichuan and Xinjiang. From then, the epidemic sped up very quickly and spread through the drug-using population to all provinces in just 5 years. By 2000, China's HIV epidemic among drug users was a nationwide problem.

In the meantime, a catastrophic outbreak of HIV infection was suddenly identified among commercial blood plasma donors in China in 1995 (Wu et al. 1995). Unsafe blood collection practices had resulted in the exposure of thousands of poor rural farmers to HIV. The magnitude of the HIV outbreak among former plasma donors (FPD) seemed so enormous that many Chinese officials scared into inaction. Little effort was made in the early stages to truly understand the actual extent of the epidemic. It was only known that HIV infections were being found in all provinces where commercial plasma collection was prevalent.

There was only one epidemiological study of HIV infection among FPD conducted in the years following the outbreak. It was found that the prevalence of HIV infection was associated with the frequency of plasma donation (Wu et al. 2001). The complete and true picture of the outbreak of HIV infection among FPD was not made public until 2005, 10 years after the outbreak was identified. The Chinese Government launched a nationwide HIV testing campaign among FPD from 2004 to 2005 during which some one million FPD were interviewed and tested for HIV infection. It was estimated that about 69,000 people had become infected.

Unlike the HIV/AIDS epidemics of the neighboring countries, HIV infection among female sex workers (FSW) never really took off in China. Based on international experience, an outbreak among this important key population had been expected but never really materialized. Rather, over the past 30 years, HIV prevalence among FSW has remained less than 1%. Only in some areas, where there were female injecting drug users involved in commercial sex, had the HIV prevalence in this risk group exceeded 1%. This very low prevalence among FSW has helped slow the growth of China's HIV epidemic.

Similarly, international experience indicated that an outbreak among men who have sex with men (MSM) was imminent. However, this was not observed until 2005, almost 20 years after the first reported HIV infection and 16 years after the first outbreak in China. The slow start of HIV among MSM indicated that there had been almost no interaction between the MSM and PWID risk groups or, at least, there had been very limited crossover. This has been supported by virology studies that have found different HIV viral subtypes among the PWID population compared to the MSM population, suggesting that HIV was not brought into the Chinese MSM community by Chinese PWID but rather via interaction with the

Westerners. Because of the lack of effective control strategies, HIV spread very fast among MSM in China. National sentinel surveillance data showed that the HIV prevalence in this group increased from 1% in 2005 to 8% in 2017.

Responding in the Chinese Way

China's response to its HIV/AIDS epidemic has gone through three stages—from initial denial to very conservative and now to innovative and positive. China is very different from most of the countries in developing world. Once the Chinese Central Government has decided to do something, it is done quickly and on a national scale. This working style has been particularly important for public health since program coverage is critical in controlling an epidemic.

When the first few cases of HIV infection were diagnosed among FPD in early 1995 (Wu et al. 1995), field observation suggested that the contamination in the process of plasma collection may have caused a potential outbreak of HIV infection in this population. In response to this finding, the Chinese Government immediately and vigorously shut down all commercial plasma collection centers across China within just a few weeks.

Harm reduction programs, including methadone maintenance treatment (MMT) and needle and syringe exchange programs (NSEP), were not initiated until 15 years after the first HIV outbreak was identified among PWID in 1989. In the 1990s, the concept of harm reduction was new. The officials in the Ministry of Health were very supportive. However, the officials in the Ministry of Public Security were against harm reduction. The Asia and Pacific Regional Offices of the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the United Nations Office on Drugs and Crime (UNODC) played a significant role in policy advocacy for harm reduction. Health officials and police officials were invited to attend advocacy workshops together, which helped improve the communication between these largely separate government departments. They also traveled on joint study tours to learn about harm reduction programs in other countries, such as Australia and the Netherlands. These events were critically important for Chinese public security and law enforcement officials to see that harm reduction strategies for drug users were well accepted by their counterparts in other countries. Over the course of many years, hardline conservative attitudes toward harm reduction softened, and finally, harm reduction strategies were adopted and written into the first Chinese State Council-issued National Five-Year Action Plan (2001–2005).

In 2004, China established its first eight MMT clinics and then very quickly scaled up MMT nationwide in just a few years. By 2006, the original eight clinics had expanded to 320 and by 2007 to over 500. By 2010, all counties that had at least 500 drug users had set up an MMT clinic. The NSEP also expanded very quickly. While MMT is led and supervised by the Ministry of Health, the Public Security Bureau, and the Food and Drug Administration but is operated by the local health departments, the NSEP is operated by the local health departments as well with the support of the drug users themselves. The combination of MMT and NSEP, plus

other intervention and treatment programs, has successfully controlled the HIV epidemic among China's drug-using population.

HIV testing is the first step for people living with HIV (PLWH) to have a chance to be diagnosed and to have an opportunity to access healthcare. Promoting HIV testing was very difficult in the early stages of China's epidemic. Even after the massive outbreak of HIV infection among FPD was identified in 1995, large-scale testing programs were still not established. It was not until nearly 10 years later in 2004–2005 that the numbers of people receiving testing began to approach an appropriate magnitude. Although criticisms came from both domestic and international sources, China engaged in active HIV testing campaigns targeting high-prevalence areas (i.e., Henan Province, Yunnan Province) and key, high-risk populations (i.e., PWID, FPD, FSW). Since 2005, the HIV testing has been expanded quickly, particularly after the World Health Organization (WHO) issued a new guideline on provider-initiated testing and counselling (PITC). The numbers of HIV tests performed and the number of HIV infections diagnosed in clinical settings have significantly increased. In 2017, the annual number of HIV tests provided in China exceeded 200 million. In some provinces, such as Yunnan, about 40% of the population has been tested for HIV.

Although highly active antiretroviral therapy (HAART) became available internationally in 1996, PLWH in China were not able to access to HAART due to its unaffordably high cost. In 2003, the Chinese Government made a promise to provide free antiretroviral therapy (ART) to all people with AIDS in rural areas and people with AIDS living below the poverty line in urban areas. Rather than waiting for patients come for ART, the health workers actively approached the patients and convinced them to initiate ART. However, health facilities in rural areas were unable to provide ART services. Thus, this capability needed to be quickly scaled-up. Providing free ART to those who became infected with HIV via unsafe plasma collection practices during the early to mid-1990s was treated as a public health emergency. Health workers in county hospitals were sent to rural villages to work in short-term, 3-month rotations. At the same time, rapid training courses on ART provision were offered to health workers at township health centers and rural health clinics. Multiple strategies were used to have all diagnosed PLWH who were FPD on ART in less than 6 months. Since 2006, annual targets for the number PLWH initiated on ART have been set in order to promote increases in ART uptake. In 2017, more than 130,000 patients had newly enrolled into the government's free ART program. The rapid roll out of the National Free ART Program has significantly reduced the case-fatality rates among PLWH in China.

Prevention of mother-to-child transmission (PMTCT) of HIV infection was initiated in 2005. However, the program was small scale and expanded very slowly. On World AIDS Day 2009, Premier Wen Jiabao chaired a panel meeting in Ditan Hospital with top AIDS experts, community-based organization leaders, UNAIDS and WHO technical officers, and Chinese Government officials. Premier Wen was provided with evidence showing that PMTCT was the most cost-effective of all HIV prevention strategies. He then promised to provide PMTCT to all pregnant women starting in the next year. Since 2010, the Ministry of Health has implemented PMTCT for HIV, syphilis, and hepatitis B virus (HBV) infection nationwide.

Milestones

Over the past three decades, there have been many milestones along China's HIV/AIDS response journey. Among the many important initiatives, a few milestones, in particular, were critical to the development of important national programs and facilitated considerable forward progress.

The first outreach program targeting FSW in real-world community settings (i.e., not in closed settings such as detention centers) was launched in 1996 (Wu et al. 2007). This pilot project was supported by the World Bank. The study demonstrated an effective approach to significantly increase the knowledge of FSW about HIV and other sexually transmitted infections (STIs) and the benefits of increased condom use. This pilot study provided a foundation for developing the first national guideline on condom promotion for FSW in China.

The first intervention workshop on HIV/AIDS was organized in Beijing by the Chinese Academy of Preventive Medicine, now renamed as Chinese Center for Disease Control and Prevention (China CDC), in 1997. The workshop was extremely controversial at that time. The main focus of the workshop was to discuss strategies for preventing or reducing HIV transmission among key populations, including FSW, PWID, and MSM. Although the distribution of the workshop's proceedings was banned, the presentations and ensuing discussions and debates were very encouraging.

In 1998, the vice minister of Health, Dr. Dakui Ying, visited FSW in an entertainment establishment in Chengjiang County, Yunnan Province. It was a demonstration study site, supported by the WHO, for the promotion of condom use, frequent health checkups, and treatment uptake for reproductive tract infections (RTIs) among establishment-based FSW. At that time, the interventions targeting FSW were still very sensitive. Dr. Ying talked with the women and was happy to learn that the project had helped them understand HIV/AIDS and other STIs and the importance of consistently using condoms and getting regular reproductive health checkups. His visit signaled great support for this sensitive but effective program, an endorsement that was a key milestone in China's HIV/AIDS response.

In 2001, an important policy paper, "China's Action Plan for Reducing and Preventing the Spread of HIV/AIDS (2001–2005)," was issued by the State Council Office (State Council Office 2001). This new central government policy described the most effective HIV prevention measures, such as condom use promotion, opioid substitution therapy, and needle social marketing (i.e., equivalent to NSEP), and a plan for the implementation of these prevention measures with specific measurable targets. Most importantly, this policy and plan were matched with appropriate funds meant to facilitate the achievement of the targets.

In 2003, Vice Premier Wen Jiabao visited Ditan Hospital in Beijing. This was the first time that a top government official had appeared publicly and shown care for PLWH and the health professionals providing services to PLWH. This public show of support and acknowledgment of the HIV/AIDS epidemic was a critical next step toward a more vigorous, coordinated, and comprehensive response.

In another such significant event, President Hu Jingtao visited You'an Hospital in Beijing in 2004. This was the first time the nation's top leader had publicly shown that he cared for PLWH and endorsed HIV/AIDS prevention and treatment programs. His visit showed lower-level government officials and China's people that HIV/AIDS would be dealt with in all seriousness and determination and that he and China would prioritize control of the epidemic and elimination of the negative impacts upon people infected and affected. This visit changed the perceptions and attitudes of the public toward PLWH.

In 2004, another important policy paper, the "Notice of the State Council on Conscientiously Strengthening HIV/AIDS Response," was issued by the State Council (State Council 2004). This was the very famous "Four Frees and One Care" policy, whereby the Chinese Central Government promised to provide free HIV testing, free ART for PLWH in rural areas and those in urban areas who were under the poverty line, free PMTCT to all pregnant women, and free schooling for children infected and affected. This policy completely changed the landscape of China's HIV/AIDS response, had a huge positive impact on its HIV/AIDS epidemic, and brought much-needed hope to its people.

In 2005, Vice Minister Longde Wang chaired a first meeting among MSM. At that time, male-male sexual behavior and the presence of MSM in Chinese society were taboo topics. Although the meeting was very small (a few officials and only eight MSM were invited) and lasted only about 3 hours, it had a significant impact and contributed to the successful launch of national response efforts among MSM.

In 2006, a third important policy paper was issued by the State Council, the "Regulations on AIDS Prevention and Treatment" (State Council 2006). With this policy, all effective HIV prevention, intervention, and treatment measures, including harm reduction strategies, anti-stigma strategies, and others, were protected by the law.

In the early 2000s, most national HIV/AIDS projects were supported by international donors, including The Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund), the United Kingdom's Department for International Development (DFID) AIDS Project, the US CDC Global AIDS Project (GAP), the World Bank Health IX Project, and others. Each project collected their own data for documentation and evaluation, as did all domestically funded projects, resulting in enormous burden on the field workers and huge inefficiencies in data collection, entry, checking, maintenance, and reporting. Thus, China launched its unified, web-based National HIV/AIDS Comprehensive Response Information Management System (CRIMS) in 2008 (Mao et al. 2010). CRIMS collects and monitors HIV testing and treatment data, data on outreach and intervention among key populations, harm reduction program data, and surveillance data. CRIMS generates monthly, quarterly, and annual national HIV implementation reports and provides vital data for the evaluation national HIV/AIDS programs.

The "Notice of the State Council on Further Strengthening HIV/AIDS Response" was issued by the State Council at the end of 2010 (State Council 2010). The policy was an important milestone in the further development of China's HIV/AIDS response as it emphasized the expansion of all HIV testing, prevention, and

treatment programs and focused on the creation of effective strategies to provide sufficient coverage of these programs in order to bring the HIV/AIDS epidemic under control.

Faster Movement from Science to Policy Implementation

One of the most unique advantages of China is its ability to quickly move from scientific results to policy implementation. This is extremely important for public health programs, such as national HIV/AIDS prevention or treatment programs. Here, we provide two typical examples to illustrate this point.

When a remarkable 96% reduction in HIV transmission between PLWH on ART and their serodiscordant partners was reported by an American scientist in 2011 (Cohen et al. 2011), Chinese scientists also began investigating the possibility that treatment itself could act as a prevention measure. Similar results were observed in an observational cohort study conducted from 2008 to 2010 (He et al. 2013). These findings were immediately translated into national policy and implemented. In 2011, a national workshop on the so-called "treatment-as-prevention" (TasP) strategy was held in Shenzhen. All known serodiscordant couples and all newly diagnosed PLWH who had serodiscordant partners were approached and encouraged to initiate ART regardless their CD4 cell counts. As a result of this effort, the number of serodiscordant couples being managed by the TasP strategy increased from 65,795 in 2011 to 141,435 in 2017. The HIV seroconversion rate among serodiscordant couples dropped from 2.72% in 2011 to 0.68% in 2017 (National Center for AIDS/STD Control and Prevention 2018).

After many years of scaling up ART, the number of HIV/AIDS-related deaths had remained unacceptably high. Each year, about 20,000 PLWH were dying. It was difficult for the officials and policymakers to understand why ART was not reducing mortality. Then, scientists in China finally discovered that over 70% of PLWH who had died had not actually initiated ART at all. This finding was very surprising. Further analysis revealed that most of those who died were diagnosed in a late stage of HIV disease. The diagnosis procedure was too complicated and too long, and the services were fragmented—several different agencies located in different places were involved in multiple steps. Scientist and health and public health experts proposed a simplified structural intervention to shorten the period from diagnosis to initiation of ART. The intervention was called the "One4All" strategy. In this strategy, all tests for diagnosis, clinical staging, and ART preparation are performed at the same time, and treatment is initiated immediately for all diagnosed individuals regardless of CD4 count, all in one healthcare setting and all in a very compressed span of time. Scientists have used a before-and-after study design in two demonstration counties to evaluate the 12-month case-fatality rate and found a 62% reduction (Wu et al. 2015). Scientists then used a cluster-randomized controlled trial design to evaluate testing completeness, ART initiation, viral suppression, and mortality. Those who received the One4All intervention experienced 20-fold increased odds of testing completeness within 30 days, three-fold greater odds of ART initiation within 90 days, and a 56% reduction in 12-month mortality

(Wu et al. 2017). This new simplified procedure has immediately been adopted as a new national policy and has been written into the 13th Five-Year Action Plan for Prevention and Treatment of HIV/AIDS in China (2016–2020).

In summary, China has progressed from a position of denial to a position of leadership with respect to its HIV epidemic and response. It has, in a relatively short time, developed and implemented one of the most effective HIV/AIDS control programs in the world. This book documents that remarkable journey.

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Contents

Part I

Epidemiology

Evolution of HIV/AIDS Epidemics in China

1

Yan Cui, Liyan Wang, Jennifer M. McGoogan, and Elizabeth Pisani

Abstract

China is vast, diverse, complex, and dynamic, and its HIV epidemic reflects these features. The surge of political, economic, and social change that came after the founding of the People's Republic of China in 1949 set the stage, and the departure from isolationist policies and movement toward participation in the global economy in the 1970s opened the door. HIV came to China in an outbreak among people who inject drugs in the southwest region in the late 1980s and again in a major outbreak among former commercial plasma donors in the mid-1990s. Over the past 30 years, China's HIV epidemic has expanded to other key populations (e.g., commercial sex workers, men who have sex with men) and all regions. The count of 146 people diagnosed in 1989 has grown to an estimated 1.25 million people as we enter 2019. The epidemic has steadily grown and expanded and has evolved into two parallel epidemics, one heterosexual and the other among men who have sex with men. This chapter documents the evolution of China's HIV epidemics—their general features, epidemiology, and impact.

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1.1 Introduction

After the People's Republic of China was established in 1949, the country and its peoples became isolated. Foreigners and foreign businesses disappeared from urban settings, the education system shut down, and the land was given back to the peasants. Primary health services spread to rural areas, healthy living was actively promoted, and behaviors including drug use, prostitution, and same-sex relationships were considered immoral and were strongly discouraged and, in many cases, criminalized. The development of extremely conservative social mores contributed, for example, to a precipitous decline in sexually transmitted infections (STIs).

When HIV came to the world's attention in the early 1980s, China was in the beginning of yet another period of rapid social and economic change. The nation had adopted an "open door" policy in the late 1970s, welcoming foreign investment, expertise, and tourists. Foreign products appeared in Chinese shops, and foreign businesses entered Chinese markets. Interaction between Chinese nationals and foreigners increased dramatically. When the first few cases of HIV were detected in China—among foreign nationals, Chinese citizens who had returned from abroad, and people who had been treated with imported blood products—the government reacted swiftly. The import of blood products was stopped, travel bans were put in place, and foreigners wishing to reside in China were required to undergo HIV testing. In addition, information campaigns vociferously denounced the risk behaviors known to spread the virus. These campaigns were promoted most actively in the increasingly cosmopolitan cities of the eastern seaboard, where it was thought the risk of people adopting such behaviors was greatest (see Chaps. 17 and 18 for more information).

Initially concentrated among people who inject drugs (PWID) in the southwest (Ma et al. 1990; Wu et al. 2004) and then appearing among former commercial plasma donors (FPD) in rural areas in central China (Wu et al. 1995, 2001, 2008), HIV spread across the land, entered urban centers, and today affects all of China's provinces, prefectures, counties, and districts. The epidemic has evolved over time and has become more generalized and is now driven predominantly by the sexual transmission route—heterosexual sex and, increasingly, sexual contact between men who have sex with men (MSM). Infection by sexual contact now accounts for more than 95% of newly diagnosed cases each year (Wu 2018).

This evolution has been shaped in part by HIV prevention and control programs, which have been successful in limiting the continuing spread of HIV in many of the key populations first affected or threatened by the virus. However, as has been the case in most countries, public health officials and policymakers were not always able to anticipate the course of the epidemic. Thus, while the evolution of the epidemic was influenced by China's response, China's response was also influenced by the evolution of its epidemic.

1.2 The HIV Outbreak Among People Who Inject Drugs

The first domestic outbreak of HIV was detected in 1989 in an extremely remote, rural area of southwestern China's Yunnan province (Ma et al. 1990; Shao et al.

1991; Zhang et al. 1991, 1994). It took Chinese authorities and most other observers by complete surprise. A local public health worker investigating hepatitis C virus (HCV) among PWID in Yunnan province, close to the Myanmar border, found that while 95% of the blood samples she collected tested positive for HCV, a shocking 40% also tested positive for HIV. After an exhaustive investigation by specialists from central government health authorities, 146 cases of HIV infection were confirmed (Pisani and Zhang 2017).

Although opium use had been commonplace in this region for many generations, the drug had traditionally been smoked. Heroin, refined in the so-called Golden Triangle and intended for export to Western markets, began to trickle across the Myanmar border after China began to open its borders to foreign trade. Once the HIV outbreak among PWID was identified in 1989, stored serum samples that had been drawn between 1986 and 1988 for HCV testing were re-tested for HIV. No HIV infection was found, suggesting that HIV had been discovered very soon after it first arrived in China (Zhang et al. 1994; Zhao et al. 1991).

By 1995, the HIV epidemic among PWID remained concentrated in the southwest region, primarily in southwestern Yunnan province (Wu et al. 2004). However, despite efforts to control the heroin trade, HIV spread along corridors established by drug traffickers who were intent on exporting the drug to Hong Kong for onward sale to America or Europe. The geographic expansion of both heroin supply and HIV infection accelerated when improvements in road infrastructure and air travel facilitated the movement of people over previously very difficult terrain. Areas with high concentrations of ethnic minority populations, including the large and sparsely populated northwestern Xinjiang Uygur Autonomous Region (Xinjiang), were disproportionately affected by the increase in heroin use. Thus, just 5 years later in 2000, HIV had already spread to neighboring Sichuan and Guangdong provinces and Guangxi Zhuang Autonomous Region (Guangxi), as well as Xinjiang (Fig. 1.1; Wang et al. 2015).

HIV prevalence among PWID, predominantly male PWID, in these five most-affected provinces peaked in 1999 at 30%, whereas in all other provinces (besides these five), HIV prevalence peaked in 2003 at 5%. However, PWID using heroin were not the only drug users affected. Individuals who used other drugs (e.g., methamphetamine, ketamine) by other means (e.g., smoking) were also becoming infected with HIV. For these non-PWID, (or non-injecting drug users [IDU]) HIV prevalence was also greatest in the five provinces, peaking at 6% in 2005, while always remaining below 1% in all other provinces (Fig. 1.2; Wang et al. 2015).

Risky drug injecting behavior, namely, sharing drug injecting equipment, continued to dominate as the major risk factor for HIV infection in the early years of China's epidemic. This was in part because PWID were more likely to be tested for the virus than anyone else. Testing was beginning to be scaled up in the early 2000s—mandatory HIV testing (MHT) was implemented in closed settings such as compulsory detoxification centers, reeducation-through-labor camps, and reform-through-labor prisons and voluntary counseling and testing (VCT) also began to be offered. However, relatively few cases were found compared to estimates of the true number of cases. Thus, in 2004 Yunnan conducted a 4-month testing campaign during which 425,000 individuals were offered testing, 99% accepted, and 13,500

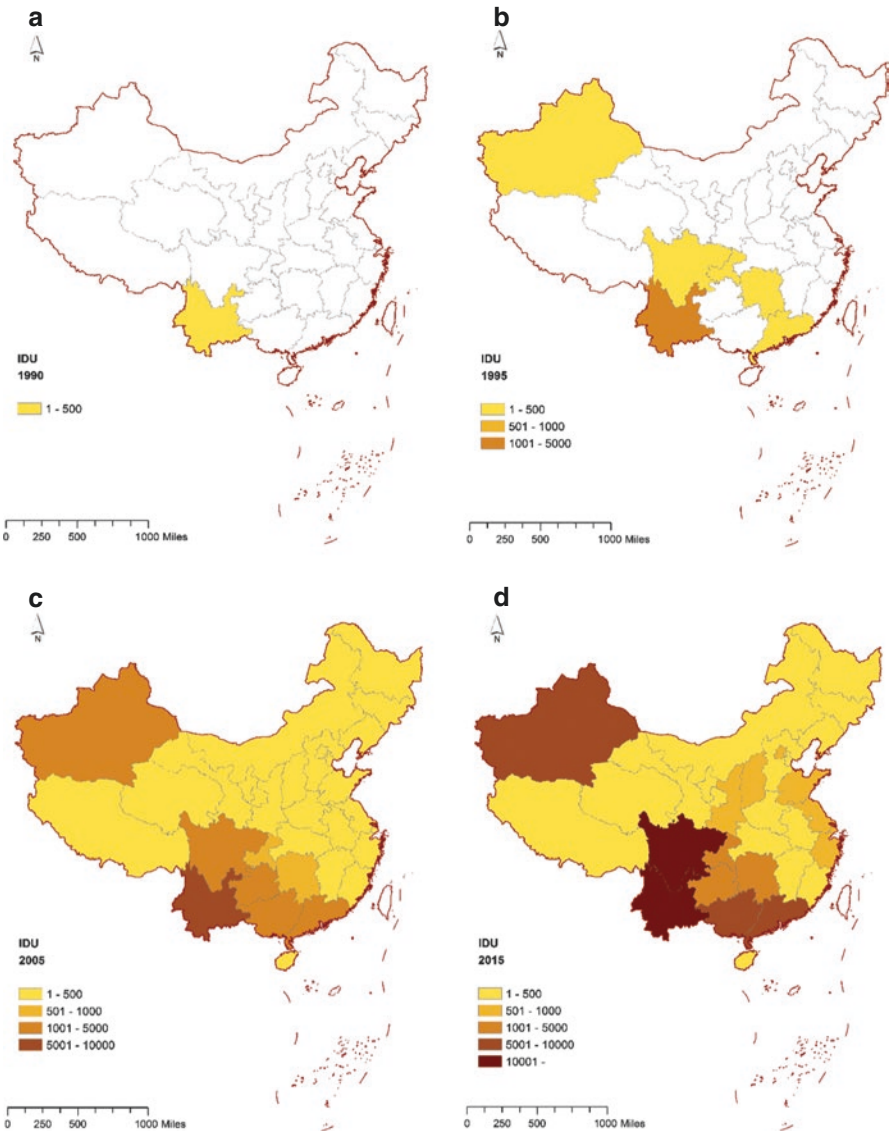

Fig. 1.1 Geographic distribution of the absolute number of HIV/AIDS cases identified among PWID in the years 1990 [panel a], 1995 [panel b], 2005 [panel c], and 2015 [panel d]. Color variation indicates numbers of cases by county. Lines within the map mark province borders

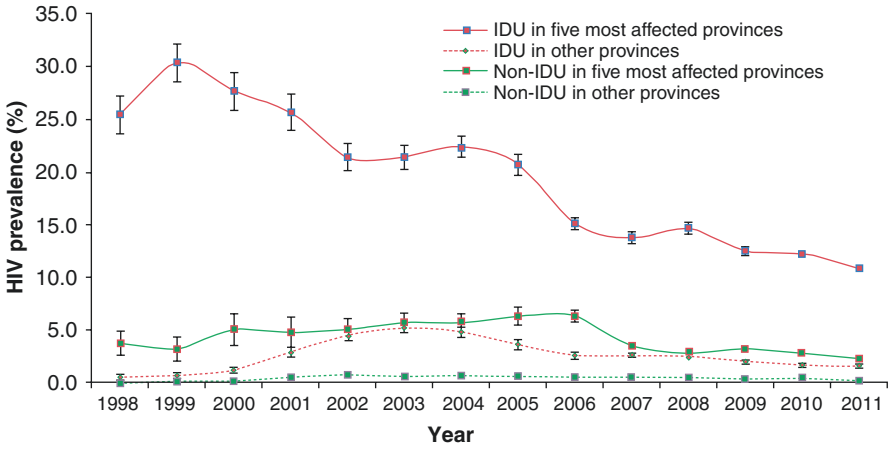

Fig. 1.2 Graph showing changes in HIV prevalence over time for PWID and non-PWID (i.e., people who use drugs by means other than injection) in the five most affected provinces (i.e., Yunnan, Sichuan, Guangdong, Guangxi, and Xinjiang) and all other provinces. Bars for each data point indicate the 95% confidence interval. Data originated from the HIV sentinel surveillance system. Figure adapted with permission from Wang et al. (2015)

new cases of HIV infection were found, many of whom were PWID (see Chap. 12 for more information).

Transmission via unsafe injecting behavior among PWID also drove the early epidemic in part because, for many years, very few PWID had access to services that might help them to reduce the harms associated with their drug-taking behaviors. Harm reduction strategies that are intended to reduce the negative consequences of drug use, in this case HIV infection, include opioid substitution therapies and provision of sterile injecting equipment. Substantial evidence of the effectiveness of these strategies in curtailing the spread of HIV among PWID populations already existed by this time (early 2000s) in other settings. Nevertheless, the idea of giving opioids (i.e., methadone) and needles and syringes to PWID was met with very strong opposition by government officials at all levels, particularly within the Public Security Bureau, and by civil society. Drug use and HIV infection were viewed as scourges and both PWID and people living with HIV (PLWH), and even more so, PWID who also had HIV infection, faced severe stigma and discrimination (see Chaps. 18 and 19 for more information).

Yet, with persistence, research, and eventually small pilot trials, the National Methadone Maintenance Treatment (MMT) Program was launched in 2005, and China's Needle and Syringe Exchange Programs were scaled up the same year (Sullivan and Wu 2007). Today, less than 4% of all individuals newly diagnosed with HIV report having acquired the infection via injecting drug use (National Center for AIDS/STD Control and Prevention 2017) (see Chaps. 9 and 10 for more information).

1.3 HIV Spread Among Plasma Sellers

The economy in China's coastal provinces began to boom in the late 1980s, driven by overseas investment and manufacturing exports. However, China's central provinces did not benefit from this investment. While their economies remained centered on agricultural production, poverty was widespread, and many households began to look for ways to supplement their income.

In the meantime, a brand-new domestic market for blood products emerged in the wake of the central government's ban on foreign imports. High demand and low supply combined with initially very few competitors meant that the domestic blood product business was extremely lucrative. Peasants in the central provinces were thought to be an inexpensive and safe source for plasma because of their conservative cultural values and their remote location. Thus, many plasma collection stations opened all over rural Henan, Anhui, and neighboring provinces. But unfortunately, like in many new industries that spring up quickly, government regulation and oversight lagged (Chaddah and Wu 2017).

When a Shanghai-based blood product company performed a random quality assurance survey in the autumn of 1994, they found that plasma collected from a 41-year-old female donor in Anhui had tested positive for HIV-1 antibodies (Wu et al. 1995). By the spring of 1995, detailed epidemiological investigations had gathered compelling evidence pointing to unsafe plasma collection practices as the means of transmission (Wu et al. 2001, 2008). Furthermore, a molecular and phylogenetic investigation into the HIV virus found among former commercial plasma donors (FPD) discovered that it was the same subtype as had been circulating among the PWID community in southwestern China (Nerurkar et al. 1998). This evidence signaled the high probability that, at some point, one or more infected PWID sold plasma in central China, thereby introducing HIV into the broader blood plasma seller population (Nerurkar et al. 1998).

Epidemiologists investigating HIV transmission among FPD found that many donated with extremely high frequency. This practice was facilitated by personnel at the collection stations—donated blood would be centrifuged on the spot and red blood cells re-injected into donors allowing them to donate again more rapidly. To keep costs down, the blood was centrifuged in batches. This meant that any pathogens in the blood taken from one individual would be mixed into the blood taken from many others and then distributed to the larger group when the pooled red blood cells were divided up and re-injected into the donors. This proved to be a very effective way of spreading HIV (Chaddah and Wu 2017; Wu et al. 2001, 2008).

As soon as this practice and its harmful consequences came to light, central government authorities put in place strict controls on blood collection centers. However, by this time, blood collection had already become an important contributor to the economies of otherwise poor counties, and local officials did not always enforce the new regulations. Moreover, some companies attempted to get around the new regulations by going out to small villages to harvest blood, rather than collect it in collection centers based in the larger district towns. This compounded the difficulty of controlling HIV transmission by unsafe blood plasma collection

practices. Although it was more common for women to sell blood than men, the legacy of a cultural belief that women's blood was, because of menstruation, more "dispensable," onward transmission to sex partners meant that the epidemic in central China quickly acquired the characteristics of a heterosexual epidemic (Chaddah and Wu 2017).

Although local authorities were in some cases slow to respond on a sufficient scale to the outbreak of HIV among FPD in central China in the mid-1990s, some data indicate that the health system actually identified the outbreak fairly early. Blood product company records and retrospective testing of blood samples collected between 1992 and 1994 by public health authorities in the central provinces found no HIV infection prior to late 1994, the same time as infections were first attributed to unsafe plasma collection practices by epidemiologists from the Chinese Academy of Preventive Medicine (renamed the China CDC in 2002).

Nevertheless, the full extent of this tragic outbreak became apparent nearly a decade later, by which time many of those infected had died. In 2004, Henan, one of the worst affected provinces, took the bold step of trying to understand just how many households and individuals had acquired HIV through selling blood. A door-to-door census was conducted to determine how many in each household sold blood in the mid-1990s. Supported by a promise of access to free care and treatment made by China's leaders at the United Nations General Assembly, health workers then offered free HIV testing. Some 280,300 people in Henan province reported having sold blood during the period in question, and 92% of them agreed to take an HIV test. Among the 258,237 people tested, 23,157 were newly diagnosed with HIV infection, for a prevalence of 9.9% (Wu et al. 2006). In just 3 months, Henan identified six times as many infections as had been reported in the province in the preceding 10-year period (Wu et al. 2017).

In subsequent years, seeing that those diagnosed were indeed given free care and support services, many other FPD came forward. HIV prevalence among these "late self-identifiers" was much higher at 16%. A number of other provinces also followed Henan's lead (Wu et al. 2017). A study by Dou et al. (2010) of the spatiotemporal expansion of the HIV epidemic among China's FPD found that the epidemic was strongly focused in Henan province, but did also affect all neighboring provinces as well as, more mildly, a few provinces further afar (Fig. 1.3).

As a part of this same study, estimated dates of infection were calculated for approximately 26,000 FPD with known plasma donation dates. This analysis found that the HIV transmission events in some counties in Henan and northern Anhui actually peaked as early as 1992. Although diagnosis rates and treatment initiation rates were substantial in the 2002–2007 timeframe, the analysis by Dou et al. found that the median time from estimated date of seroconversion to death for these FPD was roughly 13 years. This meant that many of those affected by this outbreak were never identified (Fig. 1.4; Dou et al. 2010).

Overall, some 40,000 HIV cases have been identified among plasma sellers to date, although this number clearly does not capture the tens of thousands who likely died of AIDS in the decade before the mass testing campaigns began. An additional 13,000 HIV cases have been reported among people who received HIV-contaminated

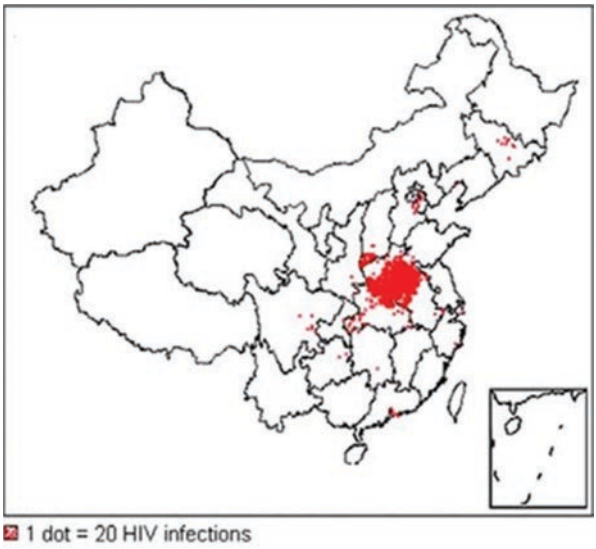

Fig. 1.3 Geographic distribution of the 36,110 HIV/AIDS cases among FPD included in the Dou et al. study (2010). Red dots each denote 20 PLWH. Figure adapted and reproduced with permission (Dou et al. 2010)

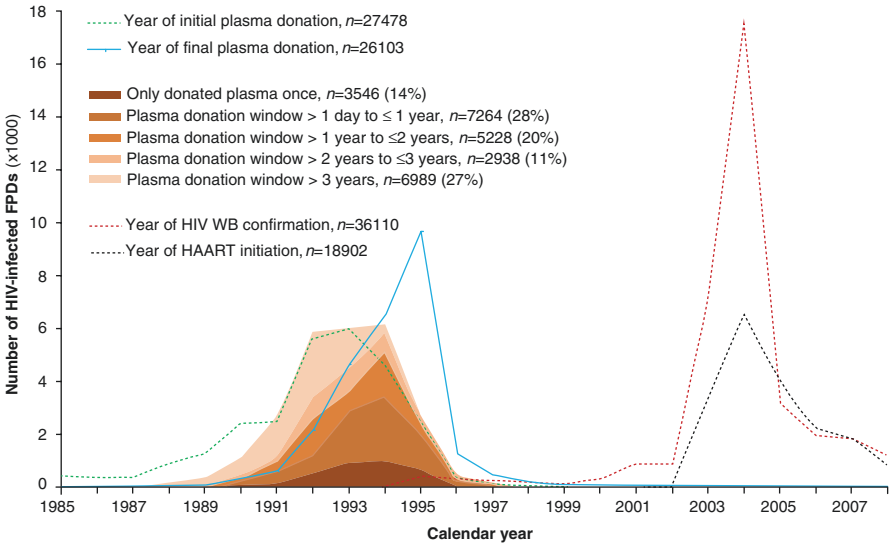

Fig. 1.4 Graph of the distribution of estimated dates of infection among a subset of 26,000 FPD with known plasma donation dates. Graph also shows the temporal distribution of subsequent diagnosis (infection confirmed by Western blot [WB]) and treatment initiation (with highly active antiretroviral therapy [HAART]). Figure reproduced with permission from Dou et al. (2010)

blood products, since it was not until the Blood Donation Law became fully effective in 1998 that stringent screening procedures were universally applied across the country (see Chaps. 6 and 12 for more information).

1.4 Transmission via Heterosexual Contact

In some other Asian nations, most notably Thailand, an HIV epidemic that first surfaced among male PWID was followed very quickly by a rapid increase in HIV prevalence among female sex workers (FSW) and their clients. From the clients of FSW, HIV there has been transmitted onward to their wives or regular female partners. Although this in turn carries the possibility of onward transmission into wider heterosexual networks, this has not been observed in industrialized countries or in many other developing nations. Generally, the wives of men who buy sex do not themselves have other concurrent partners to whom they could pass on HIV.

For the first few decades after the establishment of the People's Republic of China, commercial sex is believed to have been very rare, but by the late 1980s, commercial sex began to reappear, especially in busy border areas where there was a lot of movement of people and goods. These were some of the same areas in which drug use was most common. Some women were not only selling sex but also injecting drugs. Not surprisingly, HIV prevalence among this dual-risk sub-population was relatively high.

However, widespread HIV transmission via heterosexual commercial sex is only possible when the proportion of FSW infected with HIV is relatively high, client turnover is high, and condom use is low. The spread of HIV is further accelerated if the prevalence of other sexually transmitted infections (STIs) is also high, especially if those infections go untreated. None of these conditions are the rule in China. Client turnover among Chinese FSW depends heavily on fees charged and venues worked—it tends to be higher among lower-priced, street-based FSW than among FSW who find their clients in nightclubs or over the Internet. A large majority of the FSW in China is the latter. Condom use also varies with fee, but overall, rates of condom use in commercial sex are extremely high. In addition, there is a very high turnover rate among FSW in China—women report engaging in sex work for a median of just 6 years according to behavioral surveillance data (Chen et al. 2015; Wang et al. 2009).

Together, these factors combine to keep HIV prevalence among FSW in China low. Although HIV prevalence among FSW in areas with historically high rates of drug injection (i.e., Yunnan, Sichuan, Guangdong, Guangxi, and Xinjiang) was four times higher than in other areas of China, FSW in areas with less well-established epidemics were unlikely to be infected with HIV. Only 30 of 509 sentinel surveillance sites—all in the west and southwest—reported HIV rates over 1%, and the aggregate rate of infection in this group was 0.2% nationwide in 2014 (Fig. 1.5; National Health and Family Planning Commission 2015). Some 800,000 FSW in China were also tested for HIV in 2015 in outreach testing programs, and only 2500 new cases were found—a rate of 0.3% (National Center for AIDS/STD

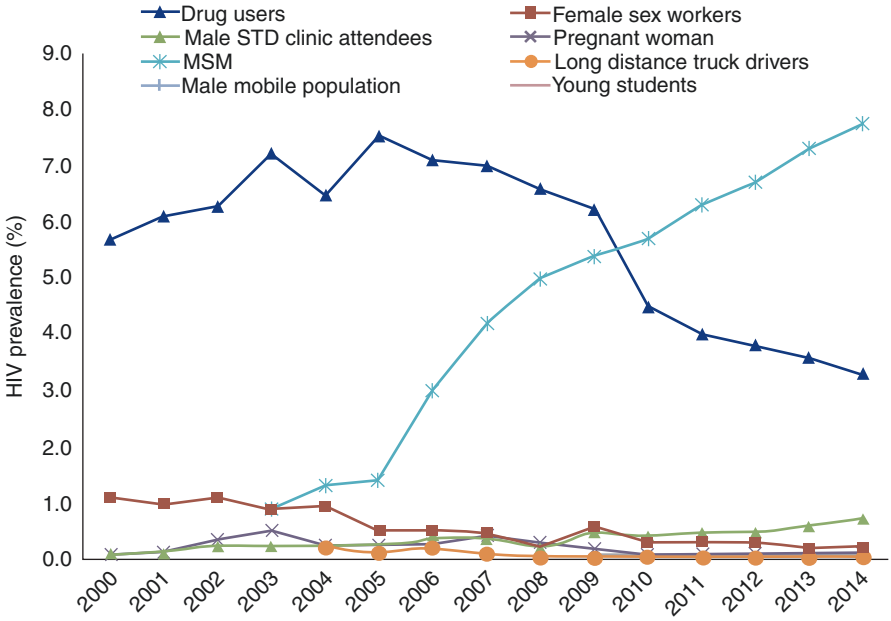

Fig. 1.5 Graph depicting changes in HIV prevalence for different risk groups over time. Figure reproduced with permission from the National Center for AIDS/STD Control and Prevention (2015b)

Control and Prevention 2015b). By comparison, in the most affected areas of Thailand and Cambodia at the height of their epidemics, greater than 30% of FSW tested positive for HIV in sentinel surveillance.

Dire predictions made over a decade ago that HIV would explode through China's sex industry appear not to have been realized. Nevertheless, the extent of the heterosexual HIV epidemic in the country remains a topic of much debate. Other than the commercial sex trade, the most obvious source of heterosexual HIV transmission is sexual contact between individuals with HIV infection (diagnosed or undiagnosed) and individuals without HIV infection (i.e., the spouses or regular partners of PLWH)—in other words, within HIV-discordant couples. Since the mid-2000s, China's public health authorities have worked hard to identify discordant couples. Starting with testing the spouses and partners of FPD and recipients of potentially contaminated blood products who were diagnosed with HIV, public health workers sought to prevent onward transmission of the virus.

Outside of groups known to be at high risk of infection, HIV prevalence among men and women in the general population remains very low in China, even in the worst-affected provinces such as Yunnan. Yet, public health officials remain vigilant. Because China's population is so large, even very low rates of HIV transmission can translate into tens of thousands of men and women becoming infected and in need

of care. However, with the exception of risk reduction in known discordant couples and of course in commercial sex settings, it is rather difficult to effectively target prevention programs to minimize the risk of heterosexual transmission, because sources of potential infection are so diffuse. Thus, the heterosexual contact transmission route has grown year by year, and from 2011 to 2014 it was responsible for two-thirds of new infections diagnosed annually (Fig. 1.6; National Health and Family Planning Commission 2015).

In 2016, 95% of newly diagnosed infections in women and 59% in men were reported to have been acquired through heterosexual contact. Among the women, 25% reported acquiring HIV from their husbands, and surprisingly, 62% reported becoming infected during casual sex (with a non-spouse, non-commercial partner). By contrast, among the men, 53% reported they were infected during commercial sex with a woman while 40% reported they were infected by their girlfriends or casual lovers (Fig. 1.7; National Center for AIDS/STD Control and Prevention 2016). Clearly there is something strange going on as it is difficult to believe that among all men in 2016 who reported heterosexual contact as their route of HIV infection, more than half pointed to FSW as the source of their infection yet the prevalence of HIV among FSW in 2016 was less than 1%. A closer examination of these figures suggests that the proportion of men infected by FSW may be overstated, at least in some areas.

In 2015, between 1.6 and 3.0 million women were estimated to be selling sex in China, and 15,000–27,000 of them were thought to be infected with HIV. Given the lower biological probability of transmission from a woman to a man (compared to from a man to a woman) in a single sexual contact, the likelihood that most FSW known to be infected were on treatment and thus not very infectious, and high background levels of condom use in commercial sex, it is implausible that a high

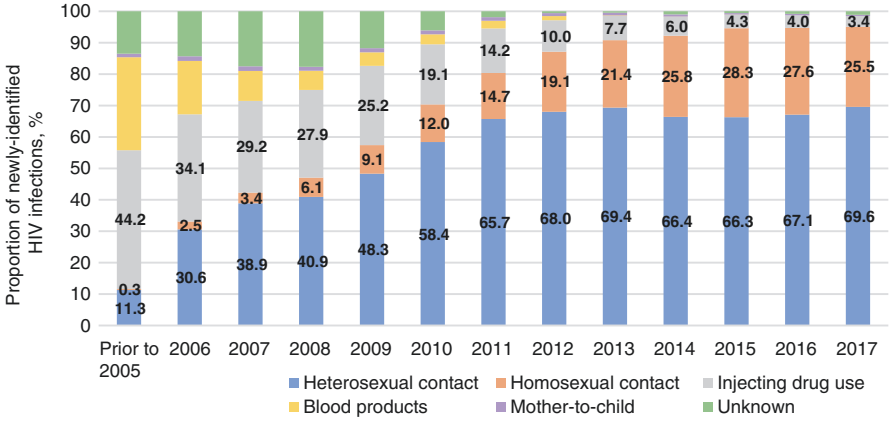

Fig. 1.6 Graph depicting annual changes in the proportion of newly diagnosed HIV cases attributed to different transmission routes. Figure reproduced with permission from the National Health and Family Planning Commission of the People's Republic of China (2015)

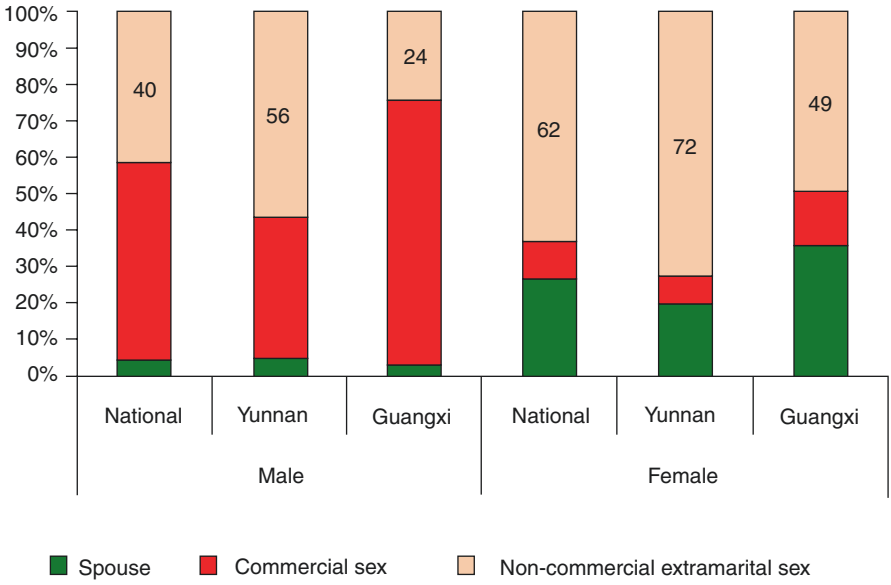

Fig. 1.7 Graph showing the proportion of newly diagnosed male and female PLWH in 2016 who attributed their infection to their spouse, commercial sex partner, or non-commercial extramarital sex partner at the national level, as well as in Yunnan and Guangxi separately (National Center for AIDS/STD Control and Prevention 2016)

transmission rate could occur in contacts between FSW with HIV and their uninfected male clients (even accounting for the fact that many of these infections would have been acquired in years past). Nevertheless, in 2015, 28,000 men newly identified as having HIV said they had been infected by a sex worker. It is actually much more likely that a large proportion of these men were in fact infected as part of the growing homosexually driven epidemic and were deliberately misreporting their transmission route because commercial sex with a woman is less stigmatized than sex in any context between men.

While men who say they acquired HIV from a woman continue to report buying sex as their greatest risk, women now report casual sex as their greatest risk factor for HIV infection, at least at a national level. However, national figures can conceal geographical differences (see, e.g., Fig. 1.7) that underscore the importance of tailoring prevention approaches, aimed at reducing heterosexual transmission rates, to the features of the local community.

The demographics of PLWH who reported heterosexual contact as their route of infection has also been changing over time. For example, a significant rise in new HIV diagnoses among older men has been observed. In 2016, 17% of newly identified HIV cases among men were in the over-60 age group, compared with just 4% in 2005 (National Center for AIDS/STD Control and Prevention 2016). This may be due, at least in part, to increased availability of HIV testing in routine healthcare

settings with which older men typically have more contact than younger men. However, this also raises the possibility that older men are exposing themselves to greater risk of infection, perhaps engaging more commonly in commercial sex as a result of the growing consumption of erectile dysfunction drugs (Tang et al. 2014). Early results from a large cohort study in Guangxi lend credence to this interpretation. Another possibility stems from the observation that most of the men first diagnosed at older ages have more advanced disease, suggesting that they have been living with HIV for a long time. Thus, rather than older men getting infected, perhaps infected men are getting older (see Chap. 7 for more information).

1.5 The Epidemic Among Men Who Have Sex with Men

As effective prevention efforts eliminated HIV infection in the blood product industry, reduced it among PWID, and prevented it from growing to a significant level among FSW, another HIV epidemic was brewing in China—this time among MSM.

Several decades of consistent economic growth in China brought with them increased mobility, urbanization, and education, shrinking family sizes, distortions in the reported sex ratio at birth, and a boom in communications technology. The result has been extraordinary social change. After a period of extreme social conformity to conservative norms, self-expression has become more acceptable and individualism more pronounced, especially among young people in China's big cities.

One way in which China's young people are exercising their newfound freedom of self-expression has been through sex. While homosexuality was not unknown to China, it had been socially proscribed in recent generations, in large part because of the cultural importance of continuing the family line through procreation. After 1949, male-male sexual contact was criminalized and men engaging in such behavior faced severe social stigma and discrimination. As a result, this community retreated underground. Along with the economic and social liberalization of China in the 1980s, Chinese society began to adopt a more tolerant attitude toward homosexual behavior, and it was eventually decriminalized by the end of the decade. Gay bars and other venues began to appear in many of China's largest cities, and by the late 1990s and early 2000s, the MSM community was emerging from the shadows.

A handful of research projects began to conduct HIV and behavioral surveillance among MSM around the same time. Sampling from gay bars and "cruising" spots in Beijing in 2001, one group of researchers found that HIV prevalence among men frequenting these venues was 3.1%—already many times higher than among FSW at the time (Choi et al. 2003). Prevalence of other STIs was also high—20 to 25% of gay men tested in a number of studies were found to have an STI (Zhang and Chu 2005).

One worrying aspect of these early studies of HIV among MSM was the high proportion who reported also having sex with women. Indeed, many were married, especially those who were older. This added another possible source of heterosexual infections. Public health authorities established the first sentinel surveillance site among MSM in 2001 and then rapidly scaled up surveillance among this key population as the male-male sexual contact route of HIV transmission became

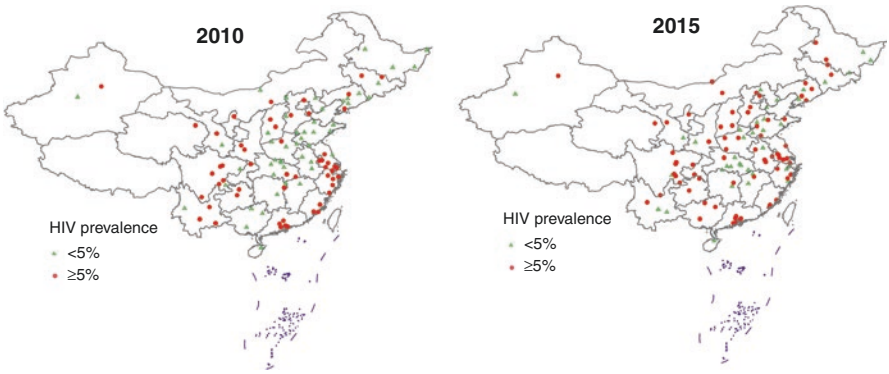

Fig. 1.8 Geographic distribution of MSM surveillance sites. Red circles mark sites that reported 0–4% HIV prevalence, and green triangles mark sites that reported 5% HIV prevalence or higher (National Center for AIDS/STD Control and Prevention 2015a). Publisher's note: Springer Nature remains neutral with regard to jurisdictional claims in published maps

increasingly important. In 2010, a total of 53 of the 102 HIV sentinel surveillance sites among MSM reported HIV prevalence of 5% or higher. By 2015, 71 of 107 sites reported 5% or higher (Fig. 1.8; National Center for AIDS/STD Control and Prevention 2015a) (see Chap. 2 for more information).

There is no doubt that the potential for transmission among this population was greatly increased by timing. By the time HIV established itself among MSM in China, HIV treatment was already widely available. Unlike MSM in Western countries, and unlike PWID in southwestern China or FPD in central China, MSM in China's urban centers had ready access to testing, counseling, treatment, and care from the very beginning. This meant that the prevention strategies developed for MSM communities in other settings in the pre-treatment era were less relevant. Importantly also, they were less feasible—the physical venues of the past generation had been replaced by virtual venues, online platforms, chatrooms and dating sites, and social media environments with geospatial capability that instantaneously connected individuals to complex networks of thousands of potential sex partners. This all on a background of persistent stigma and discrimination as well as pressures from relatives to marry and carry on the family name meant that prevention efforts among MSM were challenging.

The HIV epidemic among MSM in China differed from prior waves of infection in several ways. High prevalence "hot-spots" in PWID and FSW risk populations that have more established epidemics have not spread either geographically or numerically. Indeed, the proportion of sites measuring especially high levels of HIV prevalence has fallen for both of those populations over time. For PWID, 24% of surveillance sites reported HIV prevalence of 5% or greater in 2010, while in 2015, that proportion had declined to 19%. Similarly, for FSW, the proportion of sites reporting 5% prevalence or higher reduced from 8% in 2010 to 6% in 2018 (Fig. 1.9). By contrast, 52% of surveillance sites for MSM in 2010 reported HIV prevalence at 5% or above and 66% in 2015 (Fig. 1.8).

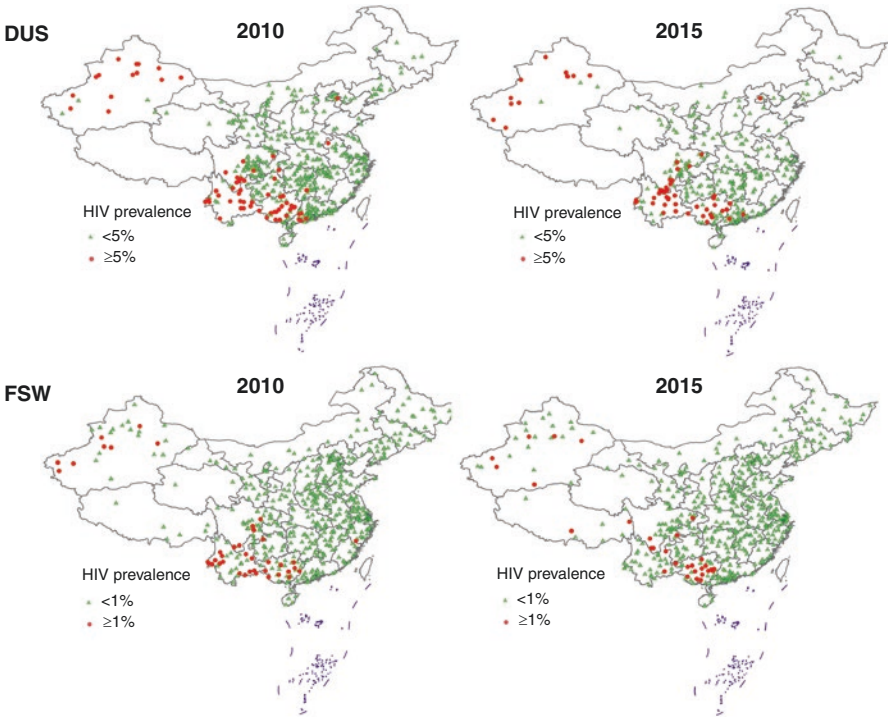

Fig. 1.9 Geographic distribution of PWID [top panel] and FSW [bottom panel] surveillance sites. Red circles mark sites that reported 0–4% prevalence, and green triangles mark sites that reported 5% prevalence or higher (National Center for AIDS/STD Control and Prevention 2010, 2015a)

The rapid growth in the HIV epidemic among MSM is also easily observable in the proportions of newly diagnosed infections attributed to the different transmission routes annually. At the national level, HIV prevalence among MSM (i.e., only those who reported acquiring HIV via male-male sexual contact) has risen from approximately 1% in 2003 to 5% in 2008, to 7% in 2013, and to 8% in 2015 (Fig. 1.5). Keeping in mind the likelihood that infection via the male-male sexual contact route is underreported, this is a very rapid rise in national-level prevalence. However, just like for PWID and FSW, MSM are also concentrated geographically and national-level prevalence figures tend to hide the true nature of the epidemic.

MSM were already known to be predominantly urban from the very beginning of the MSM HIV epidemic. Thus, not surprisingly, a pattern of much higher HIV prevalence in many of China's urban centers was already clearly observable as early as 2008, when a 61-city cross-sectional survey was conducted among MSM to measure HIV and syphilis prevalence in this population and to examine its geographical distribution. More than 47,000 MSM participated. An overall 5% prevalence of HIV and 12% prevalence of syphilis were found. However, in looking at the individual city level within these data, it appears the epidemic among MSM has expanded much faster than among PWID and FSW. For example, HIV prevalence

was measured at 10% or greater in several cities (i.e., Chengdu at 10%, Kunming at 11%, Chongqing at 17%, Guiyang at 18%, and Zunyi at 19%; Wu et al. 2013).

In this 2008–2009 study, researchers also observed the very young age of those identified as having HIV infection—among the 47,000, 43% were aged 18–24 years (Wu et al. 2013). In 2016, fully 53% of HIV infections newly identified among MSM in China were among men aged 15–29 years (National Center for AIDS/STD Control and Prevention 2016). These figures probably also reflect selective misreporting of risk since same-sex behavior is dramatically more acceptable among younger Chinese citizens than it is among those who are middle-aged or older adults. Many newly diagnosed infections each year among MSM 30 years of age or older are hidden among the numbers attributed to heterosexual transmission.

Further evidence that male-male sexual contact is spreading HIV among young people in China comes from case reports among students aged 15–24. Newly diagnosed HIV infections among female students remained rare throughout that time, never exceeding 70 infections in a year. This suggests that the heterosexual epidemic is not growing substantially among the cohort most likely to be engaging in non-marital, non-commercial sex. Among male students, however, infections were more than 30 times higher, and they tripled in just that 4-year period. The proportion of those men admitting to being infected via male-male sexual contact rose from 75% in 2011 to 85% in 2016 (Fig. 1.10; National Center for AIDS/STD Control and Prevention 2016).

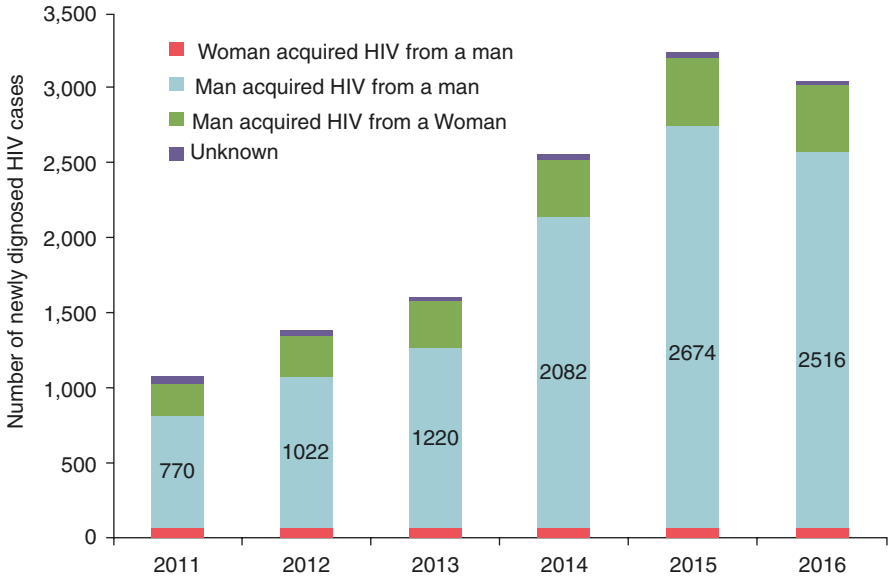

Fig. 1.10 Annual number of HIV cases newly diagnosed among students aged 15–24 years in China, 2011–2015, by reported mode of sexual transmission (National Center for AIDS/STD Control and Prevention 2016)

As attention turns increasingly to MSM and other socially marginalized groups, evidence is beginning to emerge that a small community of transgender women may also be at high risk for HIV. Very little is known about the size of this population in China or their level of risk for HIV or other types of ill-health. Research is underway to better understand how to meet the needs of this population, which is likely to be underserved currently (see Chap. 8 for more information).

1.6 HIV Transmission from Mother to Child

HIV infections among children in China were thought to have been rare, confined largely to provinces with the most well-established epidemics. Low fertility, particularly among women who suffered high levels of STI co-infection or who were known to be infected with HIV, limited the potential exposure of infants. However, data on HIV infection among pregnant women and infants were sparse until a national program for the prevention of mother-to-child transmission (PMTCT) was launched in 2005.

Very high rates of HIV testing among pregnant women—90.3% in 2011—and high uptake of preventative antiretroviral therapy (ART) among HIV-positive women who choose to carry their pregnancies to term have led to very low levels of ongoing transmission of HIV to infants in China (Zeng et al. 2016). Only 200–300 cases are reported each year (National Center for AIDS/STD Control and Prevention 2016). A recent detailed investigation of newly reported pediatric infections found that in approximately 60% of these cases, the mother's HIV status was not known at the time of birth, suggesting that these women were among the minority of pregnant women not currently reached by HIV prevention services (see Chap. 15 for more information).

1.7 The Current Epidemiology of HIV in China: Parallel Epidemics

Nearly three decades after the first domestic outbreak of HIV was identified among PWID in China, the country has managed to overcome some of the major sources of HIV transmission common in the early years. Blood collection practices, responsible for a very significant outbreak of HIV infection in rural areas in the mid-1990s, no longer contribute in any significant way to HIV transmission, while drug injection, formerly the major driver for the epidemic, has diminished greatly in importance even in the western and southwestern regions, largely due to the massive scale-up of harm reduction services. Over the past three decades, the HIV epidemic transmission mode has completely evolved from exclusively injecting drug use in the early 1990s to now almost exclusive sexual transmission. It has spread from a tiny southwestern corner of rural China to now throughout the whole country (Fig. 1.11).

The epidemic as a whole was still very geographically concentrated as of the end of 2016 (Fig. 1.12), and as of the end of 2017, China had an estimated 960,000

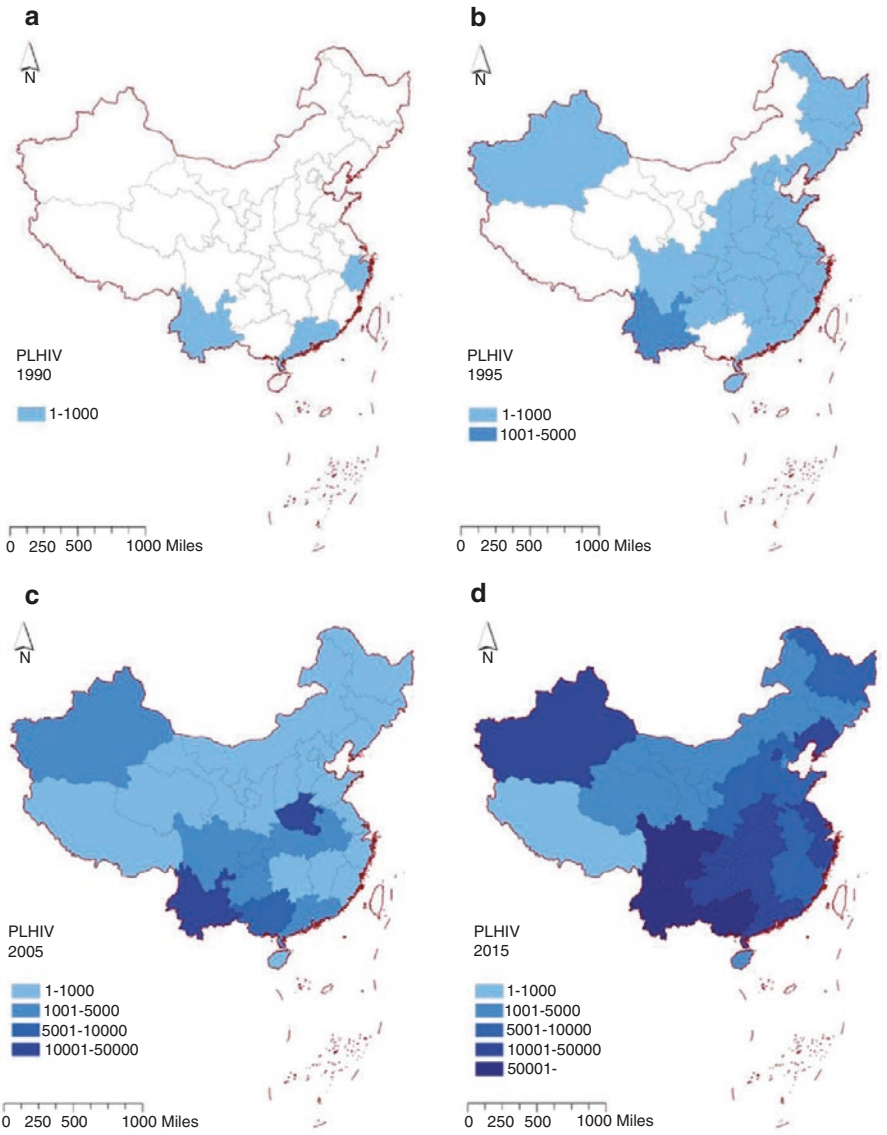

Fig. 1.11 Geographical distribution of all PLWH in China in 1990 [panel a], 1995 [panel b], 2005 [panel c], and 2015 [panel d] (National Center for AIDS/STD Control and Prevention 2015a, b)

PLWH, 71% of whom had been diagnosed. However, the country is now experiencing two parallel but largely separate epidemics. Both are the result of sexual transmission, which now accounts for more than 95% of all newly reported HIV cases in China. However, the two epidemics—one heterosexual and the other among MSM—are very different in nature.

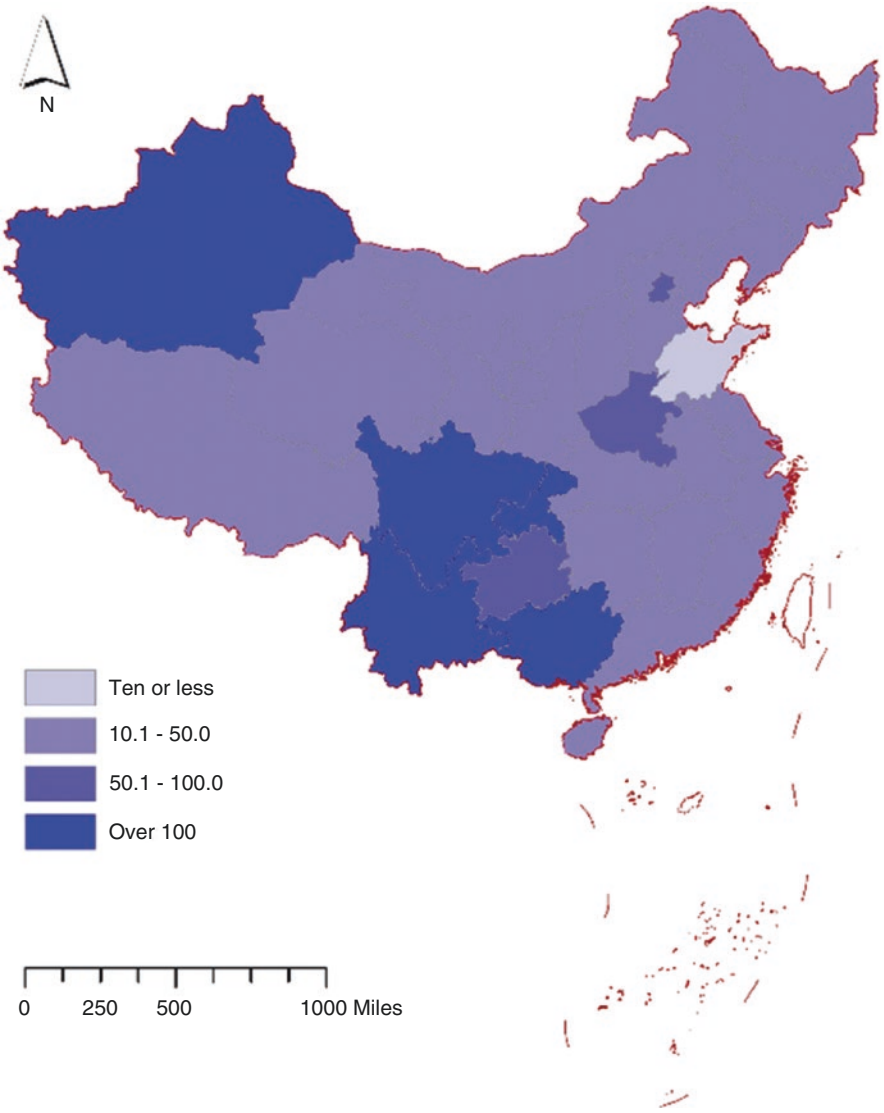

Fig. 1.12 Geographical distribution of all PLWH in China as of the end of 2016 (National Center for AIDS/STD Control and Prevention 2016)

Thanks to China's enormous population, very low infection rates can still translate into large numbers. Numerically, the heterosexual epidemic is the larger, but sentinel surveillance data show that the HIV epidemic among MSM is far more severe. While the heterosexual epidemic is growing slowly and steadily among middle-aged and older people in the poorer rural areas of China's southern and southwestern regions, the MSM epidemic is characterized by rapidly accelerating

expansion among young people in China's urban centers, particularly those with populations over five million.

With the constant evolution of China's HIV epidemics and the continual adaptation of China's HIV response efforts, both always influencing each other, it is not possible to predict the future of HIV in China with any confidence. However, if the recent pattern of pragmatic and evidence-based policy implementation is maintained, it is likely that the country will rise to each new challenge and eventually achieve control of the overall national HIV epidemic. The following chapters document China's difficult road toward developing, implementing, scaling, and improving its comprehensive national HIV response.

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The National HIV Surveillance Program

2

Yan Cui, Dongmin Li, and Elizabeth Pisani

Abstract

Early in China's HIV epidemic, officials and health authorities relied solely on case reporting to monitor the epidemic. However, since a majority of cases were diagnosed very late, the information case reporting provided was outdated and had limited utility. Thus, in 1995, the Chinese Center for Disease Control and Prevention was tasked with developing a network of sentinel surveillance sites to improve epidemic monitoring. Over time, this network evolved and expanded and today, it encompasses integrated sentinel and behavioral surveillance with nationwide coverage among 12 high-risk populations. Methods have been improved and refined over time, surveillance for antiretroviral drug resistance has been added, and substantial work in developing estimates of risk group population size has further helped to improve the quality of the information provided by what has become China's National HIV Surveillance Program.

2.1 Introduction

Like most other countries, China began tracking the HIV epidemic first through AIDS case reporting and then, when HIV testing became available, through HIV case reporting. However, in the early years of the epidemic, HIV cases were rarely identified until a patient presented with an AIDS-defining illness, often many years after they first acquired the virus. This meant that case reporting data tended to paint

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a picture that was many years out of date—it was of little use in tracking the current evolution of the epidemic and led to many lost opportunities for preventing onward transmission of HIV.

Case reporting also caused public confusion. China's public health authorities worked with academics and other specialists to develop estimates, using rigorous methods, of the number of people living with HIV (PLWH) in the country. These figures differed very substantially from the numbers of PLWH from case reports that were regularly released to the media. For example, when the State Council's AIDS Working Group published China's first long-term plan in 1998, it included an estimate of the number of Chinese citizens who had HIV infection—a shocking 300,000 as of the end of 1997 and a very worrisome 1.2 million predicted by the end of 2000 if the epidemic kept growing at its current rate. Yet, as the year 2000 came to a close, the number of confirmed, registered HIV cases was only 20,711 (State Council AIDS Working Group Committee Office and United Nations Theme Group on HIV/AIDS in China 2003; Pisani and Wu 2017). Both the estimated and the reported figures came from official sources, but many people had trouble distinguishing between the two, leading some to wonder if the lower figure (reported cases) was a deliberate understatement of the HIV problem.

Recognizing the inadequacy of HIV case reporting as a means of tracking the epidemic, the World Health Organization (WHO) in the mid-1990s began to encourage countries to set up HIV sentinel surveillance systems. In theory, sentinel surveillance used leftover blood taken for other purposes from defined subpopulations likely to be at risk for HIV. After stripping the samples of all identifiers other than age and sex, the blood samples are tested for HIV, a method similar to that used to identify the first domestic outbreak of HIV in China through the screening of samples leftover from hepatitis C virus (HCV) testing. Sentinel surveillance does not allow for the identification of individual cases, but it does provide a measure of HIV prevalence in a given population. As long as the population included in sentinel surveillance represents some larger population in known and unchanging ways, the data can be used to track trends in prevalence over time quite reliably.

This method of sentinel surveillance relies on having blood samples available for testing. When WHO began promoting the use of sentinel surveillance to track HIV in lower income settings, it was concerned principally with understanding the evolution of HIV in sub-Saharan Africa, where the epidemic appeared to be spreading widely between men and women via non-commercial sexual contact. In these settings, where contraceptive use was low and fertility was high, pregnant women attending antenatal services and giving blood for syphilis testing provided an adequate proxy for the "at-risk" population. In Asia, however, the situation was different. The groups of people most likely to be at risk were people who inject drugs (PWID), most of whom were men, as well as female sex workers (FSW) and their clients. These were harder groups to include in surveillance, because blood samples were not often taken from them for other purposes.

2.2 Early Sentinel Surveillance in China

In most of China, drug users in detention or attending voluntary or compulsory detoxification centers would have their blood drawn for opioid testing. For FSW and their clients, patients attending sexually transmitted infection (STI) clinics might serve as a rough proxy of those at highest risk, but the data would certainly be somewhat biased. Those who consistently used condoms during commercial sex would probably be excluded from the denominator because they would not contract STIs. Moreover, FSW tended to avoid STI clinics, generally preferring to self-treat. Chinese authorities thus decided that for some key groups, blood would be collected for the express purpose of HIV surveillance (Table 2.1).

The Chinese Center for Disease Control and Prevention (China CDC) began to support sentinel surveillance in 1995, including through the development of national guidelines for implementing sentinel surveillance (Lin et al. 2012; National Center for AIDS/STD Control and Prevention 2009; Sun et al. 2007). In practice, there was considerable heterogeneity in China's HIV surveillance system for many years.

Case reporting continued in parallel with the development of sentinel surveillance, which itself also proceeded unevenly. Badly affected provinces, led by Yunnan, developed quite comprehensive provincial surveillance systems, covering many or all key groups (Table 2.1). In other provinces, only the very highest risk groups (principally drug users) were included and then only if central support was available. Despite the existence of national guidelines, including the minimum number of participants per round, surveillance protocols varied according to local conditions and resources. In areas where risk behavior was particularly hidden, for example, public health officials found it difficult to find enough individuals to meet prescribed sample sizes. Where prevalence was very low, sentinel surveillance samples of between 200 and 400 individuals (depending on the risk population) very often resulted in no positive results. The apparently "zero" prevalence finding was clearly at odds with case reports and what was known about risk behavior in the area. In some cases, this issue created challenges for local epidemic prevention stations in obtaining the resources they needed.

Table 2.1 Populations and sources of blood samples in the early days of sentinel surveillance in China

Risk population	Sample use	Setting
Drug users	Opioid and hepatitis testing	Detoxification centers
Female sex workers	HIV surveillance	Reeducation-through-labor camps
Pregnant women	Antenatal syphilis testing	Antenatal clinics
STI clinic patients	STI screening and treatment	STI clinics
Long-distance truck drivers	HIV surveillance	Communities
Military recruits	General health check	Military barracks

2.3 Toward Second-Generation Surveillance

As China was developing its sentinel surveillance system, WHO and the Joint United Nations Programme on HIV/AIDS (UNAIDS) were further refining their own recommendations. Sentinel surveillance certainly gave a better picture of the evolving epidemic than AIDS or even HIV case reporting did. However, it still represented only HIV prevention failures. As HIV prevention efforts became more sophisticated and better targeted, surveillance experts began to recommend tracking not only HIV infection itself but also the risk behaviors that preceded and subsequently spread infections.

Together with international partners, epidemic prevention stations in relatively high HIV prevalence areas began to add behavioral sentinel surveillance to their other surveillance activities. The first groups to be widely included in behavioral surveillance were FSW and groups of men, including long-distance truck drivers and migrant workers, groups thought to include significant numbers of clients of FSW. As experience grew, other groups such as PWID and—eventually—men who have sex with men (MSM) were added to the populations included in behavioral surveillance. The National Center for AIDS/STD Control and Prevention (NCAIDS), a division of the China CDC, developed guidelines for behavioral surveillance to accompany those for HIV sentinel surveillance, and from 2004, national behavioral surveillance sites were included within the surveillance system (Wang and Wang 2010).

At first, behavioral surveillance was performed separately from HIV surveillance, in part because samples for sero-surveillance were, at least in theory, drawn from existing sources such as STI screening and treatment services. In practice, however, this was rarely the case for the highest risk groups (Table 2.1). FSW and male groups at high risk were in fact approached specifically for the purpose of HIV surveillance. Cultural norms prevalent in China ensured that refusal rates were typically low. Local health staff, on whom the task of surveillance fell, pointed out that sampling the population twice, once for serological surveillance and a second time for behavioral surveillance, represented a significant duplication of effort, while also increasing the time burden and disruption factor for the communities from whom data were collected.

In 2007, the decision was taken to integrate the two systems so that serological samples and behavioral data were collected from the same individuals at the same time. The ability to link behavioral and serological results from the same individuals presented interesting opportunities to identify areas of highest risk for onward transmission. However, human resource restrictions mean that these opportunities have not yet been fully realized.

Over the first decade of sentinel surveillance in China, most sites were still operated by provincial or local authorities, and there was significant heterogeneity in the system. Surveillance sites were not always included consistently, with both sample populations and locations sometimes varying from year to year. This made it difficult to track trends over time—the very purpose of sentinel surveillance was thus undermined. To counter this, NCAIDS began to support a growing number of sentinel sites designated as “national” sites (Table 2.2; Sun et al. 2007; Lin et al. 2012).

Table 2.2 Number of HIV sentinel surveillance sites in China's national system by risk population since 1995

Population	1995–1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010–
Drug users	8	13	19	19	25	25	37	49	62	77	97	97	94	124	303
MSM							1	1	1	3	4	4	4	18	108
FSW	13	17	22	21	25	25	35	43	52	66	82	82	74	161	520
Male STI clinic attendees	17	22	37	36	39	39	63	72	91	120	145	145	138	145	370
Pregnant women		1	1	1	4	4	13	18	26	37	34	34	36	82	376
Long-distance truck drivers	4	7	7	7	8	8	9	11	21	25	25	25	23	34	58
Mobile population														5	87
Young students														14	66
Former blood plasma donors			12	12											
Clients of FSW										1	3	3	2	8	
Tuberculosis patients											3	3	4	4	
Premarital exam attendees														5	
Total	42	60	98	96	101	101	158	194	253	329	393	393	375	600	1888

The growing number of national sites meant that more like-for-like data were available to allow for reliable comparison of trends over time. However, the provincial sites also provided information that was useful to central authorities as they planned and refined the national response. In January 2006, NCAIDS therefore brought together sentinel surveillance data from 388 national HIV sentinel sites, 370 provincial HIV sentinel sites, and 87 sentinel sites supported by a bilateral cooperation with the US Global AIDS Program into a single database for analysis. In part to ensure that data were sufficiently comparable to allow for this integrated analysis, additional support was provided to provincial sites. Sampling procedures, specimen handling, and quality control standards were all reinforced.

2.4 Adapting to Meet Evolving Needs

In 2009, NCAIDS undertook a careful evaluation of the existing system, including geographical coverage, representativeness, and capacity constraints (Cui et al. 2016; Lin et al. 2012; National Center for AIDS/STD Control and Prevention 2010). It was decided that the core provincial and national sites should be integrated into a single national system. Those sites have remained very consistent since 2010, with over 1800 nationwide (Table 2.2; Cui et al. 2016; Lin et al. 2012; Wang et al. 2013). The largest numbers of sites are still among groups that were the traditional focus of HIV surveillance, key populations, such as FSW, male STI patients, drug users, and pregnant women. Together, these account for 83% of all sites, with over a quarter of the total measuring HIV prevalence among FSW alone. All sites measure syphilis prevalence as well as HIV.

A notable change in the system is the addition of sites measuring HIV prevalence among MSM. From just one national sentinel site in 2002, the number of sites measuring prevalence in this group swelled to over 300 by 2010, in keeping with the increasing importance of male-male sexual contact as a key driver of the current HIV epidemic in China. This change also led to changes in operational practice. For all other groups, serological and behavioral surveillance were implemented almost entirely by staff of the local epidemic prevention stations. Outreach to MSM at first proved daunting to government staff, so collaborations with community groups serving the interests of MSM were developed. These collaborations around surveillance have also built trust and allowed for closer coordination of prevention services. A further change to the system was the addition, beginning in 2010, of 87 sentinel sites measuring HCV prevalence in five high-risk populations.

The expanded national system is supported by strong quality assurance systems. NCAIDS staff conduct annual training on the use of national surveillance protocols to provincial colleagues. Standardized quality assurance protocols are followed by local and provincial authorities at the sites where data are collected. After that, a small team of specialists from the central level travels to each province to review data and procedures and to provide advice and support for adjustments as necessary. The issues that most commonly arise relate to difficulties in meeting the sample size required by national protocols. This is especially the case where local public security

forces have undertaken a crackdown on commercial sex or drug use or in places of entertainment associated with high-risk behavior. Sites that do not meet the necessary sample size are not included in trend analysis, and in the rare case of a site consistently failing to recruit sufficient participants, it is removed from the sample frame permanently.

2.5 Interpreting Sentinel Surveillance Results

The interpretation of HIV prevalence trends is not entirely straightforward. Firstly, sites were not fully comparable until 2010. Prior to that, the number of national sites for each of these populations expanded unevenly. In general, such an expansion tends to lead to a lowering of aggregate HIV prevalence, because sentinel surveillance systems usually establish sites in epidemic "hot spots" first, expanding only gradually to other sites, which are often lower prevalence. This factor may account in part for the apparent gradual decline in infection rates among some populations in the years prior to 2010. It is especially worrying to see no sign of this effect among MSM despite the rapid expansion of sites. This suggests that HIV prevalence in this group may indeed be rising at a similar pace in cities nationwide (Fig. 2.1).

Trends observed since 2010, when the current national sites were fixed, should not suffer from this bias and should therefore be more representative of real changes over time. These trends include a striking fall in HIV prevalence among drug users (including those who use non-injectable drugs) and a sharp rise among MSM.

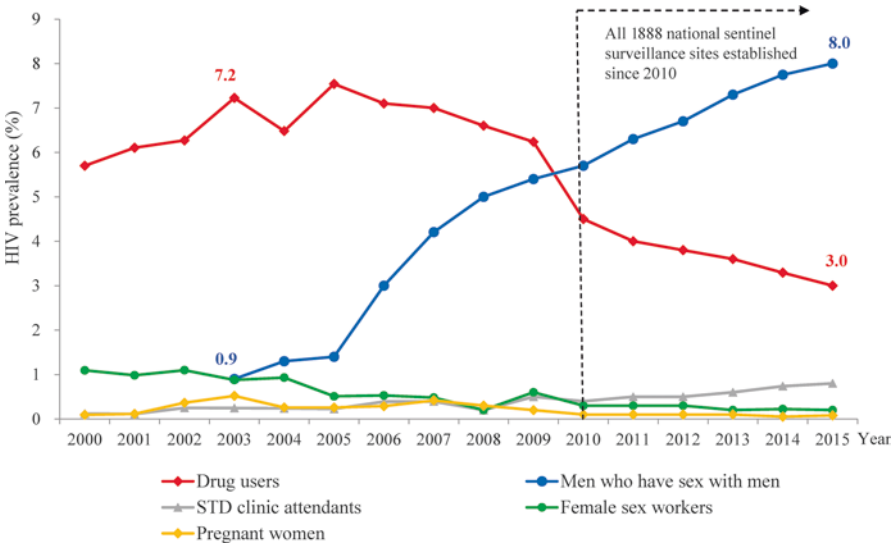

Fig. 2.1 HIV prevalence in five major risk groups, measured in all national sentinel surveillance sites, 2000–2015. Note that sites are only fully comparable from 2010 (Cui et al. 2016; National Center for AIDS/STD Control and Prevention 2015a)

Behavioral surveillance data suggest that the reduction in HIV prevalence among PWID results from a combination of two factors: a reduction in the proportion of drug users who are injecting drugs (from 60% to 42% between 2010 and 2015) as well as falling needle sharing behavior between those who do inject. The proportion of PWID who reported in sentinel surveillance that they had shared a needle at any time during the previous month plummeted from 19% in 2009 to just 3% in 2015 (National Center for AIDS/STD Control and Prevention 2009, 2015a). However, some caution should be exercised when interpreting this encouraging trend because it is especially sensitive to variations in sampling (as indeed is the falling trend in injecting among all drug users).

National protocols allow for drug users to be recruited for sentinel surveillance in several locations: detoxification centers, methadone maintenance treatment (MMT) clinics, needle exchange services, and the community. These each influence some key indicators. For example, recruiting at needle exchange program sites will certainly lead to more reports of recent injection behavior than recruiting in detoxification centers. Where the proportion recruited from each varies over time, this may affect the correct interpretation of trends. In 2015, for example, two-thirds of drug users included in sentinel surveillance were recruited at detoxification centers, with a further 8% recruited at MMT clinics (National Center for AIDS/STD Control and Prevention 2015a). The remaining 26% were recruited in the community and from needle exchange programs. If a high proportion of currently injecting PWID are recruited at needle exchange program sites, their needle sharing practices may be very different than those PWID who do not access such programs, leading to an underestimate of the risk of exposure to HIV and HCV in this group.

There are also interesting trends observable in two other populations—FSW and male STI clinic attendees. While HIV prevalence among FSW has remained very low, drifting downward from 0.3% in 2010 to 0.2% in 2015, HIV prevalence among male STI clinic attendees has doubled over the same period, from 0.4% to 0.8% (Cui et al. 2016; National Center for AIDS/STD Control and Prevention 2015a). One interpretation is that the population attending the STI clinics now includes a larger proportion of MSM. Behavioral data show that knowledge about HIV transmission, uptake of HIV prevention services, and condom use during anal sex have barely changed among MSM between 2010 and 2015, yet significantly higher HIV prevalence among MSM has been observed (Fig. 2.1). Syphilis surveillance shows that prevalence of this curable STI has fallen over the period among those same MSM, from 9% to 6%. This may be because more MSM are accessing STI clinics and getting their infections treated and cured. If some of these treatments take place at clinics that are HIV sentinel sites, this could account for both the drop in syphilis infection among MSM and the rise in HIV prevalence among male STI clinic patients.

One other important change that materially affects the interpretation of HIV sentinel surveillance results is the extremely wide availability and active promotion of HIV testing. After free HIV testing and treatment was made available in China under the “Four Frees and One Care” policy, the ethics of sentinel surveillance were actively debated in China. Although the WHO continued to recommend unlinked, anonymous surveillance using leftover samples taken for other purposes, this was

difficult to achieve for populations who were not already accessing services and for whom no samples were available. Some experts argued that people should be able to get the results of any tests that are performed for surveillance purposes, allowing them to access treatment services if necessary (see Chaps. 19 and 26 for more information).

China has adopted a "middle road" in this regard. National protocols still allow for anonymous testing, but participants included in surveillance efforts are now offered access to their test results if they wish. For those that choose to receive results, extra blood is drawn at the time of surveillance for confirmatory western blot testing, if necessary. The tests are thus voluntary, and confidential, but clearly not anonymous. These changes have taken place in parallel with a significant increase in testing services, including through outreach to high-risk groups. Together, these developments mean that an increasing proportion of infected people know their status (see Chap. 12 for more information).

Since consent is sought for participation in sentinel surveillance for those groups for whom no samples are available, those who have tested HIV positive in the past may be more reluctant to agree to have blood taken for surveillance, either for fear of discrimination or simply because they know their status and see no value in repeat testing. If people who know or suspect they are infected selectively refuse to participate in sentinel surveillance, it would mean that the method does not provide an accurate picture of population prevalence. Depending on the magnitude of this bias, it is possible that the proportion of people testing HIV positive in sentinel surveillance becomes closer to a measure of incidence (new infections), rather than prevalence (existing infections). However, little is known about reasons for refusal, or even how common it is—refusal rates are not systematically reported to the central level.

The great scale-up of service provision in China also calls into question the utility of ongoing sentinel surveillance among pregnant women. At present, 376 sites nationwide report HIV prevalence among a sample of 400 pregnant women who present to antenatal services during the designated surveillance period. However, the near universal coverage of services to prevent HIV transmission from mother to infant means that HIV prevalence data are available for a far larger sample—some 19 million pregnant women were screened for HIV in China in 2015, roughly 80% of known pregnancies nationwide (National Center for AIDS/STD Control and Prevention 2015a). This larger sample obviously gives a far more accurate measure of HIV prevalence in this population than the sentinel surveillance sites can provide. While the reporting of sentinel results in this population requires little in the way of additional resources, it also adds very little in terms of understanding the spread of HIV in China. The continued inclusion of pregnant women in sentinel surveillance is currently under discussion.

2.6 The Added Value of Behavioral Surveillance

Behavioral surveillance was added in part to help those planning and evaluating prevention programs to understand whether the programs were succeeding and which additional areas remain in need of attention and further effort. They

revealed significant differences in the reach of prevention programs among different populations.

China's epidemic prevention stations have been engaged in active outreach among FSW since 2005, so it was expected that this sub-population has reported high levels of contact with HIV prevention programs. However, what was unexpected was the significant gap between the proportion of FSW and PWID who reported having been approached by HIV prevention program in the last 12 months and the proportion who reported receipt of HIV test results, given the strong focus on HIV testing. Data indicate that, from 2005 to 2015, levels of recent HIV testing were relatively unchanged for FSW and PWID at between 30% and 40% (Fig. 2.2; National Center for AIDS/STD Control and Prevention 2015a).

Testing rates were relatively higher among MSM during the latter part of this period, which may suggest that the approach to outreach in this population, via partnerships with non-governmental, community-based organizations, may be more effective than prevention services delivered exclusively through state institutions.

The notable drop in reported reach of prevention programs between 2008 and 2009 may be related to a temporary re-deployment of resources for the rapid and substantial expansion of treatment services. In 2010, central government funding for the HIV response increased dramatically—more than doubling compared with the previous year to over CNY 2 billion, together with another CNY 650 million available from international sources. However, much of the focus was again placed on providing treatment, and prevention service coverage crept back up only slowly.

The clear exception came in 2015, where indicators of both prevention and testing coverage improved markedly. This is probably related to the fact that targets for HIV prevention are determined over a 5-year cycle, the most recent of which

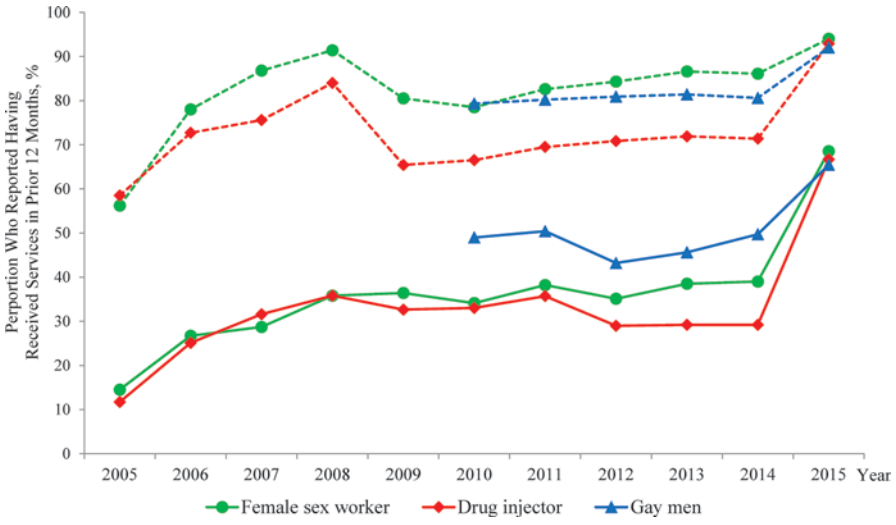

Fig. 2.2 Trends in access to HIV prevention services (i.e., contacted by a prevention program; dashed lines) and use of HIV testing services (solid lines) reported by FSW, PWID, and MSM, 2005–2015 (National Center for AIDS/STD Control and Prevention 2015a)

ended in 2015. The improvement may indicate a dramatic push by prevention workers to improve their service provision toward the end of the cycle and over-reporting in the face of unmet targets may have also been a factor.

There also appears to have been a relationship between trends in prevention program reach and risk behavior (Fig. 2.3). For example, coverage of prevention programs for FSW and PWID was relatively high throughout the 10-year period from 2005 to 2015, and self-reported risk behavior among these groups has fallen—roughly from 50% in 2005 to 20% in 2015 among FSW and from 15% in 2009 to less than 5% in 2015 for PWID. Although prevention reach is high among MSM, the proportion of MSM who reported unprotected anal sex in the prior 6 months has fallen only slightly from 57% to 54% between 2010 and 2014 (National Center for AIDS/STD Control and Prevention 2015a).

As noted, recruitment of surveillance populations may affect these indicators. Most notably, if a high proportion of injectors are recruited at needle exchange facilities, we would expect them to report low levels of sharing. However, if the recruitment practices have been unchanged over time, the downward trend should reflect real reductions in risk of exposure to HIV in these populations.

The risk of exposure to HIV is determined by needle sharing or unprotected sexual contacts combined with the likelihood that the partners with whom that contact occurs are themselves infected. FSW report moderate levels of unprotected sex—only one in ten reported not using a condom with her most recent client, although close to one in four reported some unprotected sex with a client in the previous month. Infection rates among clients, however, are very low. While prevalence among PWID is much higher, just 1 in 30 reported sharing a syringe at

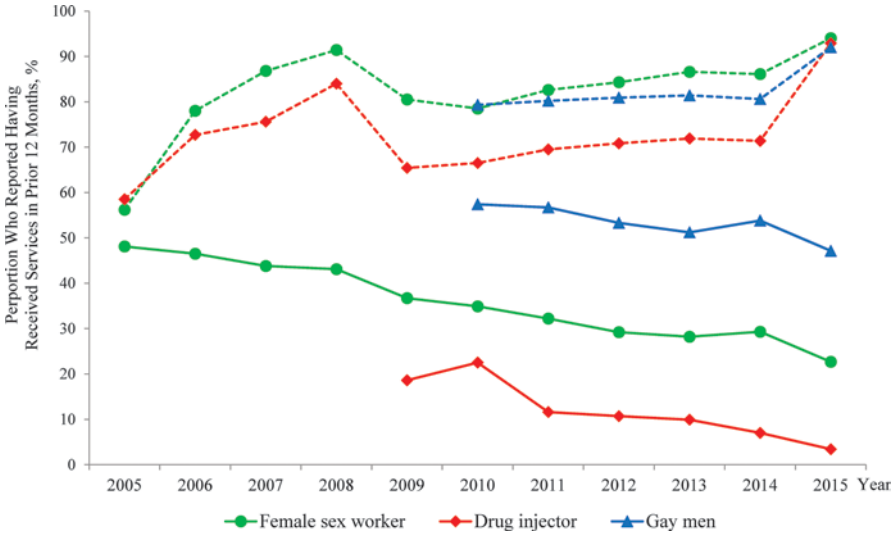

Fig. 2.3 Trends in access to HIV prevention services (i.e., contacted by a prevention program; dashed lines) and continuing risk behavior (solid lines) reported by FSW, PWID, and MSM, 2005–2015 (National Center for AIDS/STD Control and Prevention 2015a)

any time in the previous month, again limiting exposure. MSM, on the other hand, report the highest levels of unprotected sex and have the highest likelihood of HIV exposure. This means that, overall, the likelihood of both acquiring and passing on HIV is highest in this group (National Center for AIDS/STD Control and Prevention 2015a) (see Chaps. 7, 8 and 10 for more information).

2.7 Estimating the Denominator

One of the major limitations of sentinel surveillance is that it provides an idea of the proportion of a sub-population that is infected with HIV, or that engages in particular risk behaviors, but it does not provide any information about the size of each population. It is thus possible from sentinel surveillance to get a picture of the relative magnitude of the HIV challenge in different populations, but not of the absolute magnitude. Estimating the total number of people infected with HIV (and thus in need of care) requires the percentages derived from sentinel surveillance to be applied to denominators that encompass all the people in the group represented by the sentinel population. In responding to a national epidemic, relatively low prevalence in a large population may require more attention than a high prevalence in a very small and well-contained population. The size of the sub-population engaging in a specific risk behavior is also important because it delineates the number of people in need of effective prevention services.

China was a pioneer among countries trying to develop solid, evidence-based estimates of the size of different sub-populations at risk for HIV. Beginning in 2003, China CDC worked together with UNAIDS and several other partners to try to develop and test ways of estimating the numbers of people in high-risk groups. Eventually, they settled on variations of what are known as "multiplier methods," later adopted by WHO as the recommended method for estimating the number of HIV infections in countries whose epidemics are concentrated in known high-risk groups. In 2005, China undertook an exercise to make estimates of the number of people in high-risk groups in every province, summing them into a national total. This provided a robust estimate of how many people were in need of prevention services, as well as those in need of care. Over 30 million people were believed to be engaging regularly in high-risk behavior—the bulk of them clients of sex workers—while 650,000 Chinese citizens were estimated to be living with HIV. These estimates were over five times higher than the number of reported cases at the time, underscoring the fact that only a small fraction of those estimated to be living with HIV actually knew that they were infected (Ministry of Health et al. 2006; Wang et al. 2010; Wu et al. 2017).

2.8 HIV Case Reporting Re-prioritized

Voluntary HIV testing became very widely available in China from 2004, and the following year a comprehensive central database of reported cases was developed.

Since then, vigorous efforts have been made to increase the proportion of people who know their HIV status, and thus far, these efforts have been very successful. The annual number of HIV tests performed in China has increased from 25.3 million in 2005 to 143.6 million a decade later. Newly identified infections have risen every year, from 41,000 in 2005 to 115,000 in 2015. Although behavioral surveillance data indicate that there is much still to be done (Fig. 2.1), China has made substantial progress in ensuring that those most at risk for HIV have easy access to free testing (see Chap. 12 for more information).

One of the effects of this widespread testing effort, together with greatly improved reporting systems, was that HIV case reports were once again an important means of tracking the evolution of HIV in China. Much of the analysis that underpins official reports is now performed on case reports rather than sentinel surveillance data. This is in part because case reports provide richer information than sentinel surveillance data—they cover a far wider geographical range and provide more detailed information on the sociodemographic characteristics of PLWH, which has been helpful in understanding the evolution of the epidemic. Furthermore, data derived from case reporting has been more compelling to politicians and the general public because they represent actual population of PLWH, rather than simply a fraction of some sub-population that may or may not be representative of the whole (see Chaps. 24 and 26 for more information).

Case reports, however, are also an imperfect source of data. They are determined largely by patterns in testing, which change over time and are therefore not a reliable guide to trends. They are also subject to misreporting of risks for exposure. Further, "newly reported cases" should not be used as a proxy for incidence, because they may represent exposures (and therefore patterns of risk) that were prevalent many years earlier. Taken together, these factors mean that an excessive reliance on case reporting as a means of HIV surveillance may lead to misunderstanding of transmission patterns and mistargeting of prevention programs.

2.9 Surveillance of Drug Resistance

As a consequence of the rapid expansion of HIV antiretroviral therapy (ART), China has added surveillance of drug resistance to its national HIV tracking system. All patients who have been receiving ART for 1 year or more in China are offered annual viral load (VL) testing. In 2015, 280,000 patients had their VL assessed. Patients with detectable viral load were referred for further testing to determine whether their failure to suppress the virus might be related to mutations that conferred resistance to the antiretrovirals they were taking.

In China, highest rates of both treatment failure and of the discovery of drug-resistant mutations typically have occurred in the first few months of therapy (Fig. 2.4).

However, this reflects a systemic bias—VL tests are not offered until after 12 months of treatment. Earlier VL testing takes place only when it is clinically indicated; in these cases, the likelihood of treatment failure is often suspected. Over one quarter of those who received VL tests in the first 6 months of treatment

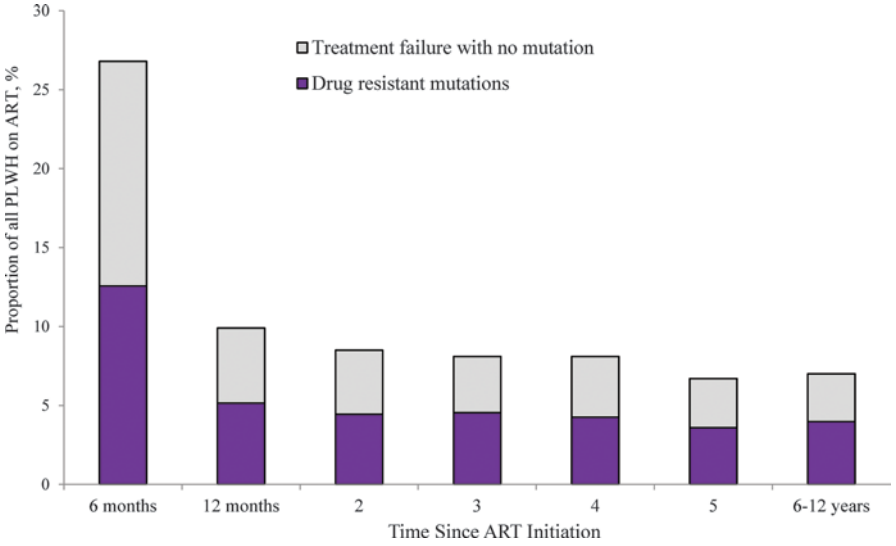

Fig. 2.4 Prevalence of treatment failure and drug resistance among Chinese ART patients by time since initiation of ART, 2015 (National Center for AIDS/STD Control and Prevention 2015b)

showed signs of treatment failure, and 47% of those were confirmed as having been related to viral mutation for a drug resistance rate of 13% of all those on treatment who were tested. Once ART patients have been on treatment for 1 year and they enter the routine annual test timetable for VL, the proportion of patients showing signs of treatment failure falls, stabilizing at approximately 8%, with drug resistance rates at 4–5% (National Center for AIDS/STD Control and Prevention 2015b).

Surveillance of transmitted drug resistance is also conducted. Every year, samples are collected from approximately 1000 people newly diagnosed with HIV who have never been exposed to any ART medicines, and the samples are tested for resistance to first-line therapies. The prevalence of drug-resistant strains in these individuals is an indicator of transmitted resistance. In China, the prevalence of transmitted drug resistance has been consistently below 5% in these annual surveillance measurements (National Center for AIDS/STD Control and Prevention 2015b).

2.10 Conclusion

China's HIV sentinel surveillance system has evolved into a robust structure that provides important and relevant information on the prevalence of HIV infection, HIV-related risk behavior, and ART drug resistance, as well as syphilis and HCV infection. Together with an ever-improving case reporting system and a consistently applied and carefully crafted method for understanding the total number of PLWH

in China, politicians, policymakers, public health and health workers, and international aid organizations have a better understanding of the features and trajectory of China's HIV epidemic. This dramatic improvement in the availability of high-quality data has been critical in ensuring that a pragmatic and evidence-based approach has been taken for the development and implementation of prevention, testing, treatment, and care programs in China. Challenges remain—the quality of the data must always be improving, the representativeness of samples from larger populations should be better understood, data from multiple separate sources could be better integrated, and iterative improvement of the system as a whole must remain a focus in the future. Nevertheless, China has come a long way in its understanding of its HIV epidemic over the 30 years since its first outbreak in 1989.

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Controlling Syphilis and Other Sexually Transmitted Infections

3

Xiaochun Wang, Willa Dong, Qianqiu Wang, and Jennifer M. McGoogan

Abstract

Sexually transmitted infections (STIs) are not new to China. However, a resurgence, particularly of syphilis, has been observed in the 1980s and 1990s. Driven by the sweeping political, economic, and social reforms of the late 1970s, syphilis has emerged as the third most-commonly reported infectious disease. Although inexorably linked to the emergence and expansion of China's HIV epidemics, China's syphilis response has lagged and been plagued by lack of recognition and lack of funding. Nevertheless, prevention and control efforts have grown with advances in treatment, testing, surveillance, and case reporting. Over the past decade, new national policies have prioritized syphilis prevention and control, and observational studies have improved our understanding of the syphilis epidemic among key, at-risk populations. Yet, many challenges remain—late presentation to testing and treatment is all too common, clinical services are not fully standardized, STI screening coverage still needs to be expanded, sexual health education should be improved, human resource and laboratory capacity needs to be increased, and stigma and discrimination must be eliminated. The syphilis response could benefit greatly from being more integrated into the HIV response, and China should look for opportunities to provide its citizens integrated prevention, testing, treatment, and care services.

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3.1 Introduction

Sexually transmitted infections (STIs) have been recognized as a significant public health concern in China for centuries and, in response, have been subjected to a range of control measures. After the establishment of the People's Republic of China in 1949, extreme control measures resulted in the near eradication of STIs. However, after the beginnings of the political, economic, and social shifts in the late 1970s and early 1980s, China saw a resurgence in STIs as well as the emergence of HIV. Control of STIs, and control of syphilis in particular, has been an important component of China's comprehensive response to its growing HIV epidemic. This chapter describes the epidemiology of syphilis and other STIs in the China setting, the evolution of current policies and response strategies, and remaining challenges for prevention and control. Particular focus is placed on the interactions between syphilis and HIV and how the challenges of these dual epidemics have been addressed thus far.

3.1.1 The Biology of Syphilis

STIs include over 30 different bacterial (e.g., syphilis, gonorrhea, chlamydia), viral (e.g., herpes simplex virus 2 [HSV-2]), and parasitical (e.g., trichomoniasis) infections that are primarily spread through sexual contact. Syphilis is caused by the *Treponema pallidum* bacterium (*T. pallidum*). In 2012, the estimated global prevalence of syphilis was 0.5%—nearly 18 million prevalent cases among men and women aged 15–49 years worldwide—with highest prevalence observed in the African region. The global incidence rate in the same year was estimated to be 1.5 cases per 1000 or 5.6 million new cases of syphilis among those 15–49 years of age worldwide. More than 90% of these new infections in 2012 occurred in low- and middle-income countries (LMIC; Newman et al. 2015).

Although syphilis has no vaccine and can be fatal, it is one of only seven STIs that are curable. Syphilis is a chronic, systemic infection that is transmitted by sexual contact with an infected partner (acquired syphilis) and less commonly from an infected pregnant woman to her fetus or newborn (congenital syphilis). Syphilis progresses through periods of active and latent disease characterized by four distinct yet overlapping stages, each with different symptoms and transmission dynamics (Box 3.1; Stamm 2016).

Left untreated, acquired syphilis can cause considerable morbidity, and mortality rates may reach nearly 60%. Perinatal death occurs in up to 40% of cases where the pregnant mother has untreated early syphilis, and congenital syphilis is associated with physical deformity and neurological complications in surviving infants. Successful treatment of syphilis depends heavily on timely diagnosis. First-line therapy, regardless of clinical stage, is generally intramuscular injection of benzathine penicillin G (BPG)—a long-acting antibiotic on the World Health Organization's List of Essential Medicines (Stamm 2016; WHO 2017).

Box 3.1 The Four Stages of Syphilis

- *Primary syphilis* is generally acquired via sexual contact with an infected partner. Approximately 3 weeks after exposure, a skin lesion called a chancre appears, most commonly on the cervix in women and on the penis in heterosexual men or anorectal region in men who have sex with men (MSM).
- *Secondary syphilis*, occurring approximately 4–10 weeks after primary infection, is characterized by skin rash that may be focal or widespread and may also involve the mucous membranes. The lesions harbor *T. pallidum* bacteria, and thus affected skin is infectious. These acute symptoms may resolve on their own after 3–6 weeks, although symptoms of secondary infection may recur in approximately 25% of cases.
- *Latent syphilis* is defined as having serologic evidence of syphilis infection but lacking any symptoms of disease. Early on during latent syphilis, patients remain contagious and may experience recurrence of symptoms. However, after 1 year in late latent syphilis, infectivity decreases.
- *Tertiary syphilis* occurs between 3 and 15 years after infection. Although individuals with tertiary syphilis are not contagious, they suffer from symptoms that affect the skin, bone, liver, central nervous system, and cardiovascular system.

Diagnosis of syphilis is performed by microscopy of clinical specimens or by two types of serological tests for syphilis (STS)—non-treponemal and treponemal. Non-treponemal STS, including the rapid plasma reagin (RPR) and toluidine red unheated serum test (TRUST), is readily available, inexpensive, and fast and can be used to quantitatively evaluate the effect of antibiotic treatment. However, non-treponemal STS are not suitable for screening since they lack sufficient sensitivity for primary and tertiary syphilis and are susceptible to biological false-positive (BFP) results. Treponemal STS, including the *T. pallidum* particle agglutination assay (TPPA), various enzyme-linked immunoassays (EIAs), chemiluminescence immunoassays (CIAs), and others, are more sensitive and specific and less susceptible to BFPs but cannot separate active from prior or treated infection and cannot be used to monitor treatment. The conventional testing algorithm for syphilis is one non-treponemal STS for screening followed by one treponemal STS for confirmation of syphilis infection in reactive specimens (Stamm 2016).

Syphilis has a strong biological (and social) connection to HIV—the presence of syphilis infection increases the risk of acquiring and transmitting HIV during sexual contact (Fleming and Wasserheit 1999; Galvin and Cohen 2004). Control of syphilis is a critically important component of China's HIV response.

3.1.2 Syphilis in China, 1979 and Prior

As early as the Tang Dynasty (618–907), diseases such as gonorrhea were described in medical and other texts but not recognized as being transmitted through sex (Dikötter 1995). It is thought that syphilis was introduced to China by Portuguese traders and missionaries in the port city of Guangzhou, Guangdong province (Canton), in the early 1500s, and became very prevalent by the 1900s (Chen et al. 2013; Cohen et al. 1996; Crosby 1969; Dikötter 1995; Henriot 1992; Hesketh et al. 2008). Historically, attempts to control STIs reflected local priorities and circumstances. Control measures included the prohibition of prostitution in some areas and time periods, and regulation through licensing and taxation at other times. With the founding of the Republic of China in 1911, the government attempted to implement an STI control strategy, but it was weakened by stronger focus on civil conflicts (Chinese Civil War, 1927–1937 and 1946–1949) and international conflicts (World War II, 1939–1945) alike (Cohen et al. 1996; Dikötter 1995; Henriot 1992).

By the 1949 founding of the People's Republic of China, the country was in the midst of what may have been one of the largest syphilis epidemics in human history, thanks in large part to rampant prostitution. In 1950, an estimated ten million citizens had an STI, most commonly syphilis, and a disproportionate burden of disease was observed among minorities—syphilis prevalence in 1951 had reached nearly 60% in minority areas in five heavily affected provinces (i.e., Guangxi Zhuang Autonomous Region, Gansu Province, Inner Mongolia, Xinjiang Uygur Autonomous Region, and Yunnan Province; Chen et al. 2013; Hesketh et al. 2008).

Thus, Chairman Mao Zedong undertook the eradication of both prostitution and syphilis (as well as other STIs) beginning in late-1949 and early-1950 (Chen et al. 2013; Hesketh et al. 2008). Stringent control measures were implemented with the goal of eradicating these dual scourges from Chinese society. Measures included:

- Forbidding prostitution, closure of brothels, and police "crackdowns".
- Educating the public on STI signs and symptoms, transmission routes, prevention, and treatment.
- Developing a control program and sending medical teams to endemic areas.
- Selecting more feasible and effective approaches to detection and diagnosis.
- Adopting the widespread use of laboratory tests for the detection of syphilis.
- Conducting mass screenings in minority and urban areas for syphilis and other STIs.
- Establishing a unified treatment regimen (i.e., penicillin) and providing treatment for free.

The syphilis epidemic began to shrink, and the absolute numbers of syphilis cases and the prevalence and incidence of syphilis began to decline (Fig. 3.1). After 15 years of continuous, focused effort toward control plan implementation and case report and census survey monitoring, the government officially announced in 1964 that China had eliminated syphilis (Chen et al. 2013; Cohen et al. 1996; Hesketh et al. 2008; Hu et al. 1964). However, it did not last long. In 1979, a new case of syphilis was reported in Chongqing. STIs were back.

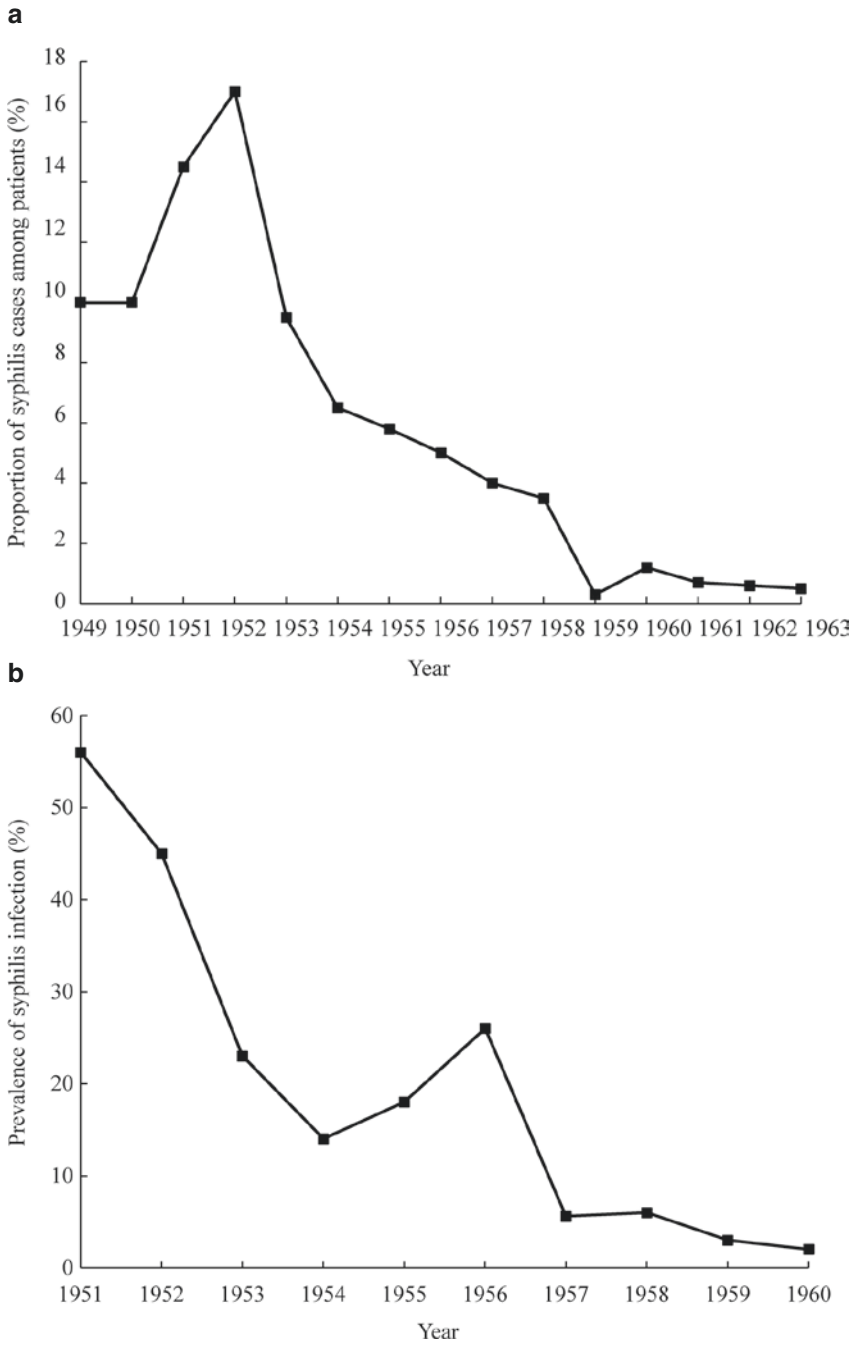

Fig. 3.1 Decline of China's syphilis epidemic after 1949: (**a**) reduction in the proportion of syphilis cases among patients attending Peking Medical College Affiliated Hospital and (**b**) in the prevalence of syphilis in minority areas of Guangxi Zhuang Autonomous Region, Gansu province, Inner Mongolia Autonomous Region, Xinjiang Uygur Autonomous Region, and Yunnan Province. Adapted with permission from Chen et al. (2013)

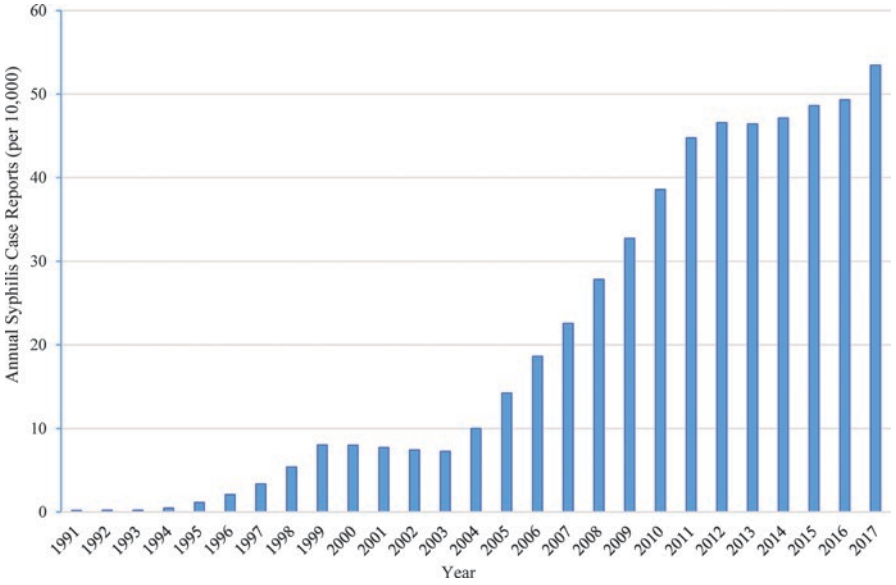

Fig. 3.2 Rise in annual number of syphilis case reports up to 2017. Partial released data (2004–2017) were extracted from the web-based reporting system for notifiable infectious diseases established in 2004 (Yang et al. 2017). Data for 1991–2003 were reported by Gong et al. (2002, 2014)

3.1.3 Syphilis in China, 1980–2010

The opening up of China's borders and the ensuing, sweeping socioeconomic reform of the late-1970s and early-1980s set the stage for the resurgence of China's commercial sex industry and the re-emergence of STIs, syphilis in particular (Hesketh et al. 2008). By 1987, there were approximately 1000 known cases of syphilis in China (Chen et al. 2013), but by the late 1990s, the annual number of reported syphilis cases was growing by about 30% per year (Chen 2009). After a temporary plateau from 1999 to 2003, numbers of cases reported annually climbed steeply until 2011, then increased slowly (Fig. 3.2).

A large proportion of newly reported syphilis cases each year were diagnosed as primary and secondary syphilis (Fig. 3.3), indicating high rates of recent transmission (Chen et al. 2007a, b, 2013). Furthermore, newly diagnosed cases continued to cluster in urban areas, particularly in eastern, coastal regions (Fig. 3.4), and among high-risk populations including female sex workers (FSW), men who have sex with men (MSM), and STI clinic attendees (Tucker and Cohen 2011).

The roughly 75,000–80,000 syphilis cases newly identified each year (approximately 5 per 100,000) from 1999 to 2003 quickly turned to more than 100,000 per year and rising quickly. As of 2010, annual syphilis case reports had reached 30 per 100,000 (Fig. 3.3; Chen et al. 2013).

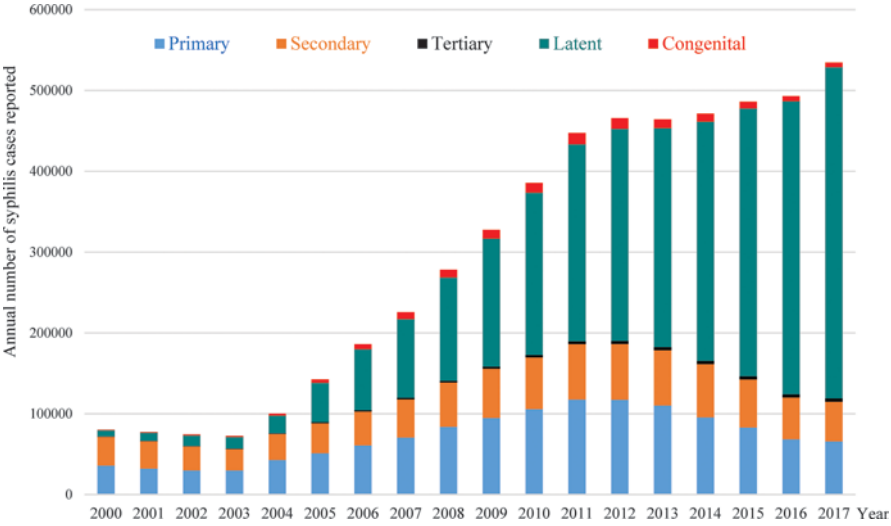

Fig. 3.3 Annual number of new syphilis cases reported via China's nationwide STI surveillance system, categorized as acquired primary, secondary, tertiary, or latent syphilis and congenital syphilis. Partial released data (2004–2017) were extracted from the web-based reporting system for notifiable infectious diseases established in 2004 (Yang et al. 2017). Data for 2000–2003 were reported by Gong et al. (2014)

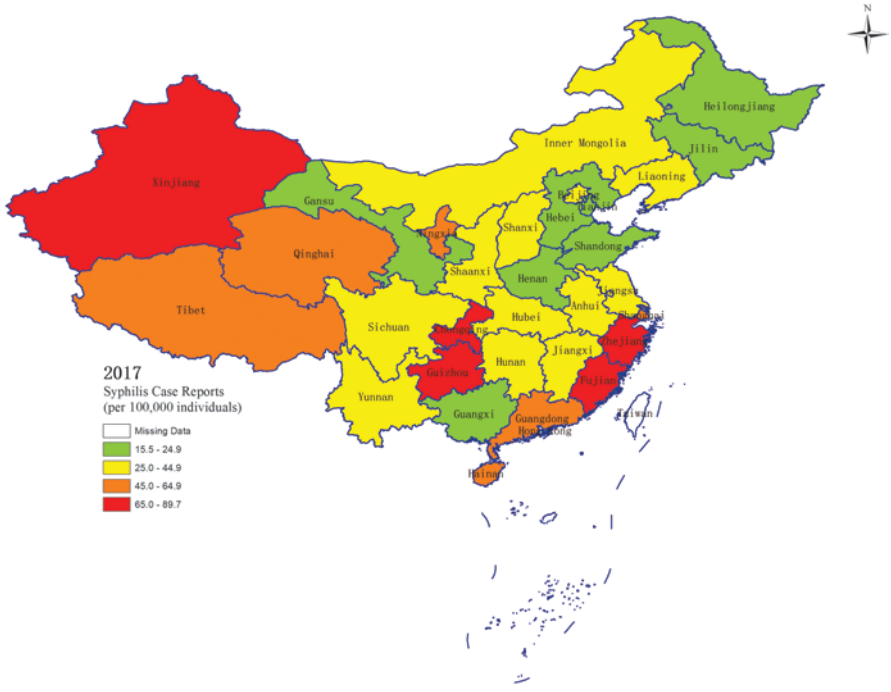

Fig. 3.4 Geographical distribution of syphilis case reports in 2017. Publisher's note: Springer Nature remains neutral with regard to jurisdictional claims in published maps

3.1.3.1 Key Populations

Not surprisingly, syphilis infection was concentrated among key, high-risk populations. A systematic review of the English and Chinese literature published prior to 2005 found that syphilis prevalence was rising among all risk groups (Lin et al. 2006).

Among FSW, a 2009 study in eight cities (in Jiangsu province and Guangxi Zhuang Autonomous Region) found a syphilis prevalence of 5% in more than 7000 participants, with older age, lower education, lower tier (defined as street-based or soliciting in outdoor spaces), and injection drug use associated with significantly greater odds of syphilis infection (Chen et al. 2012). This measure was considerably higher than annual national surveillance estimates of syphilis prevalence among FSW between 2004 and 2008, which ranged from 0.5% to 1.8% (Wang et al. 2009). Other STIs were even more prevalent among this population. In a 2006 study among 1400 FSW in Chengdu, Fuzhou, Nanjing, Guangzhou, and Shenzhen provinces and Shanghai municipality, the prevalence of chlamydial infection ranged from 11% to 26% depending on whether participants were recruited from STI clinics, female re-education centers, or sex entertainment venues (Chen et al. 2006).

Syphilis was similarly high among male clients of FSW. A 2008 study in Sichuan with 600 participants found a syphilis prevalence of just over 5%. Significantly lesser odds of syphilis infection was found among those who had local registration and reported consistent condom use, while significantly greater odds of syphilis was found among those who reported always drinking alcohol before sex and always washing their genitals after sex with FSW (Yang et al. 2010).

A study of more than 11,000 STI clinic attendees in 16 Guangxi hospitals from late 2004 to early 2006 found a syphilis prevalence of 12% (Chen et al. 2007a, b).

An estimated more than 20 million rural-to-urban migrants were working in Zhejiang province in 2009. A 2010 study that included over 17,000 migrant workers in Zhejiang found a syphilis prevalence of 0.6%. Participants who were divorced or widowed had eight-fold greater odds of syphilis infection, while lesser odds of syphilis was observed for those who were single, of Han ethnicity, and had lived and worked in Zhejiang 1 year or longer (Pan et al. 2013). A systemic review and meta-analysis of studies conducted from 1990 to 2013 found a syphilis prevalence of 0.7% among migrants and two-fold greater odds of syphilis infection among migrants compared to the general population. In the same study, gonorrhea prevalence was 2% (14 times greater odds of infection compared to the general population), and genital warts prevalence was 1.5% (39 times greater odds; Zou et al. 2014).

Syphilis is also high among drug users. A 2006 study found syphilis prevalence of nearly 18% among drug users in Guangxi, 10% in Xinjiang, and 10% in Guangdong, and being female was associated with up to 8.5-fold greater odds of syphilis infection (Zhang et al. 2011). Some evidence suggests that rates of syphilis infection are different depending on drug used. A 2010 study found that all methamphetamine-user participants had syphilis infection (Liao et al. 2014).

Finally, among MSM, syphilis was very prevalent. A Beijing study among MSM in late 2006 to early 2007 found a syphilis prevalence of 20% and incidence of 17 per 100 person-years (Ruan et al. 2009). A large 61-city cross-sectional study with more than 47,000 participants conducted from early 2008 to late 2009 found an

overall syphilis prevalence of nearly 12%. Those who were older (>24 years), minorities, or non-local residents or those who reported finding sex partners in public bathhouses/saunas or parks or having two or more sex partners had greater odds of syphilis infection, while those who had college-level education or reported using condoms consistently or having at least one female sex partner had lesser odds of syphilis infection. Geographically at the provincial level, syphilis prevalence was highest in Chongqing, Guizhou, and Yunnan (Wu et al. 2013). A 2011 literature review found several studies reporting syphilis incidence densities ranging from 8 to 39 per 100 person-years among MSM in China (Chen et al. 2011).

3.1.3.2 China's Early Response

To lead the response to China's newly re-emerging STI problem, the central government formed the Chinese National Center for Sexually Transmitted Disease (STD) Control in 1986 (Chen et al. 2007a, b, 2013). One of the first and most important tasks was the collection of accurate and timely surveillance data. Thus, STI surveillance was initiated using two methods.

The first method relied on case reports and was termed the National STD Surveillance System. HIV/AIDS, syphilis, and gonorrhea were the three STIs designated Class B reportable diseases via the Law of the People's Republic of China on Prevention and Treatment of Infectious Diseases (adopted in 1989, revised in 2004). Resulting mandatory reporting of new cases was critical for improving understanding and monitoring of the HIV, syphilis, and gonorrhea epidemics in China. Moreover, the move in 2005 from paper form-based reporting of syphilis cases to an electronic, online-submission system improved efficiency and timeliness of case report data (Chen et al. 2007a, b).

The second method employed sentinel surveillance. The first 16 STI sentinel surveillance sites were founded in 1987 in areas known to have high rates of STIs. This network was expanded in 1993 to include a further 10 sites for a total of 26 across China. Expectedly, evaluations of syphilis in China via sentinel surveillance data resulted in a much grimmer picture since sentinel sites were deliberately located in high prevalence areas (Chen et al. 2007a, b). However, the combination of national surveillance based on case reports and sentinel surveillance measurements together yielded important information on the growth of China's syphilis epidemic.

Nevertheless, accurate estimation of syphilis prevalence and incidence has been complicated in China (not unlike many LMIC settings) by suboptimal diagnostics and inconsistent clinical evaluations. Thus, the diagnosis of syphilis was more clearly defined in the mid-2000s as having physical examination findings consistent with syphilis infection and both positive treponemal and positive non-treponemal STS results. Additionally, criteria aiding the standardized staging of acquired syphilis were more clearly defined, and diagnostic criteria for congenital syphilis were developed (Chang and Wang 2004; Chen et al. 2007a, b; National Center for STD Control 2006; Tucker and Cohen 2011).

Public health response efforts largely focused on educational campaigns aimed at improving health and STI knowledge, encouraging behavior change, and promoting condom use. Condom use promotion, in particular, was scaled up and taken

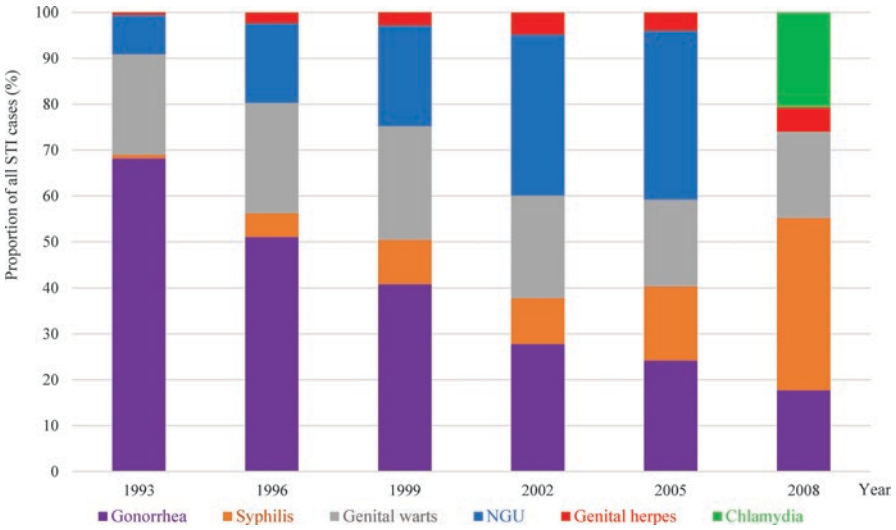

Fig. 3.5 Proportions of various STIs among all STI cases in China in 1993, 1996, 1999, 2002, 2005, and 2008 (*NGU* nongonococcal urethritis). Data were reported, respectively, by Gong et al. (2002), Qin et al. (2004), and Zheng et al. (2014)

nationwide in the early 2000s. However, China experienced persistently high syphilis prevalence and incidence through the remainder of the decade (Fig. 3.2; Chen et al. 2013), and dynamic changes were observed in the proportions of gonorrhea, syphilis, chlamydia, genital warts, and genital herpes among all STI cases (Fig. 3.5; Zheng et al. 2014).

3.1.3.3 Surveillance

Before 2004, STI cases were reported by the National STD Reporting System. STIs captured by this reporting mechanism included HIV, gonorrhea, syphilis, nongonococcal urethritis (NGU), genital warts, genital herpes, chancroid, and donovanosis. The system is generally managed by provincial CDCs. However, in some provinces (e.g., Hainan, Anhui, Shandong, Zhejiang, Guangxi, Heilongjiang, and Shaanxi), this reporting has been managed by provincial skin and sexually transmitted disease prevention and control centers.

STI screening for surveillance purposes was conducted in prison settings throughout China in the 1980s. From 1993 to 2002, some STI monitoring occurred among some key populations, such as incarcerated women and pregnant women. From 2000 to 2002, with the financial and technical support of the WHO, surveys of STI prevalence and risk factors was implemented among FSW, long-distance truck drivers, and pregnant women. In 2007, the China CDC piloted the National STD Surveillance Program with the number of monitoring points expanding to 105 counties, covering about 5% of each country's population. However, there were concerns about the representativeness of the samples.

In summary, while STI surveillance had begun in China during this time frame, the quality and timeliness of these data were less than ideal, and considerable improvements were needed, yet limited resources were a major barrier to scale-up and betterment of this program.

3.1.3.4 The Emergence of HIV

Although a few sporadic cases of HIV were found in China as early as 1985, the first true HIV outbreak on the Mainland was not discovered until 1989, when a cluster of 146 cases of HIV were found among people who inject drugs (PWID) in rural southwest Yunnan province (see Chaps. 1 and 29 for more information on the HIV outbreak among PWID). The discovery of this outbreak was followed a few years later in 1994 by another in rural central China among tens of thousands of former plasma donors (FPD) (see Chaps. 1 and 30 for more information on the HIV outbreak among FPD). Although highly concentrated both geographically and among high-risk groups, HIV spread rapidly, and the epidemic expanded considerably—one case in 1985 had turned into an estimated 650,000 cases by the end of 2005 (Ma et al. 2018).

By the late 1990s, a substantial body of strong evidence had already been amassed demonstrating the direct effect of STIs on HIV transmission. Observational studies had shown that both HIV infectiousness and HIV susceptibility were heightened by the presence of ulcerative (e.g., syphilis) and non-ulcerative STIs through a range of different biological mechanisms (Fleming and Wasserheit 1999; Galvin and Cohen 2004). Furthermore, two randomized-controlled trials had shown that interventions promoting timely STI diagnosis, treatment, and care services reduced HIV incidence in African settings (Gosskurth et al. 1995; Wawer et al. 1999). Thus, many were calling for STI treatment and control to be made a central part of comprehensive HIV prevention strategies already by the late 1990s (Fleming and Wasserheit 1999; Galvin and Cohen 2004). Hence, it is not surprising to have found that when HIV emerged in settings where a variety of STIs were already high and rising, HIV spread much more quickly (Galvin and Cohen 2004). China is one example of this. By 2009, an estimated 740,000 citizens were living with HIV (Ma et al. 2018).

3.2 The Epidemiology of Syphilis Since 2010

Today, 45 infectious diseases are designated as mandatorily reportable in China. Five of these have been nearly eradicated, and the incidence of another 18 has declined in recent years. Gonorrhea is one of those that have been on a downward trend. However, given China's very large population, the absolute number of gonorrhea cases in China each year remains large. By contrast, several notifiable infectious diseases have been on the rise. Prominent among these are syphilis and HIV (Liu et al. 2018). At the national level, syphilis incidence was estimated at 32 per 100,000 in China in 2016 (Liu et al. 2018).

3.2.1 Case Reporting

In 2013, the 31 provinces reported a total of 444,952 syphilis cases, the third most prevalent infectious disease among all those legally reportable after hepatitis B and tuberculosis. Deaths caused by syphilis ranked ninth among 39 reportable infectious diseases. Between 2012 and 2013, the number of gonorrhea cases increased by 8.2% for the first time in a decade, to 103,085 cases. Gonorrhea ranked sixth in number of cases among legally reportable infectious diseases in 2013 (Yan et al. 2014).

Also in 2013, the top five provinces for reported number of syphilis cases were Guangdong, Zhejiang, Guangxi, Sichuan, and Henan. The provinces with the highest syphilis incidence were primarily concentrated in coastal southeast China, in Guangxi, Fujian, Zhejiang, and Shanghai, as well as in Xinjiang. For congenital syphilis, the five provinces with the highest incidence were Shanghai, Fujian, Sichuan, Guangxi, and Hunan (Yan et al. 2014). In a study conducted in Guangdong province, a total of 82,554 syphilis cases were reported from 2014 to 2015—21% were primary or secondary syphilis cases, 1% were tertiary syphilis cases, 76% were latent syphilis cases, and 2% were congenital syphilis cases (Wong et al. 2018).

Demographically, both reported number of cases and incidence of syphilis tend to be higher among women than among men, and over 50% of syphilis cases tend to be concentrated among those aged 20–45 (Yan et al. 2014).

3.2.2 Key Affected Populations

Syphilis remains concentrated among key affected populations. For example, a large meta-analysis of 84 studies published from 2009 to 2013 found a pooled syphilis prevalence of 11% among MSM in China (Zhou et al. 2014). Yet, testing uptake in this key, high-risk population is persistently low. An online cross-sectional survey conducted in late 2015 among more than 1000 Chinese MSM recruited from gay social networking sites found that only 30% had ever tested for syphilis (Zhang et al. 2017). Syphilis and other STIs are still a significant occupational health issue for FSW. A study conducted in Jiangsu, Guangxi, Guangdong, and Hainan in 2009 found an overall syphilis prevalence among FSW of 5%. However, when participants were grouped by tier, determined by high-, mid-, or low-fee venue, syphilis prevalence was significantly different—2% for high-tier FSW, 4% for mid-tier FSW, and nearly 10% for low-tier FSW (Chen et al. 2012). A systemic review and meta-analysis of 29 studies of syphilis among methadone maintenance treatment (MMT) clients found a pooled syphilis prevalence of nearly 8% (Wang et al. 2014). Although the key populations at high risk of STIs are typically thought of and discussed as exclusive groups, they are overlapping, and these dual-risk subpopulations are especially vulnerable. For example, a study of migrant MSM in Beijing found a syphilis incidence of over 11 per 100 person-years (Mao et al. 2014).

3.3 National Strategies for Controlling Syphilis and Other STIs in China

3.3.1 Recognizing STI Prevention and Control as an Effective HIV Control Measure

China has recognized that one key to HIV prevention and control is STI prevention and control. Therefore, as a component of HIV prevention, China has formulated and issued a series of national policies and implemented strategies that emphasize the importance of STI prevention and control. The State Council has put forth a strategy for expanding coverage for comprehensive interventions, reducing HIV transmission risk, and curtailing sexual transmission in order to prevent transmission from key populations to the general population. These main measures were supplemented by revised regulations on STI treatment and implementation of comprehensive interventions specifically for STI patients.

STI prevention and control was also included in China's 12th 5-Year Plan (2011–2015) and China's 13th 5-Year Plan (2016–2020) for HIV prevention. These measures include adding HIV/STI testing into physical exams for entertainment and hospitality workers, providing early treatment for STIs, training health workers in STI prevention and control, improving STI services, and integrating STI treatment with HIV prevention interventions.

3.3.2 National Plan for Syphilis Prevention and Control (2011–2020)

To address the growing syphilis epidemic specifically, China's Ministry of Health (now called the National Health Commission) developed and issued the National Strategic Plan for Syphilis Prevention and Control (2011–2020). It aims to strengthen the integration of syphilis and HIV prevention, curb the syphilis epidemic, reduce the incidence of primary and secondary syphilis, and lower the incidence of congenital syphilis (Box 3.2).

Box 3.2 National Strategic Plan for Syphilis Prevention and Control (2011–2020)

Targets

1. Reduce the growth in number of primary and secondary, as well as congenital syphilis cases to below 5% and lower congenital syphilis incidence to less than 30 per 100,000 live births to be on track to reaching the 2020 goal.
2. Increase the proportion of those aged 15–49 who are knowledgeable about syphilis prevention to 75% among rural residents, 80% among migrants, 85% among urban residents, and 90% among FSW and MSM.
3. Increase the proportion of maternal health workers and medical professionals who are knowledgeable about syphilis prevention and control to 80% and 85%, respectively.

4. Expand provider-initiated testing and counseling (PITC) coverage to 80% and standard treatment to 90%.
5. Expand testing coverage to 80% of urban residents and 60% of rural residents, expand treatment coverage to 90% of patients in urban areas and 70% in rural areas, and expand treatment coverage to 90% of syphilis-exposed infants in urban areas and 80% in rural areas.
6. Complete the establishment of a syphilis surveillance network and a laboratory quality control and monitoring system, and improve syphilis testing and reporting quality.

Tactics

1. Expand health education and health promotion on syphilis prevention and control for all by integrating syphilis and HIV education, tailored for different populations (i.e., general public, key populations).
2. Implement comprehensive interventions that are integrated with HIV interventions (such as condom use interventions) in clinical settings and through mobilizing community-based organizations.
3. Improve the quality of surveillance and testing, implement active testing, and promote the early diagnosis and treatment of syphilis.
4. Strengthen the national syphilis surveillance, case reporting, and prevalence monitoring systems.
5. Increase the capacity of laboratories to perform syphilis testing.
6. Establish free routine counseling and testing services at MMT clinics and HIV VCT sites.
7. Establish a referral system for serum test confirmation and treatment.
8. Provide standardized syphilis treatment—strengthen STI care and improve its accessibility, strengthen syphilis care through establishing STD clinics and improving the quality of services, standardize syphilis medical services, and provide efficient and standardized medical services.
9. Provide congenital syphilis prevention services—prioritize the treatment of maternal syphilis patients to reduce infant exposures, strengthen follow-up management of infants that are syphilis antibody positive, and standardize their medical treatment.
10. Increase resources for international cooperation and syphilis prevention research—draw lessons from successful syphilis control in other settings and improve the capacity for syphilis prevention and control.

Strategies

1. Strengthen management of public health activities. Routinize the syphilis prevention and control work within HIV prevention activities. Clarify the responsibilities and duties of various HIV prevention offices, enhance multi-sectoral cooperation, and mobilize the communities to participate in these activities.

2. Funding support. In areas that have a severe epidemic, increase local government financing and establish a dedicated fund for syphilis prevention activities.
3. Continuous improvement of syphilis treatment. The health administrative departments at each level should improve the medical system according to the requirements of the medical and health system reform, and ensure the production and supply of goods needed for syphilis treatment and testing.
4. Capacity building. Training medical workers on syphilis prevention and control skills, especially for those who work in community and maternal and child health clinics. Strengthen basic facilities and laboratory capacity of those institutions.

Additionally, health administrative departments and same-level government bodies were encouraged through this new policy to coordinate in establishing and improving the STI prevention and control system by incorporating STI prevention and control work into basic health services, training more professional medical workers, adequately funding STI prevention and control, and actively managing STI prevention and control.

3.4 China's STI Epidemic: Responses and Challenges

Guided by these national policies and their resulting administrative framework, China's response to the STI epidemic has been implemented through the core components of clinical services, asymptomatic screening, and targeted intervention. These efforts are supplemented by community-based health education, expansion of laboratory capacity, surveillance, training, and advocacy.

3.4.1 Clinical Services (Effective Case Management)

Control of syphilis and other STIs depends on effective case management delivered in clinical settings. Case management encompasses timely diagnosis of STIs—prompt, efficient, and standardized treatment to shorten the course of disease and curtail infectivity and reduce the reservoir of infection. Effective delivery of these clinical services requires implementing standardized care, providing adequate and well-equipped facilities, and training for medical personnel. Early detection must be a priority—STI screening, VCT, and outreach services that include STI testing and exams need to be scaled up—and care-seeking must be promoted among those who are diagnosed. Standard-of-care services should include accurate and effective STI diagnosis, standardized treatment, reliable supply of quality drugs, and counseling

and other ancillary services. Finally, STI knowledge and risk behavior education, condom distribution and condom use promotion, and partner notification are also important components of comprehensive clinical services for STI prevention, testing, treatment, and care.

3.4.1.1 Improving Quality of Care

Today, STI care in China is provided by variety of public and private means. Public institutions provide the majority of STI care. These include specialty STI clinics, dermatology and STI specialty hospitals, related departments within general hospitals (e.g., obstetrics and gynecology, urology), maternal and child health clinics, and family planning clinics. Private institutions are also increasingly providing STI care in a similar array of settings. Private pharmacies are now providing many treatments for STIs, such as antibiotics and antivirals, over the counter thereby eliminating doctor's visits and prescriptions for easily treated symptoms. However, among these diverse settings, there are significant disparities in quality of care and availability and affordability of services.

Major challenges include false advertisements for ineffective (and sometimes unsafe) treatments, unlicensed facilities and practitioners, and non-standardized diagnosis and treatment. A survey conducted by the Ministry of Health indicated that out of 595 STI-care institutions included, 31% were unlicensed and 24% of medical personnel were practicing illegally. Use of unapproved methods, unvalidated equipment, and untrained staff for STI testing continues to commonly contribute to underdiagnosis and misdiagnosis of STIs. Treatment also often does not adhere to guidelines set out for optimal clinical management of STI patients, for which many clinics have been known to overcharge patients.

To address these challenges, increased regulation and oversight of testing, diagnosis, and treatment should be implemented. Increased supervision of care provided by health workers, inspections of health facilities, and enforcement of compliance with testing, diagnosis, and treatment guidelines are needed. Additionally, identification and prosecution of unlicensed practitioners and facilities needs to become a priority.

3.4.1.2 Promoting Early Detection

Timely care-seeking is important for reducing the spread of STIs. To increase early STI treatment, service quality and accessibility must be improved. Some key populations, such as non-venue-based FSW and MSM, tend to seek care at low levels. Additionally, those with low education levels, such as truck drivers and service industry workers, rarely seek care at all. These low levels of care-seeking are likely due to lack of knowledge of STI symptoms, as well as perceptions of high fees, inconvenience, and lack of confidentiality associated with health services.

To promote appropriate care-seeking behavior, STI knowledge must be improved, and service quality of healthcare institutions providing STI care must strengthened. HIV/STI hotlines, peer education, and health communication campaigns should be implemented to encourage key populations to seek proper medical care in a timely fashion. Although some of this work could take place via including STI education

and testing within existing HIV outreach services for key populations, many STI clinics and health workers do not have experience with this sort of outreach work, and integrating HIV and STI work is still uncommon in China.

3.4.1.3 Providing Standardized Clinical Services

Despite national policies, regulations, guidelines, and administrative codes and procedures, STI treatment remains of uneven quality. The disparate care received by patients is due to several factors. Many health workers are not aware of guidelines related to STI testing, diagnosis, treatment, and care. Because of the poor accessibility of services (e.g., long wait times, lack of privacy, low-quality facilities, and high costs), many patients delay care-seeking, attend unregulated private clinics, and obtain and take medication without professional consultation or supervision. For key populations, such as FSW, MSM, young adults, and older adults, health workers often lack skills to communicate with patients effectively and nonjudgmentally. The mismanagement of STI symptoms, such as misdiagnosis and incorrect treatment, is common, especially in hospital departments that do not specialize in STI care, such as gynecology, urology, and pediatrics departments, and remote, local-level, and/or private clinics. Finally, penicillin shortages for syphilis treatment remain a serious issue, where up to one-fourth of public medical institutions did not have adequate supplies.

3.4.1.4 Preventing STIs in a Clinical Setting

To prevent the further transmission of STIs, clinics must encourage treatment adherence, provide risk reduction counseling, perform partner elicitation and notification, and promote condom use. Challenges to increasing preventive services in STI clinics include lack of patient privacy within healthcare facilities, low profits for providing prevention services, and negative provider attitudes toward condoms, such as the belief that condoms promote extramarital sex or that preventive services are a lower priority compared to treatment. To address these challenges, facilities should provide private spaces for physician-patient interactions and health education materials. If physicians are overburdened, task shifting should be explored. Health education can be easily shifted to other allied health professionals. Finally, condom prices at clinics should be reduced or provided for free to increase accessibility and encourage use.

In the clinical setting, partner notification has become increasingly common among physicians. However, there are several challenges to implementing partner notification. First, although partner notification is considered a best practice in China, many physicians are overburdened by huge caseloads and notification is often not performed as a result. Other concerns with the large-scale adoption of partner notification are physician capacity for carrying out partner notification. There is concern that physicians do not adequately explain the importance of STI diagnosis and risk to the partner. Furthermore, patients fear disclosing their diagnosis to their partners, and thus the proportion of partners notified and then tested and treated remains low. Shifting the task of partner notification to social workers may alleviate this burden, improve notification and counseling quality, and increase rates of successful linkage to testing, treatment, and care.

3.4.2 Asymptomatic Screening

The objectives of STI screening are to identify individuals who have asymptomatic STI infections and to provide early treatment. Screening programs for syphilis, gonorrhea, chlamydia, and HPV-related anogenital cancer have been implemented successfully by many countries. Screening is effective and efficient for reducing STI-related sequelae and complications. However, in China, no screening programs for gonorrhea, chlamydia, and cervical cancer have been implemented widely. By contrast, asymptomatic screening of syphilis has been conducted for different key populations through existing facility-based programs. Syphilis screening occurs in a wide range of settings that often overlap with HIV testing. These settings include hospitals for inpatients, HIV VCT sites, MMT clinics, blood banks, HIV sentinel surveillance sites among key populations and via outreach to key populations at high risk of HIV, STI clinic attendees, antenatal clinics attendees, and closed settings such as detention centers and reeducation-through-labor camps. At sentinel sites alone, almost nine million people receive testing for HIV and syphilis annually.

3.4.3 Targeted Intervention for High-Risk Populations

Given the similarities in transmission pathways and key populations, STI prevention and control activities are increasingly being integrated into HIV programs. These activities include outreach, peer education, and testing for MSM, FSW, PWID, and migrants. Finally, with the expanding role for civil society in public health endeavors, community-based organizations (CBOs) serving key populations have increasingly taken the lead in implementing interventions.

3.4.4 Community Education

Health education interventions emphasizing HIV risk, prevention, testing, and treatment have been scaled up since 2003 in China (see Chap. 11 for more information). However, there are fewer health education efforts targeting other STIs. This is due to lack of relevant policies mandating health education, severe social stigma toward those with STIs, lack of tailored and effective health education materials, and lack of evidence demonstrating the effectiveness of health education for STIs in the China setting. As a result, HIV/AIDS knowledge tends to be higher among Chinese citizens than knowledge of other STIs.

3.4.5 Laboratory Capacity

Strong professional capacity of technicians in STI testing laboratories ensures accuracy of testing results. However, the level of knowledge and skills of laboratory staff is uneven across China due to low rates of formal training. Provinces

that have invested in quality control (QC) measures, such as Guangdong, have successfully improved laboratory capacity. In 2003, Guangdong established standardized STI testing procedures and QC regulations, including regular assessments, which have allowed for the timely identification of testing issues. Nevertheless, even in provinces with high-quality laboratory services, such as Guangdong, where 99% of laboratories meet quality standards, challenges remain. For example, low-quality reagents sometimes cause poor testing accuracy. Although strong focus on continuous improvement of technician training and testing QC procedures may increase laboratory capacity, few provinces have implemented these measures so far.

At the national level, a National Reference Laboratory has been established, which supports the national network STI laboratories on a range of issues including QC procedures, compliance audits, and training. Each year, an assessment of laboratory capacity is conducted among provincial STI testing laboratories, surveillance sites, and hospitals with STI laboratories. One area that the National Reference Laboratory evaluates is in syphilis testing reagents. In a study of four domestically manufactured kits, three had a sensitivity of 94–95%, while the sensitivity of the third was only 57%, demonstrating the uneven quality STI detection kits and reagent on the Chinese market.

The lack of advanced facilities is another challenge for primary-level and community health centers. Among most primary-level public hospitals, only microscope testing is available in laboratories. Additionally, very few hospitals have the facilities and equipment to culture specimens to support diagnosis. As a result, many STIs are not diagnosed in a timely manner, which hinders the prevention of transmission. Currently, the National Health Commission is spearheading a plan to address women's reproductive health, through increasing screening, diagnosis, and health education on syphilis, gonorrhea, and chlamydia, and to improve the testing capacity of primary-level hospitals.

3.4.6 Training

Training for healthcare providers on STIs needs to be strengthened. Currently, coverage of training is low and directed at clinicians only—health workers at community-level clinics and primary-level hospitals often are not reached by these trainings even though they frequently serve key populations. Training content primarily focuses on clinical knowledge, rather than prevention. Additionally, training is often underfunded, and clinicians are frequently overburdened. To address these issues, China's National Plan for Syphilis Prevention and Control aims to train 85% of healthcare providers and 80% of maternal and child health providers in syphilis prevention. Local public health agencies have implemented other measures to strengthen provider capacity, such as requiring attending STI training as part of provider licensing in Shanghai. These efforts should be expanded through improving facilities, funding and policy support, and integration with maternal care efforts and HIV prevention.

3.5 Future Perspectives

Given the importance of STI control to address both the growing syphilis epidemic and sexual transmission of HIV, strengthening these efforts requires not only the development and evaluation of evidence-informed best practices specific to the Chinese health system and context but also effective, widespread implementation. Priorities for STI control include the effective implementation of a syphilis prevention and control program, reduction of congenital syphilis, strengthening of a national surveillance system and data dissemination, integration of STI work into HIV programs, and sexual health education for the general public. In the context of the Chinese health system, these measures must be bolstered by building capacity among a wide range of health workers, including those who care for key populations and STI patients and laboratory workers, particularly in underserved regions. Despite the emphasis on STI prevention and control in national plans, policies, and administrative codes, these efforts must be supported by adequate financing at the local level where implementation occurs, access to reliable supplies, and strong enforcement and licensing practices. Beyond the health system, community-based health communication campaigns and sexual health education are necessary not only to increase knowledge of STI prevention but also to reduce stigma and discrimination. The long history of STIs and varied outcomes of responses suggest the importance of implementation and offer insights on the positive outcomes and negative consequences (e.g., stigmatization of key populations) of these measures.

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Common HIV Co-infections in China: HBV, HCV, and TB

4

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Abstract

Co-infections common among people living with HIV (PLWH) in China include hepatitis B virus (HBV), hepatitis C virus (HCV), and *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis (TB). On their own, each of these infectious diseases, HIV, HBV, HCV, and TB, are major contributors to the global burden of disease. In combination, they are clinically very challenging to manage and are generally associated with poorer outcomes including elevated morbidity and mortality. In China, PLWH, in general, bear a disproportionate burden of viral hepatitis and tuberculosis. However, people who acquired their HIV infection via injecting drug use are dramatically more vulnerable to HBV, HCV, and TB co-infection. China must endeavor to find these people with HIV co-infections, durably link them to care, and help them to initiate treatment. Enhanced screening and integrated care models would help China to better care for people with HIV co-infections.

4.1 Introduction

Infection with HIV, hepatitis B virus (HBV), hepatitis C virus (HCV), and *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis (TB), are all major individual contributors to the overall global burden of disease. In 2017, there

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were an estimated 36.9 million people living with HIV (PLWH) worldwide, 1.8 million of whom became newly infected, and 940,000 of whom died from AIDS-related illnesses that same year globally (Joint United Nations Programme on HIV/AIDS 2018). An estimated 350 million people are infected with HBV worldwide, and 1 million deaths annually are attributed to HBV infection. An estimated 170 million globally have HCV, and HCV infection causes 350,000 deaths globally each year (Basnayake and Easterbrook 2016). Approximately one-quarter of the world's population currently has latent TB, and 10 million people acquired TB and 1.6 million died of TB in 2017 (World Health Organization 2018a).

PLWH are more susceptible to other illnesses due to their compromised immune systems, which opens the door for many co-infections (i.e., having more than one viral or bacterial infection at a time). The prevalence of various combinations of co-infections greatly depends upon the microbes present in the environment. The most common co-infections relevant to the HIV epidemic in China are HIV/HBV co-infection, HIV/HCV co-infection, HIV/HBV/HCV triple infection, and HIV/TB co-infection. PLWH with these co-infections are at increased risk of accelerated disease progression, elevated morbidity, and higher mortality. The challenges of co-infection among PLWH in China are many, but these challenges have been recognized, and the Chinese Government has taken steps to respond with prevention and control measures to try and help those with co-infections and prevent others from acquiring them.

4.2 Hepatitis Co-infection

Hepatitis, or inflammation of the liver that can lead to fibrosis, cirrhosis, or liver cancer, has many causes, the most common of which globally is viral infection. HBV and HCV are responsible for 96% of worldwide hepatitis mortality (World Health Organization 2015) and are the two main viral types relevant to China's HIV epidemic. Like HIV, HBV and HCV are spread through exposure to infective blood. For example, HBV and HCV can be acquired via receipt of contaminated blood products or sharing of drug injecting equipment. While HCV can be acquired via sexual contact also, this transmission route is relatively rare. By contrast, HBV can be transmitted through semen and other body fluids and can be transmitted from an infected mother to her infant at birth or from a family member to a child. The overlapping routes of transmission and risk factors of these viruses make HBV and HCV a highly prevalent comorbidity of HIV in China, especially among people who inject drugs (PWID) and men who have sex with men (MSM; Zhang et al. 2014).

4.2.1 HIV/HBV Co-infection

4.2.1.1 Epidemiology

HIV/HBV co-infection is one of the most common forms of co-infection among PLWH. A large narrative review of the literature has found that the prevalence of

HBV infection among HIV patients ranged from roughly 5% to 15% in studies from Europe (e.g., France, Germany, Greece, Italy, Netherlands, Spain,), 5% to 10% in studies from the Americas (e.g., Brazil, Canada, United States), and 5% to 30% in studies from African (e.g., Ivory Coast, Nigeria) and Asia-Pacific region countries (e.g., India, Iran, Japan; Askari et al. 2014). In Africa, home to roughly 70% of PLWH globally and a widespread epidemic driven predominantly by sexual contact, an estimated 10% are thought to have HBV co-infection (Matthews et al. 2014). A study in Malaysia found that 13% of PLWH in a tertiary care hospital setting had HBV co-infection, and those with a history of injecting drug use had greater risk of HIV/HBV co-infection (Akhtar et al. 2016).

In China, HBV is the predominant cause of viral hepatitis. The most recent national survey of viral hepatitis in general population was conducted in 2006. Hepatitis B surface antigen (HBsAg) prevalence was found to be 7.2% in 2006, down from 9.8% in 1992 when universal infant HBV vaccination was first implemented (Cui and Jia 2013). As of 2005, HBV infant vaccination had reached an overall coverage rate of 90%, albeit still 20% lower among rural citizens compared to urban citizens. Thus, although the 2006 survey yielded a 7.2% overall prevalence of HBV, HBV among children under 15 years of age was much lower and among those under 5 years was less than 1%. Unfortunately, this meant that those who were older or among high-risk groups carried a disproportionate burden (Cui and Jia 2013).

A 2007–2008 study among Chinese PLWH in infectious disease hospitals in seven high-prevalence provincial-level administrative areas found that the overall prevalence of HIV/HBV co-infection was 12.5%, with sexual contact and injecting drug use cited as the major transmission routes (Yan et al. 2011). In a series of studies by Yang and colleagues, the prevalence of HBV co-infection among PLWH has been found to be 10% (Yang et al. 2008, 2014). In a study that re-screened blood samples collected in Sichuan between 1995 and 2010 that were all confirmed to be HIV positive, 13% were found to also be HBV positive. Among those with HBV co-infection, a majority had already progressed to AIDS at the time the blood samples were taken (Liu et al. 2014). Other studies have found HBV co-infection prevalence to be higher or lower depending on route of HIV infection. For example, in a study of 3000 PLWH in Guangxi who became infected with HIV via sexual contact, HBV prevalence was under 5% (Zhang et al. 2017). By contrast, in a Yunnan study of 500 PLWH who were also PWID, the prevalence of HBV co-infection was 72% (Dong et al. 2015).

4.2.1.2 Testing, Treatment, and Care

Currently, China's standard-of-care procedure of diagnosing and clinically evaluating PLWH prior to initiation of treatment does not include testing for HBV co-infection. As of the end of 2017, China had an estimated 960,000 PLWH, 71% of whom had been diagnosed. If HBV prevalence among China's diagnosed PLWH population truly is in the neighborhood of 10%, then as many as 68,000 people may not be receiving the specialized treatment they require in a timely fashion.

This is an important missed opportunity that needs to be addressed. Progression of chronic HBV infection to cirrhosis and end-stage liver disease or hepatocellular carcinoma is accelerated among patients with HIV/HBV co-infection. Conversely, some reports indicate that HIV disease progression is also accelerated with HIV/HBV co-infection patients experiencing greater risk of virological failure and death. Clinical management of patients with HIV/HBV co-infection is more complicated. HIV/HBV co-infection patients require careful selection of antiretroviral (ARV) drug regimens since some ARV drugs are dually active against HIV and HBV, while others are contraindicated for these patients as they are more susceptible to ARV drug toxicity and other liver-related complications.

A nationwide, retrospective cohort study of all PLWH who entered China's National Free ART Program between January 2010 and December 2011 found an HBV co-infection prevalence of 8.7% (Zhang et al. 2014). However, among the nearly 71,000 PLWH otherwise eligible for the study, almost 36,000 (51%) were excluded due to lack of HBV or HCV test results in their records. No effect of HBV co-infection was observed in any of the outcomes measured in this study (e.g., CD4 count, viral load, mortality). However, the authors speculate that this may have been due to the inclusion of lamivudine (3TC; active against both HIV and HBV) in the treatment regimens of all patients included in the study. The authors argue that their findings underscore the urgent need for implementing thorough screening of all PLWH for co-infection with HBV and integrating HBV care into the existing HIV care infrastructure in China (Zhang et al. 2014).

4.2.2 HIV/HCV Co-infection

4.2.2.1 Epidemiology

Estimates of global HCV prevalence among PLWH range widely. One systematic review estimated HIV/HCV co-infection prevalence to be 33% globally (Basnayake and Easterbrook 2016). In the United States, an estimated 25% of PLWH have HCV co-infection (Koziel and Peters 2007). A large, global systematic review and meta-analysis of nearly 800 studies found that the prevalence of HCV co-infection among PLWH overall was 6.2%. However, the prevalence of HIV/HCV co-infection was clearly affected by HIV transmission mode. Prevalence of HCV co-infection was 2.4% among general populations, 4.0% among PLWH who acquired HIV via heterosexual contact, 6.4% among PLWH who acquired HIV via male-male sexual contact, and 82.4% among PWID.

In China, HCV prevalence among the general population is much lower than HBV prevalence. In 2006, it was estimated that HCV prevalence was 0.4% among the general public, down from 3.2% in 1992. Mandatory screening for HCV infection prior to blood donation implemented in the mid-1990s and harm reduction for PWID scaled up in the mid-2000s are thought to have contributed to this decline (Cui and Jia 2013). Not surprisingly, just like with HBV, HCV prevalence is also higher in high-risk groups in China. Groups at high risk of HCV in China include

PWID, kidney dialysis patients, and others—similar to the groups who are also at high risk of HIV infection.

According to data from China's National Sentinel Surveillance System, the overall prevalence of HCV in the nationwide sentinel population, which includes drug users, MSM, female sex workers, voluntary blood donors, kidney dialysis patients, and others, decreased from 42% in 2010 to 33% in 2015. However, HCV prevalence among PWID has remained above 60% as compared to the prevalence of HCV among dialysis patients, which was 4.6% in 2015. HIV/HCV co-infection prevalence among all other risk groups (e.g., MSM, pregnant women, students, long-distance truck drivers, and male migrants) has fallen below 1%.

A study among Chinese PLWH in infectious disease hospital settings in high-HIV-prevalence areas from 2007 to 2008 found an overall prevalence of HIV/HCV co-infection of 42% (Yan et al. 2011). A study in Yunnan from 2009 to 2011 found that 26% of participants had HIV infection, 78% had HCV infection, and 15% had HIV/HCV co-infection (Zhou et al. 2012). A study among PLWH in Hunan found that among PLWH, the prevalence of HCV co-infection was 50%. However, among PLWH who reported their infection route as injecting drug use, the HCV co-infection rate was 94% (Chen et al. 2013).

4.2.2.2 People Who Inject Drugs

UNAIDS has estimated that, worldwide, there are roughly 12 million PWID, 14% of whom are have HIV infection (1.6 million people) and 50% of whom have HCV infection (6 million people; Joint United Nations Programme on HIV/AIDS 2017). A majority of individuals who have HIV/HCV co-infection are PWID. A broad range of studies have found that the prevalence of HCV co-infection among PWID who have HIV infection (PWID-PLWH) is as high as 90%.

China, the Russian Federation, and the United States are home to the largest HCV-infected PWID populations in the world (Nelson et al. 2011). China's 2015 National Sentinel Surveillance Program Report revealed that the nationwide prevalence of HIV/HCV co-infection among PWID was 60%, much higher than among non-injection drug users (14%). However, not surprisingly, there is some geographical variability, and drug use treatment status and drug use-related risk behavior influence HIV/HCV co-infection prevalence results as well. For example, a study among PWID-PLWH in Yunnan province found an HIV/HCV co-infection prevalence of 91% (Dong et al. 2015). By contrast, the HIV/HCV co-infection rate of two Guangxi methadone maintenance treatment (MMT) clinics was 18%—higher among those who had history of needle sharing (36%) compared to those who had never shared needles (10%; Yao et al. 2018).

4.2.2.3 Testing, Treatment, and Care

Clearly, HCV infection is one of the most clinically relevant comorbidities in the HIV-infected population in China. However, China's current standard-of-care procedure for diagnosing and clinically evaluating PLWH does not include HCV testing although HCV testing is more common within China's National MMT Program,

where some 200,000 PWID are actively being treated each year for opioid dependence. Just like with HBV, this represents a missed opportunity to find patients with HIV/HCV co-infection early and ensure they receive the specialized services they require.

Also similar to HIV/HBV co-infection cases, HIV/HCV co-infection cases are complex and challenging to manage. Untreated PLWH are less likely to spontaneously clear HCV infection, have higher HCV viral loads, and experience more rapid HCV disease progression than those without HIV infection, particularly with advanced levels of immunodeficiency (Platt et al. 2016). The effect of HCV infection on the progression of HIV disease is less clear, but it is thought that HIV disease is accelerated in the presence of HCV. Nevertheless, morbidity among HIV/HCV co-infection patients is elevated compared to patients with either HIV or HCV alone.

HCV/HIV co-infection patients should receive curative HCV treatment as well as ART, being careful to avoid drug-drug interactions and resulting potential for drug-induced liver injury. However, in China, treatment coverage among individuals with HCV/HIV co-infection is less than ideal. A nationwide study of all PLWH who entered China's National Free ART Program between January 2010 and December 2011 found an HCV co-infection prevalence of 18%. Patients with HIV/HCV co-infection had 46% greater risk of death and 30% greater odds of ART dropout compared to those with HIV infection alone. It is important to note that in this study almost 36,000 PLWH were excluded because their records did not contain results of HBV or HCV testing (Zhang et al. 2014). It is difficult to speculate as to whether the study results for HIV/HCV co-infection were under- or overestimated because of this unfortunate lack of data. On the one hand, many people with HIV/HCV co-infection experience severe symptoms, which may make them more likely to seek care, obtain HCV testing, and initiate ART. On the other hand, a very large majority of people in China who have HIV/HCV co-infection are PWID, and PWID in China are well-known to experience more, and more challenging, barriers to HIV treatment and care.

Clearly, China should consider better addressing the needs of this particularly vulnerable population. At a minimum, thorough screening of all PWID-PLWH for co-infection with HCV should be urgently implemented. However, HCV screening for all newly diagnosed PLWH and integration of HCV care into the existing HIV care infrastructure and/or into the National MMT Program in China would better ensure that these people get the specialized treatment and clinical monitoring they require.

4.2.3 HIV/HBV/HCV Triple Infection

HIV/HBV/HCV triple infection is much less prevalent than either HIV/HBV or HIV/HCV co-infection but is associated with even worse outcomes and is a significant clinical issue in China. For example, a study in Hunan found 12% prevalence of HIV/HBV/HCV triple infection (Chen et al. 2013). One study among PWID in

Yunnan found that 7% had HIV/HBV/HCV triple infection (Zhou et al. 2012), while another found a 67% prevalence of HIV/HBV/HCV triple infection (Dong et al. 2015).

Among PLWH who were receiving ART in China, the overall nationwide prevalence of HIV/HBV/HCV triple infection was 3.3%. All-cause mortality was highest among PLWH on ART who had HBV and HCV co-infections, and HIV/HBV/HCV triple-infected patients had a 90% greater risk of death compared to patients with HIV monoinfection. Patients with triple infection also had 26% greater odds of virological failure and 37% greater odds of loss to follow-up (Zhang et al. 2014).

4.3 Tuberculosis Co-infection

TB, caused by infection with the *Mycobacterium tuberculosis* bacteria, is a preventable and curable infectious disease, is currently one of the top ten causes of death worldwide, and is the leading cause of death among PLWH. Developing countries see 95% of TB cases and 95% of TB deaths worldwide (World Health Organization 2018a). China has a high burden of TB among its population. In 2017, an estimated 889,000 (761,000–1,030,000) new cases of TB occurred in China (diagnosed and undiagnosed), accounting for 9% of the estimated 10.0 million (9.0–11.1 million) new cases worldwide, more than any other country except India (World Health Organization 2018b).

Drug-resistant TB continues to be a public health crisis globally and in China. In 2017, an estimated 58,000 people in China developed TB that was resistant to rifampicin (RR-TB), the most effective first-line TB drug, and many of them had multidrug-resistant TB (MDR-TB). China accounts for 13% of the estimated 558,000 cases of RR-TB/MDR-TB globally. The World Health Organization (WHO) has named China as one of the 30 high-burden countries for TB, MDR-TB, and TB/HIV co-infection for the 2016–2020 period (World Health Organization 2018b).

4.3.1 Epidemiology of HIV/TB Co-infection

Globally PLWH have 20- to 30-times greater risk of TB infection compared to people who do not have HIV (World Health Organization 2018a). With nearly 900,000 new TB infections each year (diagnosed and undiagnosed) and more than 100,000 new cases of HIV diagnosed each year (Pisani and Wu 2017; World Health Organization 2018b), it is not surprising that China is home to many HIV/TB co-infection cases—an estimated 12,000 new cases in 2017 (World Health Organization 2018b).

The presence of HIV infection elevates risk of progression to active TB among individuals with primary TB infection and risk of reactivation of TB among individuals with latent TB infection. It furthermore impairs the immune system's ability to contain TB infection and is associated with increased likelihood of re-infection

with TB. Conversely, the presence of TB infection is associated with elevated HIV viral replication, exaggerated immune suppression, and accelerated disease progression, thereby contributing to increased risk of opportunistic infection and death (Kwan and Ernst 2011).

PLWH are more likely to have active TB than the general population in China. A meta-analysis of 29 articles published prior to 2010 found that the prevalence of TB among China's PLWH was 7.2% but was 23% among those who had already progressed to AIDS (Gao et al. 2010). In a 2012–2013 study in Guangxi, among 3000 PLWH found a TB co-infection prevalence of 5% (Zhang et al. 2017). In another 2012–2013 study in Guangxi, this time among over 1000 PLWH, 16% were found to have TB co-infection, and greater odds of TB co-infection were found among those who smoked, had lower CD4 counts, had longer duration of HIV infection, and had not received ART (Cui et al. 2017).

Conversely, among TB patients, HIV co-infection is also relatively common. A study in Guangxi, Henan, and Sichuan found that among more than 1000 participants with TB infection, 3.3% were diagnosed with HIV co-infection (Xu et al. 2014). In a study among more than 19,000 TB patients, 4.8% were found to have HIV co-infection. Furthermore, 26% of deaths observed in the cohort were among HIV/TB co-infected patients—HIV infection was associated with eight-fold greater risk of death (Lai et al. 2015). In a study in Jiangsu of nearly 11,000 TB patients, 14% were found to have HIV infection, and a range of sociodemographic factors as well as HIV and TB knowledge were found to be associated with HIV/TB co-infection (Chen et al. 2016).

4.3.2 Response

The challenge of the HIV/TB co-infection was recognized by China's Ministry of Health (now National Health Commission) very early, and a series of policy documents, technical specifications, and activities were carried out to meet this challenge.

In 2005, a work plan for TB screening among PWLH was launched by the Ministry of Health for the purpose of strengthening the prevention and treatment of HIV/TB co-infection. This work plan indicated that TB screening should become a routine service for all diagnosed PWLH nationwide.

In 2008, the Ministry of Health and the Chinese Center for Disease Control and Prevention (China CDC) issued a China Tuberculosis Control Plan, which specified that, in areas with high HIV prevalence, TB control agencies should mobilize newly registered TB patients to receive HIV testing and follow-up. For TB patients diagnosed with HIV infection, TB control agency staff should immediately arrange linkage to further HIV care. The policy also delineates guidelines for the clinical treatment of HIV/TB co-infected patients. Historically, treatment for TB is provided

before starting ART. However, more recent evidence indicates that there is a substantial benefit to earlier initiation of ART in these patients (Yan et al. 2015).

In 2010, a national work plan for HIV/TB co-infection prevention and control was issued by the Ministry of Health. It explicitly stated that TB screening services should be provided to PLWH at least once per year. This new work plan also recognized the overlapping work required by TB prevention and control agencies and HIV/AIDS prevention and control agencies and encouraged better communication and cooperation.

In 2017, the General Office of the State Council of China issued the "13th 5-Year Plan for National Tuberculosis Prevention and Control." This plan recognized the need to strengthen the prevention and control of HIV/TB co-infection and called for active TB screening among key populations, such as PLWH, and tasked medical institutions responsible for the diagnosis and treatment of both HIV and TB with establishing a sound cooperation mechanism to jointly screen, diagnose, treat, and manage HIV/TB co-infected patients.

4.4 Challenges and Conclusions

People in China with common HIV co-infections, including HIV/HBV, HIV/HCV, HIV/HBV/HCV, and HIV/TB co-infections, are extremely vulnerable and face many barriers to testing, diagnosis, treatment, and care and face higher levels of morbidity and mortality. Although some progress has been made, many challenges persist. First, underreporting and underdiagnosis of HBV, HCV, TB, and MDR-TB among China's PLWH remain major challenges for China. Patients who are unaware of their co-infection status are unlikely to receive the specialized treatment and intensive monitoring they require. Second, although HBV, HCV, and TB are all preventable and HCV and TB are curable, accessibility and coverage of vaccinations and treatments are persistently suboptimal. Knowledge is low, treatment and associated costs are high (e.g., hospitalization, diagnostic testing), and the healthcare system is complex and difficult to navigate. Third, more complete data and more timely reporting are needed to better estimate the magnitudes of HIV co-infection prevalence and locations of high-prevalence areas, so that targeted intervention could be implemented. Finally, universal screening of all diagnosed PLWH for HBV, HCV, and TB should be implemented, and integrated care for patients with these co-infections should be developed to maximize retention in specialized treatment and care.

China must more closely examine its problem of HIV co-infection and carefully develop a comprehensive, pragmatic solution that can be scaled up rapidly nationwide. These individuals are extremely vulnerable. They must be identified, linked to care, and started on treatment and close monitoring as quickly as possible.

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HIV Laboratory Network and Quality Assurance System

5

Yan Jiang

Abstract

HIV testing was first implemented in 1985 by the Chinese government, and since then, many public and private entities have played a dynamic role in the development of HIV laboratories in China. The Chinese government set targets for HIV control and provided vital support, in the form of policies and funding, that was foundational to the establishment of the laboratory system. In addition, international organizations have also provided vital technical assistance, equipment, training, expertise, and problem-solving support. As a result of three decades of effort, the National HIV Reference Laboratory, more than 12,000 screening laboratories, and almost 600 confirmatory laboratories have been established in China. Most of these laboratories are equipped to perform serological, immunological, and virological testing. Moreover, an extensive quality assurance and quality control program has been put into place that includes thorough training, proficiency testing programs, laboratory assessments, and other activities to ensure quality in work performed by all laboratories in the network. Although challenges remain, China has built a strong foundation and expanded it to build a capable network of laboratories focused on providing quality HIV testing services for both diagnosis of HIV infection and management of treatment.

5.1 Introduction

Laboratory testing is a critical element in HIV epidemic surveillance, clinical diagnosis, and evaluation of treatment efficacy. In China, the increase in HIV infections and the widespread application of antiretroviral (ARV) drugs demand

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high capacity for diverse and sophisticated laboratory testing capabilities. With the leadership of the government and Chinese public health institutions and assistance of international organizations, a laboratory system that covers all provinces, prefectures, and cities has been established. This network carries out laboratory testing related to epidemic surveillance, clinical diagnosis, treatment monitoring, and blood supply safety (Jiang 2007). This chapter discusses the responsibilities of various agencies within the laboratory system at different levels, current testing and diagnosis strategies for HIV infection, assays and surveillance strategies for identifying recent HIV infection, assays and strategies for monitoring antiretroviral therapy (ART) effectiveness, and current challenges in quality assurance (QA).

By the end of 2017, a large network of HIV laboratories had been established in China, including 1 National HIV Reference Laboratory (NHRL), 35 centralized provincial confirmatory laboratories, 586 confirmatory laboratories, and over 12,000 screening laboratories (Fig. 5.1). The NHRL and the centralized provincial confirmatory laboratories were established by China's National

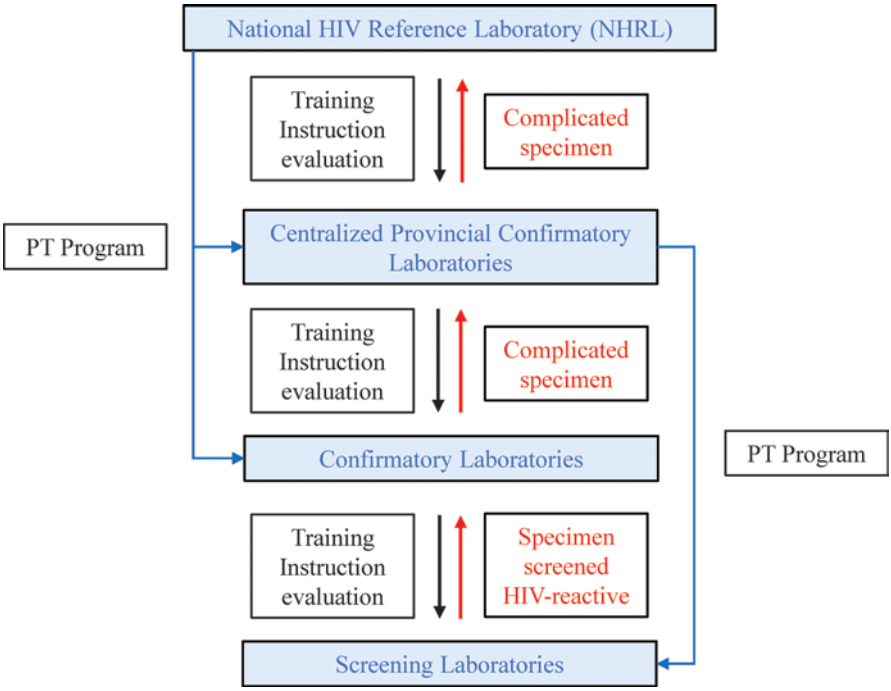

Fig. 5.1 Overall structure of China's HIV/AIDS laboratory network. Black arrows show the downward cascade of training, evaluation, and proficiency testing (PT) to lower level laboratories in the network, and red arrows show the as-needed upward escalation of specimens to more sophisticated laboratories at higher levels in the network

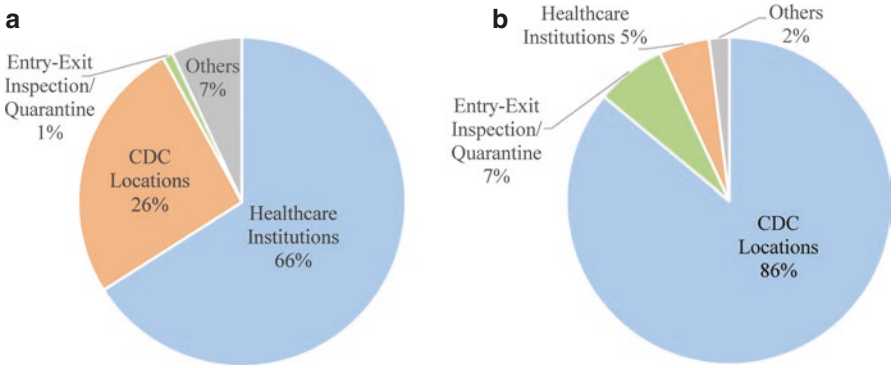

Fig. 5.2 Distribution of HIV laboratories by setting in China for (**a**) screening laboratories and (**b**) confirmatory laboratories (of all types)

Health Commission (NHC, formerly the Ministry of Health). Other confirmatory laboratories and screening laboratories fall under the purview of the health authorities at the provincial government level and are constructed and expanded in response to local epidemic conditions. In addition to the very large laboratory network, there are also nearly 20,000 testing sites that provide rapid HIV screening in rural areas.

Laboratories at the lowest level are generally integrated to some degree with China's health system. For example, a majority of screening laboratories are based in hospitals (66%), while only 26% are at CDCs and 9% are in other facilities (Fig. 5.2a). Confirmatory laboratories are primarily based at provincial Center for Disease Control and Prevention (CDC) locations (85%), with the remainder at hospitals (5%) and other facilities (9%; Fig. 5.2b; Jiang 2014).

In addition to the basic blood HIV antibody-based testing, a range of tests, such as $CD4^+$ T cell count, HIV-1 viral load (VL), HIV-1 drug resistance (DR), early infant diagnosis (EID), urine HIV-1 antibody testing, and HIV-1 incidence assay, have been introduced to laboratories in China. While all laboratories can conduct HIV antibody screening, different testing responsibilities are assigned to each level in the laboratory network. In general, the 35 centralized provincial confirmatory laboratories can conduct all of these HIV-related tests. In addition to confirmatory tests, other confirmatory laboratories also often conduct $CD4^+$ T cell count testing and HIV-1 VL testing. Finally, all screening laboratories conduct HIV antibody screening tests, such as enzyme-linked immunosorbent assay (ELISA), rapid testing (RT), and chemiluminescence immunoassay (CLIA). A few screening laboratories also conduct $CD4^+$ T cell count testing (Table 5.1).

Table 5.1 Tests performed by laboratories at different levels of China's HIV laboratory network

Test	Measurement	Laboratory number	Types of laboratories	Testing coverage (%)				
				National level	Provincial level	City level	County level	Village level
ELISA/CLIA	Antibody (screening)	11,899	NHRL, CPCL, CL, SL	100	100	99.7	95.1	
RT	Antibody (screening)	11,090	NHRL, CPCL, CL, SL, TS	100	100	99.7	96.8	26.3
WB/RIBA	Antibody (confirmation)	412	NHRL, CPCL, CL	100	100	83.2	1.5	
CD4	$CD4^+$ T Cell count	410	NHRL, CPCL, CL, SL	100	100	80.2	6.0	
VL	Viral load	110	NHRL, CPCL, CL	100	100	28.8	0.3	
BED/LAg	Recent infection	35	NHRL, CPCL	100	100			
DR	Drug resistance	34	NHRL, CPCL	100	93.5			
EID	Early infant diagnosis	15	NHRL, CPCL	100	61.3			
Urine EIA	Antibody (screening)	36	NHRL, CPCL, CL	100	85.7	0.02		

Types of HIV-related tests and their measures are included with the number and types of laboratories that conduct those tests, along with coverage at national and provincial levels as well as city, county, and village levels

ELISA enzyme-linked immunosorbent assay, *CLIA* chemiluminescence immunoassay, *RT* rapid test, *WB* Western blot, *RIBA* recombinant immunoblot assay, *VL* viral load, *DR* drug resistance, *EID* early infant diagnosis, *NHRL* National HIV Reference Laboratory, *CPCL* centralized provincial confirmatory laboratories, *CL* confirmatory laboratories, *SL* screening laboratories, *TS* testing sites

5.2 Roles and Responsibilities

5.2.1 Role of the Central Government

In China, the central government's response to the HIV epidemic has changed over time. Early on, when the epidemic was just beginning, the central government issued a new policy called the "National Plan for AIDS Prevention (1988–1991)." This policy, issued in 1987, established a national fund for HIV/AIDS prevention and treatment, and as a result, the first HIV laboratory was established in 1988 at the Chinese Academy of Preventive Medicine (now the China CDC) in Beijing. Later on, when China's HIV epidemic began to expand in size, but generally remained geographically localized (1989–1995), many policies and regulations related to the HIV epidemic were issued, including the "Medium Term Plan of HIV Prevention and Control in China," which was issued in 1990, and the "Guideline for HIV Laboratory Testing and Management," which was released in 1997. As HIV incidence increased and the epidemic became more mature, the government emphasized prevention and issued the "Medium- and Long-Term Development Programs of HIV Prevention and Control in China (1998–2010)." Additionally, a series of policies specifically addressing HIV testing were issued during this time. In 2004, HIV screening tests in voluntary counseling and testing (VCT) clinics were required to be offered free of charge. In 2006, the first regulations for HIV testing laboratories were issued in a policy called the "National Management Regulation of HIV/AIDS Detection." Finally, $CD4^+$ T cell count testing and HIV-1 VL testing were made free to patients also in 2006, and HIV confirmatory testing was made free to patients beginning in 2008 (see Chaps. 12 and 18 for more information).

Within the central government, the NHC is responsible for issuing basic regulations for all laboratories, managing construction of new laboratories, and equipping and staffing those laboratories. Although substantial funding supporting the HIV epidemic response in China was provided by international organizations, China's central government has steeply ramped up its budget allocation to HIV-related missions including supporting the HIV laboratory network. For example, in 2000, China's HIV response budget was 20 million CNY (almost 2.5 million USD at that time), whereas in 2017, it had increased to 2.6 billion CNY (nearly 415 million USD). Altogether, the government's strong focus on, and investment in, its HIV response has laid a solid foundation of strong technical support for national HIV prevention and control efforts, thus making surveillance, diagnosis and treatment, intervention programs, and blood safety possible.

5.2.2 Role of the China CDC

The China CDC's NHRL was established in 1998 and provides technical guidance and certification to China's HIV laboratory network. It is responsible for compiling and editing technical guidelines to standardize testing in regional laboratories, organizing national-level technical training, assessing commercial reagents and kits, and

evaluating and promoting the use of new technologies. The NHRL also acts as an organizer for proficiency testing (PT; i.e., a method for assessing and controlling interlaboratory variability) at the national level and establishing an effective platform for laboratory network communication (Qiang et al. 2006).

The China CDC has developed and released a number of guiding documents that have helped to ensure standardized testing in regional laboratories:

- National Guideline for Detection of HIV/AIDS (2004, 2009, and 2015).
- Guideline for $CD4^+$ T Lymphocyte Counting and Quality Assurance (2006 and 2013).
- Guideline for HIV-1 Viral Load Testing and Quality Assurance (2008 and 2013).
- Guideline for HIV Antibody Rapid Test (2011).
- Guideline for HIV-1 Genotyping, Drug Resistance Testing, and Quality Assurance (2013).

5.2.3 Role of the Provincial and Local Laboratories

Centralized provincial confirmatory laboratories are responsible for the planning and design of laboratories at the local levels. They also organize technical guidance at the provincial level, including updating technical training curriculum and implementing PT programs for screening laboratories. Other confirmatory and screening laboratories are responsible for routine testing according to national guidelines. Centralized provincial confirmatory laboratories are essential elements linking the NHRL and the regional laboratories (i.e., other confirmatory laboratories, screening laboratories, and testing sites). Issues and requirements proposed by the regional institutions are transferred to NHRL by the provincial institutions (Fig. 5.1).

Table 5.2 International programs that influenced the development of China's HIV laboratory network

Years	Projects
2000–2005	The World Bank Loan Program: The Ninth Health Program
2001–2004	UNICEF Program: Prevention of Maternal-Neonatal Transmission of AIDS
2002, 2004, 2006	Sino-ASEAN Program: Construction of an AIDS Laboratory System
2002–2008	US NIH Program: Comprehensive International Program of Research on AIDS (CIPRA)
2003–2018	Sino-US Cooperation: Global AIDS Program (GAP)
2003, 2004	Sino-German Cooperation: STD and AIDS Program
2003–2005	Sino-British Financial Cooperation: AIDS Program
2004–2010	Clinton Health Foundation HIV/AIDS Initiative (CHAI)
2005–2013	WHO Program: The Technical Cooperation Network for AIDS
2006–2012	Global Foundation AIDS Program
2007–2011	China-MSD HIV/AIDS Partnership Program (C-MAP)

UNICEF United Nations International Children's Emergency Fund, *ASEAN* Association of Southeast Asian Nations, *US NIH* United States National Institutes of Health, *STD* sexually transmitted disease, *WHO* World Health Organization, *MSD* Merck Sharp & Dohme

Every 2 or 3 years, the centralized provincial confirmatory laboratories receive guidance from national experts at NHRL.

5.2.4 Support from International Organizations

Since 2000, several international programs have facilitated the development of the China's HIV laboratory network (Table 5.2). Expertise on laboratory design and construction, as well as management and inter- and intra-laboratory communication, was provided. Equipment was supplied, new technologies were introduced, and staff members were trained. Assistance with optimization of laboratory procedures and QA and quality control (QC) systems was provided, laboratory certification was facilitated, and human resource capacity was increased (see Chaps. 20 and 21 for more information).

Two examples of international agencies that had an impact on improving HIV laboratory testing in China are the Clinton HIV/AIDS Initiative (CHAI) and the Global AIDS Program (GAP). In 2004, the Ministry of Health (now the NHC) and CHAI signed a memorandum of understanding. With the assistance of CHAI, NHRL acquired the ability to perform $CD4^+$ T cell count testing and HIV-1 VL testing. CHAI also funded the establishment of integrated proficiency testing (PT) systems for $CD4^+$ T cell count testing (i.e., immunological quality assurance [IQA]) and VL testing (i.e., virological quality assurance [VQA]) within the laboratory network. As a result, there are now more than 500 certified $CD4^+$ T cell count testing laboratories and 200 VL testing laboratories in China as of the end of 2017.

The GAP, which was a Sino-US Cooperation, was initiated in 2003. With an emphasis on applying new techniques, NHRL introduced BED testing to China in order to estimate HIV incidence through surveying recent infections. Following the guidance of the US CDC and epidemiological data, NHRL recalculated the mean duration of recent infection (155 days for the USA and 168 days for China) and adapted the BED technique for application to Chinese populations. Today, international organizations still periodically participate in the review of laboratory guidelines and standard operating procedures and share new strategies and technologies, such as the avidity enzyme immune assay technique, with China.

5.3 HIV Diagnosis

In China, HIV is primarily diagnosed through detecting the presence of HIV antibodies using traditional serological testing (e.g., ELISA and Western blot [WB]). However, in some cases, antibody testing to determine serostatus is not useful. For example, exposed infants retain maternal antibodies well after birth and therefore must be tested for actual HIV nucleic acid sequences by EID. As another example, individuals with recent infection will not have generated antibodies to HIV until several weeks have elapsed. Thus, nucleic acid testing (NAT) is also used to test individuals suspected to be in this so-called window period (see Chap. 12 for more information).

The range of tests used to determine a diagnosis of HIV infection require many types of reagents, kits, and equipment, all of which must be approved by the China Food and Drug Administration (CFDA) and evaluated by NHRL before being incorporated in the laboratory network's protocols. NHRL shares the results of its evaluation annually to facilitate selection of reagents among the individual laboratories.

5.3.1 Screening Testing

According to testing guidelines, qualified reagents and kits are used for HIV screening. Three types of HIV screening tests are primarily performed in China: ELISA, CLIA, and RT (Table 5.1). ELISA-based methods are capable of detecting antibodies and antibody/antigen complexes. Currently, antibody-detecting ELISAs are the most frequently used screening assay in CDC laboratories. However, in other laboratories, antibody/antigen complex-detecting ELISAs are more common. Most HIV ELISA kits and reagents are purchased from local sources. CLIAs for HIV screening are always conducted on automated systems, which are widely used in China's hospital laboratories. These assays tend to be more sensitive than ELISAs and can detect not only antibodies but simultaneously also antigens. CLIA kits and reagents and associated equipment are also sourced domestically. Finally, RT is widely used in CDC, hospital, and VCT clinic laboratories across the country, but especially in settings where resources are limited such as remote regions and rural health centers. RT is a fast and convenient way to get results in as little as 10–30 min, and most of the products used for this type of testing are made in China.

5.3.2 Supplementary Testing

According to testing guidelines, qualified supplementary reagents and kits are also used for supplementary testing. Annually, more than 150,000 HIV confirmatory tests are conducted nationwide. Only certified laboratories may conduct these tests for diagnosis, according to national regulations. Samples with reactive screening results are retested using supplementary assays, and repeatedly reactive samples are diagnosed as HIV infection. According to the National Guideline for Detection of HIV/AIDS (Jiang et al. 2015), supplementary tests are ordinarily antibody assays, including WB and recombinant immunoblot assay (RIBA) and HIV RNA or DNA NAT. WB has been most commonly used. However, RIBA kits and NAT are being used with increasing frequency.

5.3.3 Testing Algorithm

All HIV screening in China is performed according to the National Guideline for Detection of HIV/AIDS (2015; Fig. 5.3). Samples that yield nonreactive results

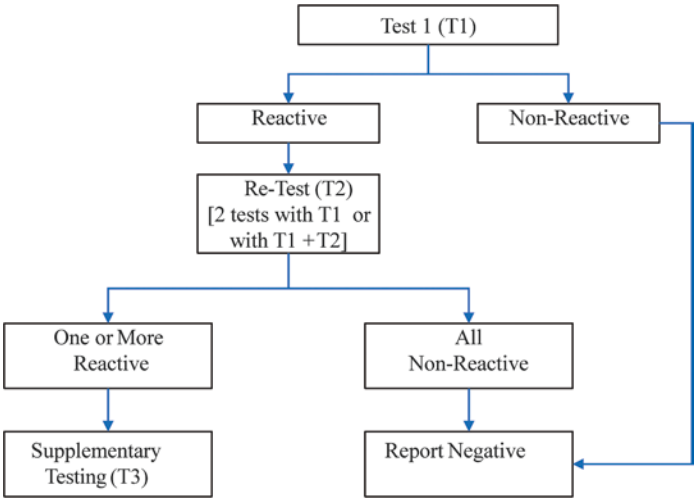

Fig. 5.3 National testing algorithm for HIV screening in China

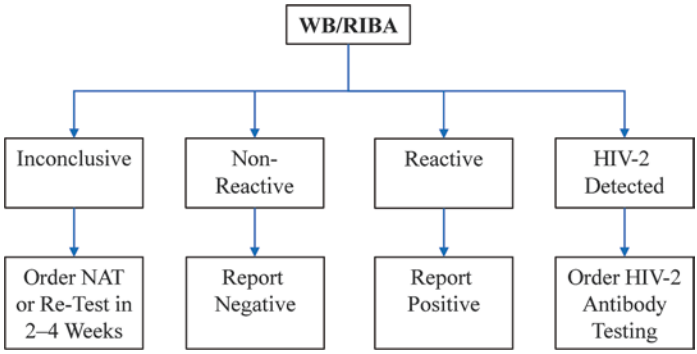

Fig. 5.4 National testing algorithm for HIV supplemental testing—confirmatory testing by WB/RIBA—in China

with screening tests (T1) are reported as negative. However, reactive samples are not reported as positive. Rather, they are subjected to retesting (T2) and further supplementary testing (T3). Reactive samples are retested two times using either the exact same reagents and kits as used in screening for both retests or using the exact same reagents and kits for one retest plus another set of reagents and kits (e.g., different manufacturer or test method) for the other retest (T1 + T1 or T1 + T2). If an antibody/antigen complex screening test was used initially, then at least one antibody/antigen-detecting kit should be used in the retest. If both retests are nonreactive, then the result is reported as negative. If the retests are either both reactive or one reactive and one nonreactive, then supplementary testing must be conducted.

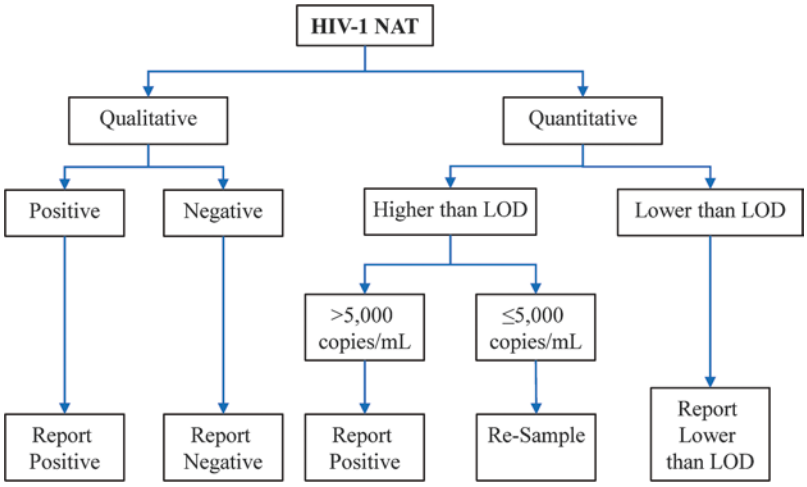

Fig. 5.5 National testing algorithm for HIV supplemental testing—confirmatory testing by NAT—in China (*LOD* limit of detection)

All HIV supplementary testing in China is also performed according the National Guideline for Detection of HIV/AIDS (2015; Figs. 5.4 and 5.5). A reactive WB or RIBA result (or a negative NAT result) is reported as HIV negative, while a reactive (on WB or RIBA) or positive (on NAT) result is reported as HIV positive and results in a diagnosis of HIV infection. However, it is possible for WB or RIBA test results to be inconclusive. When this occurs, WB or RIBA testing may be conducted again after 2–4 weeks or NAT testing may be performed. In the unlikely event that HIV-2 is detected, then HIV-2 antibody supplementary testing must be ordered. Samples that are difficult to diagnose are ultimately analyzed at the NHRL (Fig. 5.1).

In high-incidence areas, an alternative supplementary strategy is carried out for high-risk populations to reduce costs and to simplify and accelerate the HIV testing algorithm. Testing carried out under this strategy can also be performed under limited, experimental conditions and is mainly conducted in screening laboratories. This strategy consists of a highly sensitive screening test, a highly specific screening test, and a highly sensitive ELISA. These three different screening tests are conducted in parallel. If all three tests yield reactive results and the signal-to-cutoff ratio (S/CO) in the ELISA is high, then a diagnosis of HIV infection may be made directly (Fig. 5.6).

5.3.4 Diagnosis of Acute Infection and Late Stage of Disease

NAT is used for the diagnosis of acute infection since individuals with newly acquired HIV infection will not generate antibodies to HIV viral antigens until several weeks later. This “window period” of infection causes traditional antibody-based screening tests to yield nonreactive results despite the presence of virus. Thus,

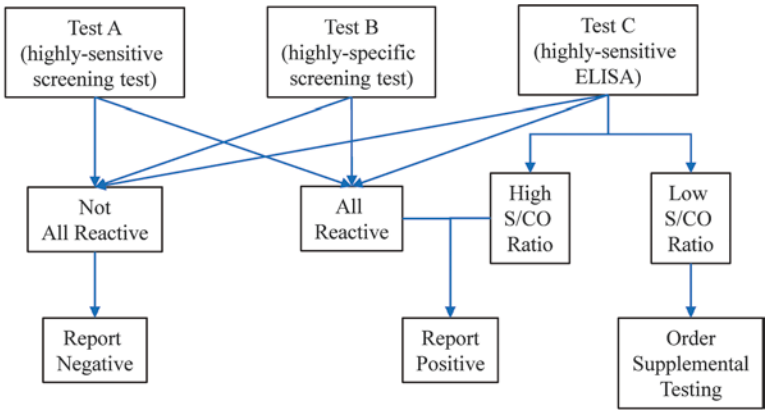

Fig. 5.6 National testing algorithm for HIV supplemental testing—alternative strategy for high-incidence areas

to diagnose HIV infection during the acute infection stage, NAT can be used to test for viral nucleic acid molecules directly. Generally, if an NAT test is negative, the result is reported as HIV nucleic acid negative. However, if an NAT test is positive, follow-up sampling and retesting is performed. If the retest result is also positive, then a diagnosis of acute HIV infection is made. It is possible, to have an indeterminant result, in which case further follow-up testing is required.

In high-risk populations, such as men who have sex with men (MSM), pooled NAT is used to discover early-stage infection. Populations with suspected infections and negative antibodies can be screened through pooled nucleic acid amplification (Pan et al. 2007). Pooled methods are more cost-effective compared to conducting many individual NAT tests.

NAT is also used for the diagnosis of late-stage disease since some patients may have very low levels of antibodies due to increasingly compromised immune system function.

5.3.5 Early Infant Diagnosis (EID)

HIV EID, for diagnosing early-stage infection in infants, typically vertically infected infants younger than 18 months old, is conducted by HIV NAT (RNA or DNA; Fig. 5.7). The HIV RNA test is highly sensitive in the early phase of infection, while the HIV DNA test is consistent and unaffected by maternal ART, milk-borne ARV drugs, and pre-exposure prophylaxis (PrEP) or postexposure prophylaxis (PEP) using ARV drugs. The first blood sample should be collected at 42 days (6 weeks after birth) and prepared as a dried blood spot (DBS) or as a whole blood sample collected using ethylenediaminetetraacetic acid (EDTA) anticoagulant. If this 6-week sample is positive, then a second blood sample should be collected as soon as possible. If it is also positive, then a diagnosis of HIV infection can be made. If it

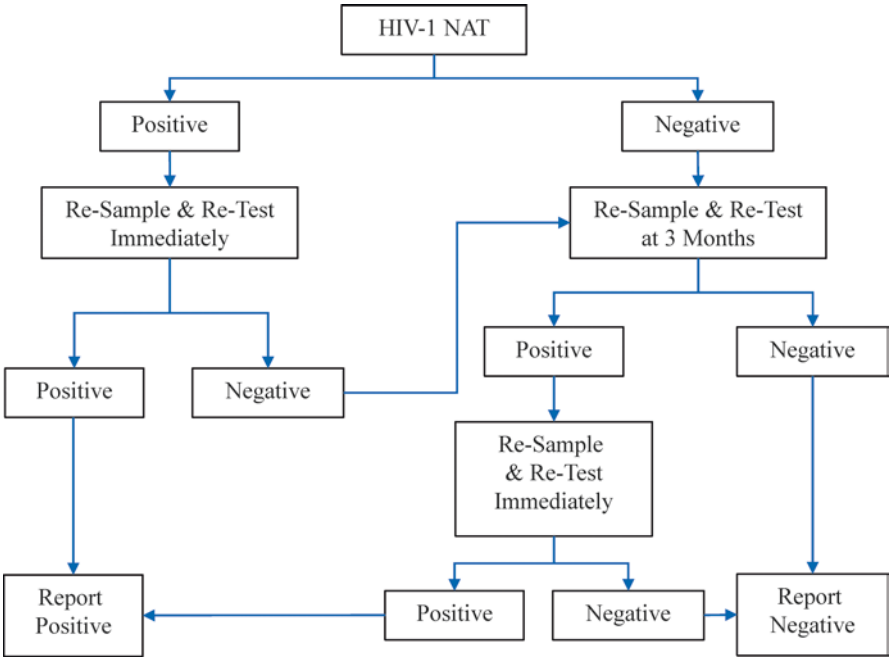

Fig. 5.7 National testing algorithm for EID

is negative, then another blood sample should be collected and tested at 3 months. If the 6-week sample is negative, then health services and follow-up are maintained until 3 months, when another sample is collected and tested. If the 3-month sample is positive, a diagnosis is made, but if it is negative, then the infant is treated as uninfected but is followed until 12 months. At 12 months, the traditional antibody-based screening assays should be performed, but according to a procedure for maternally exposed children so that a definitive infection status may be determined (Ministry of Health 2011; Zhang et al. 2008).

Breastfeeding infants with negative EID test results should be scheduled for repeat HIV NAT testing at 6 weeks and 3 months after weaning and antibody-based screening at 18 months of age. For infants that did not have a blood samples collected prior to 3 months of age, two blood samples should be collected separately as soon as possible and submitted for EID testing. However, if the first blood sample is collected after 12 months of age, HIV testing should follow the same antibody-based procedure for maternally exposed children as mentioned above (see Chap. 15 for more information).

5.3.6 Testing for Other Purposes

For the National Sentinel Surveillance Program, subjects are initially tested with only one screening kit (usually a high-sensitivity ELISA), and a nonreactive result

is immediately reported as HIV seronegative. If the result is reactive, then either another screening kit (produced by a different manufacturer or using a different test principle) is used or highly specific ELISA is used for a retest. Two reactive results are reported as HIV seropositive (see Chap. 2 for more information).

Nationwide, all donated blood is first screened by both an HIV screening immunoassay and by NAT. A reactive result is reported as HIV undetermined/positive and the blood is immediately recalled. Additionally, the donor is advised to seek further testing to determine whether HIV infection is present. Only blood with two nonreactive results is eligible for further processing and for clinical use (see Chap. 6 for more information).

5.4 Recent HIV Infection Surveillance

Surveillance of HIV incidence allows early identification of HIV transmission hotspots, provides scientific evidence of changes in the HIV epidemic over time, informs decisions regarding the allocation of limited resources, and facilitates the evaluation of HIV prevention strategies. Currently, there are three main approaches for estimating HIV incidence, namely, longitudinal follow-up of cohorts, mathematical modeling, and laboratory methods. Generally, laboratory methods may identify recently infected persons in cross-sectional samples, thereby estimating HIV incidence. Such methods have become increasingly important because of their low cost, simple operation, and real-time results (Busch et al. 2010; Mastro et al. 2010; Murphy and Parry 2008; Shen and Jiang 2010; Stekler et al. 2005).

5.4.1 BED Assay

The BED capture-enzyme immunoassay (BED-CEIA), developed by the US CDC, determines the ratio of HIV-specific immunoglobulin G (IgG) to total IgG. Obviously, this assay only works for individuals who have already seroconverted. However, its utility has been widely recognized, and it has been adopted by many countries to evaluate recent HIV infection.

In China, the BED-CEIA was first evaluated in late 2005. It was determined that the assay had good repeatability and stability (Wang et al. 2007) and was compatible with methods that employed dry blood samples (Shen et al. 2009). Thus, BED-CEIA was used to reestimate HIV incidence in 2005. Results were close to what had been estimated using prospective cohort studies (Jiang et al. 2007; Xu et al. 2010).

Between 2005 and 2007, BED-CEIA was established in several high-prevalence areas, including Guangdong, Guangxi, Sichuan, Chongqing, Xinjiang, Guizhou, and Yunnan, and pilot projects among people who inject drugs (PWID) were initiated to evaluate the method's practical application and to better understand the HIV epidemic in these areas. From 2006 to 2010, NCAIDS held experts' conferences and working group meetings on the detection and monitoring of new infections. Experts in monitoring, statistics, and laboratory, clinic, and comprehensive

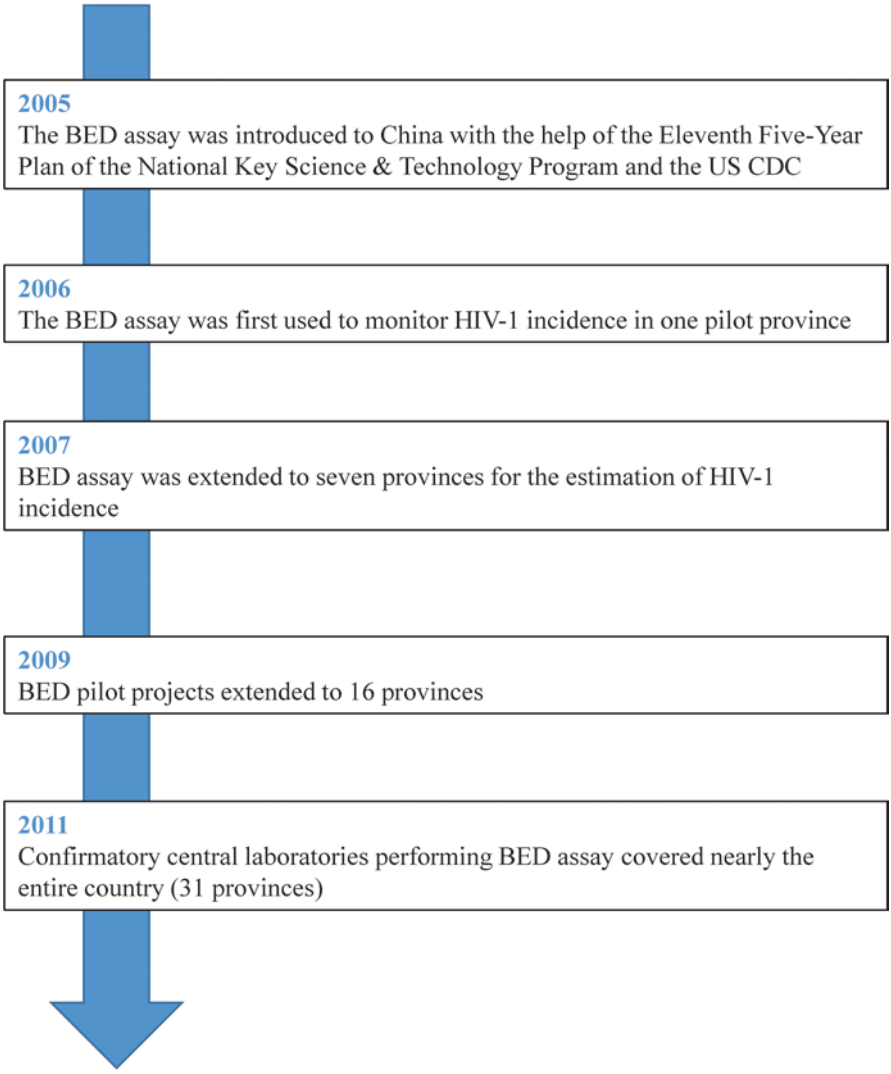

Fig. 5.8 Timeline of the 7-year implementation of BED assay in China

management, together with technical staff from the World Health Organization (WHO), the China-US CDC GAP, and the China-Merck Sharp & Dohme (MSD) AIDS projects, were involved in developing guidelines for the serological determination of HIV-1 recent infection through the use of BED.

In 2008, original pilot projects among PWID expanded to 15 provinces and municipalities, including Fujian, Hebei, Shandong, Shanghai, Jiangsu, Shanxi, and Beijing. New projects extended to other key populations including MSM, female sex workers (FSW), patients of clinics specializing in sexually transmitted infections

(STIs), and pregnant women, as well as those voluntarily receiving premarital health examinations (Duan et al. 2010; Han et al. 2007, 2009; Li et al. 2008; Lu et al. 2008; Xiao et al. 2007). At the beginning of 2011, BED was then extended to all national monitoring sites (Fig. 5.8), and from 2012 to today, BED has been widely used in China (Chen et al. 2017; Guo et al. 2013; Hu et al. 2012; Jin et al. 2014; Ma et al. 2013, 2017; Su et al. 2015; Xu et al. 2013; Wang et al. 2016; Zhang et al. 2015).

Unfortunately, the false recent rate (FRR) of the method is relatively high. The FRR is an index used to evaluate the specificity of the incidence assay using a set of samples from individuals with known long-term infection (longer than two window periods). The proportion of samples identified as recent infection (numerator), divided by the total number of samples tested (denominator), is defined as the FRR. Meta-analyses indicate that the FRR of BED assay is approximately 6% (Tao et al. 2011; Xu et al. 2010).

5.4.2 Avidity Assay

To address the issue of FRR in BED assay, a new method, the avidity assay, was developed in the early 1990s. This method results in a more precise estimate of recent infection. Avidity refers to the binding force between the antibody and its corresponding antigen. The avidity assay is based on the fact that avidity of HIV-1-specific antibody is weak in the early infection stage but increases over time. On preliminary evaluation in 2012, the avidity assay was found to be superior to other methods (Duong et al. 2015). Later that same year, the NHRL with the assistance of the US CDC began an evaluation of the limiting-antigen (LAg)-avidity assay and found that the method had good repeatability and operability (Yu et al. 2013). All confirmatory laboratories at the provincial level then participated in a training and PT program (Yan et al. 2014a, b) on the avidity method. Mean duration of recent infection with avidity assay was published (Duong et al. 2015), and pilot avidity testing was conducted using this method to estimate the incidence in an MSM population (Liang et al. 2014). LAg-avidity assay and BED capture-enzyme immunoassay for the detection of HIV-1 new infection were also compared (Xia et al. 2016), FRR of LAg-avidity assay in an ART patient population was evaluated (Wang et al. 2017), and the PT program for LAg-avidity assay in China's laboratory network was described (Cheng et al. 2018). In addition, a new limiting-antigen avidity dot immuno-gold filtration assay for HIV-1 incidence has been developed and compared with the BED-CEIA and LAg-avidity assay (Gao et al. 2016, 2017; Yan et al. 2014a, b).

5.4.3 Current Surveillance for Recent Infection

At present, surveillance of recent HIV infection is mainly applied at sentinel sites. There, all newly reported cases from four key populations (i.e., PWID, MSM, FSW, and STI clinic attendees) have blood samples submitted for detection of recent

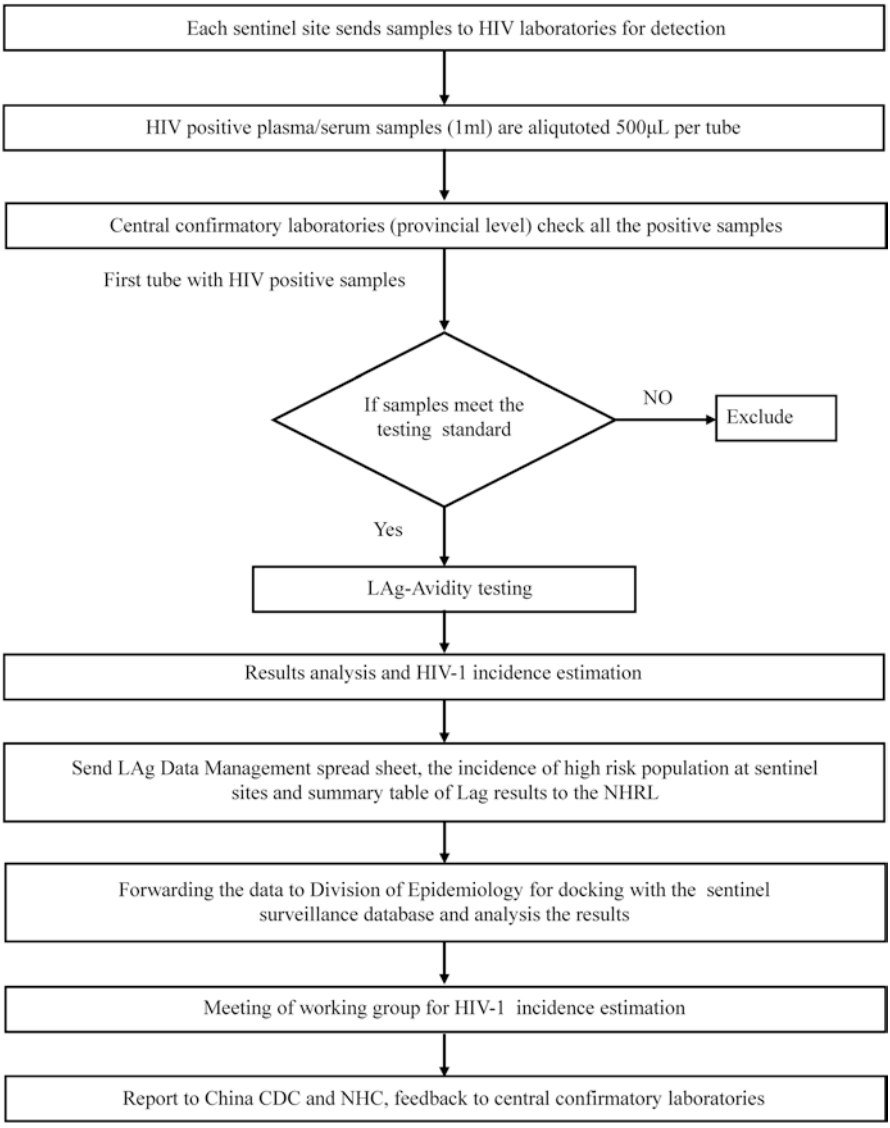

Fig. 5.9 Procedure for surveillance of recent HIV infection—HIV incidence is determined using samples from newly identified cases at sentinel surveillance sites, and testing is conducted by LAg-avidity assay method (*HIV* human immunodeficiency virus, *NHRL* National HIV Reference Laboratory, *China CDC* Chinese Center for Disease Control and Prevention, *NHC* National Health Commission of the People's Republic of China)

infection with avidity assay as dictated in the National Guideline for Detection of HIV/AIDS (2015).

Testing for recent HIV infection is conducted by confirmatory laboratories. When testing yields positive results, new samples are obtained and sent to the appropriate centralized provincial confirmatory laboratory. Positive samples from all sentinel sites throughout the province are examined and reviewed by each province's centralized provincial confirmatory laboratory. Samples/subjects that meet requirements (i.e., treatment naïve, CD4 count more than 200 cells/mm^3, and no record of long-term infection) undergo avidity assay to estimate HIV incidence. NHRL is responsible for the verification and analysis of testing results from provincial confirmatory laboratories. The data are then reported and linked to the sentinel surveillance database for comprehensive analysis. Relevant results are discussed and reported to the China CDC, the NHC, and the provinces (Fig. 5.9).

5.5 Clinical Management of Antiretroviral Therapy (ART)

Over the entire course of treatment and care for individuals with HIV infection, laboratory testing is important for clinical management and optimization of outcomes (World Health Organization 2016). These assays fall primarily into three categories: CD4$^+$ T cell count testing, HIV VL testing, and DR testing (Table 5.3) (see Chap. 13 for more information).

Table 5.3 Commercially available reagents and kits used in China for management of ART

Manufacturer	Product	Certificate
Northeast Pharmaceutical Group, Liaoning Pharmaceutical Co., Ltd	HIV-1 RNA quantification kit (fluorescence probe method)	2013-3401854
DA AN Gene Co., Ltd	HIV-1 RNA quantification kit (nest PCR-fluorescence method)	2012-3401095
DA AN Gene Co., Ltd	HIV-1 nucleic acid quantification kit (PCR-fluorescence probe method)	2012-3400077
Shanghai Semi Bio Technology Co., Ltd	CD4$^+$ cell counting kit	2012-2400335
Beijing QuantoBio Biotech Co., Ltd	CD3-FITC/CD8-PE/CD45-PerCP/CD4-APC Fluorescent monoclonal antibody kit	2014-3400288
Beijing QuantoBio Biotech Co., Ltd	CD3-FITC/CD4-PE/CD45-PerCP Fluorescent monoclonal antibody kit	2014-3400289
Beijing QuantoBio Biotech Co., Ltd	CD3-FITC/CD16+CD56-PE/CD45-PerCP/CD19-APC Fluorescent monoclonal antibody kit	2014-3400290
Acea Biosciences Inc.	NovoCyte Flow cytometry	2013-2400379
Xitogen Co., Ltd	XTG™-1600B Flow cytometry	2014-2400194

5.5.1 CD4 Count Testing

In vivo, HIV mainly integrates into the genomes of $CD4^+$ T lymphocytes, and as a result of the pathophysiology of HIV, this lymphocyte population is progressively destroyed. $CD4^+$ T lymphocyte counting provides essential insights into the immune status of people infected with HIV, estimating disease progression, assessing treatment effectiveness, and judging prognosis. All individuals diagnosed with HIV infection should have their CD4 counts monitored, and most guidelines recommend a frequency of every 3–6 months.

Traditionally, CD4 count was also used to determine when to initiate ART. In China, ART initiation criteria generally followed guidelines and recommendations made by the WHO. Thus, the CD4 count-based ART initiation criteria changed over time from <200 cells/mm^3 before 2008 to <350 cells/mm^3 until 2014 to <500 cells/mm^3 until early 2016. Finally, in February 2016, China abolished its CD4 count requirement for ART, and today, all individuals diagnosed with HIV infection qualify for ART immediately, regardless of their CD4 count result.

To cope with the increasing demand for CD4 testing, China has rapidly scaled up its CD4 testing capacity. In 2012, there were already more than 400 sets of flow cytometry equipment dedicated to CD4 count testing, which covered all provincial-level and some county-level laboratories. In 2006, only 20% of individuals newly diagnosed with HIV had received their first CD4 test within 6 months. However, as of 2015, 65% had received their first CD4 test within 2 weeks and 85% within 6 months.

When CD4 count testing was first introduced in China, only non-flow cytometric methods were available, typically Cyto-Spheres $CD4^+$ counting kits, Dynabeads magnetic kits, and fluorescence imaging kits. The Cyto-Sphere method is based on a monoclonal anti-CD4 antibody-coated latex sphere, which binds to cells expressing CD4 surface antigen, forming a rosette. After lysis of erythrocytes, the absolute $CD4^+$ T cell number can be counted manually by optical microscopy. Monocytes also expressing CD4 surface antigen are blocked by beads coated with anti-CD14 antibodies. The Dynabeads method is based on immuno-active magnetic beads coated with anti-CD4 and anti-CD8 antibodies, facilitating capture of $CD4^+$ and $CD8^+$ T lymphocytes in whole blood. Capture of $CD4^+$ monocytes is also blocked using similar magnetic beads coated with anti-CD14 antibody. Cell number is counted manually by light microscopy or automatically using a cell counter after cell staining. For the fluorescence imaging method, anti-CD3 and anti-CD4 antibodies are differentially labeled with fluorescent markers, allowing automatic counting of cell number using specific imaging systems and software.

As demand for CD4 count testing grew, $CD4^+$ T cell counting techniques needed to improve and become more efficient. Therefore, in 2004, China began to transition to advanced flow cytometry techniques, including a single-platform assay. As of the end of 2004, more than 30 sets of flow cytometry equipment were in service across China. Compared with first-generation flow cytometry (i.e., dual-platform assay), single-platform assays can obtain both the relative and absolute count of T cell subgroups in one step. The flow reagent, which always couples with lymphocyte subgroup acquisition and analysis software in flow cytometry instruments, commonly

contains three or four fluorescent colors and internal absolute counting microspheres. By using a known quantity of microspheres for internal reference, single-platform assays can report the absolute count directly by acquiring the percentage of target cells and the reference microspheres, the number of the reference microspheres, and the volume of the sample. Single-platform assays minimize detection error caused by using multiple instruments for one sample (dual-platform assay) and provide high accuracy and repeatability.

Today, China is transitioning to yet a newer, more advanced method for CD4 testing. This method involves the use of a small, portable, fully automatic CD4 analyzers that facilitate acquisition of CD4 results in as little as 30 minutes.

5.5.2 Viral Load (VL) Testing

Since HIV-1 VL testing was introduced to NHRL for the first time in 1997, China has been equipped more than 200 sets of HIV-1 VL detection instruments as of the end of 2017. Although this equipment was concentrated in key HIV epidemic areas, and a few laboratories at the county level, coverage extended to CDC locations, hospitals, inspection and quarantine authorities, and military installations.

Both quantitative and qualitative VL assays are available in China. Quantitative methods include real-time polymerase chain reaction (RT-PCR), nucleic acid sequence-based amplification (NASBA), and branched DNA (bDNA) technologies. All quantitative methods employ commercial kits, while qualitative methods typically involve the use of commercial kits and/or in-house formulations. Nevertheless, VL testing requires sophisticated, expensive equipment and well-trained staff to run the complicated protocols properly.

Thus, although current guidelines recommend annual HIV VL testing for all individuals on ART 12 months or more, many do not receive this testing. A variety of barriers to VL testing have been described, including factors related to attrition from the HIV care cascade and laboratory capacity (Ma et al. 2018a, b), and several studies have provided evidence of benefit of immediate and regular VL testing and the effectiveness of interventions meant to improve VL testing uptake (Wu et al. 2015, 2017). However, even despite high and increasing demand, VL testing has still not been fully scaled up and coverage remains poor, particularly in rural areas.

5.5.3 Drug Resistance (DR) Testing

Because of the high rate and low fidelity of HIV viral replication, and long-term ARV drug exposure, development of DR is a very real concern. Therefore, the timely detection of DR is an important component of HIV treatment and AIDS prevention. DR testing is widely used in surveillance of drug-resistant viral strains among populations of individuals with HIV, to understand the epidemiological characteristics and risk factors associated with these strains and to guide policymakers charged with managing the large-scale public health effort that is the National Free ART Program. DR testing for individuals may also be conducted

before initiation of ART so that clinicians may appropriately optimize ARV drug regimens. Finally, DR testing may also be used to evaluate individuals experiencing treatment failure. This helps clinicians to understand the reasons for treatment failure and better formulate a revised treatment plan.

In China, DR testing faces several challenges. First, DR testing before treatment initiation is not included in current HIV/AIDS treatment and care guidelines. Second, for those already on treatment, prerequisites for receiving DR testing are (1) having been on treatment for a minimum of 12 months and (2) having a VL result of greater than 1000 HIV RNA copies per mL. As a result of these conditions and limitations, the power of DR testing for surveillance of populations and clinical management of individuals has not been fully realized.

By the end of 2017, there were more than 41 laboratories engaged in HIV-1 genotype resistance testing, and as many as 10,000 DR tests were being conducted per year. In China, HIV-1 DR testing is mainly performed using the ViroSeq™ genotype HIV-1 automatic detection method, TRUGENE® HIV-1 genotype semiautomatic detection method, and individual laboratories' in-house methods. Compared to the former two methods, the in-house method is not significantly different with regard to accuracy of results, and the price is low, so it is more widely used (Niu et al. 2012).

5.6 Quality Assurance and Quality Control

China has established a strong laboratory QA and QC system to support testing related to HIV, with the NHRL and the centralized provincial confirmatory laboratories playing key, complementary roles. This system includes training, PT, laboratory assessment, and quality evaluation of reagents and kits.

NHRL evaluates, supervises, and assists laboratories at lower levels and has responsibility for many specific tasks, including (1) providing technical support, instruction, and training to all staff at centralized provincial confirmatory laboratories, as well as laboratories at lower levels; (2) organizing PT of screening and confirmatory antibody-based testing, EID testing, BED testing, and DR testing at centralized provincial confirmatory laboratories and other confirmatory laboratories; (3) organizing PT of CD4 cell count and VL testing at all laboratories that conduct these tests; (4) organizing the quality evaluation of commercial reagents and kits available domestically; (5) evaluating the functional management of all centralized provincial confirmatory laboratories; and (6) providing site supervision.

The provincial confirmatory central laboratories serve as the liaison between NHRL and the local levels through (1) providing technical support, instruction, staff training, and organization of supplier quality assurance for local laboratories; (2) evaluating the laboratory management work of local laboratories; (3) organizing the quality evaluation of local commercially available reagents and kits in particular provinces; and (4) reporting QA/QC information, test results, problems, and requirements to the provincial government health authorities and the NHRL (Fig. 5.1).

5.6.1 Training

Staff training is the primary determinant of laboratory quality. In order to build capacity among laboratory workers, training is mandatory and occurs regularly. All new technical staff members in laboratories undergo professional training regarding topics such as laboratory testing, QA/QC, and biosafety. Technical staff must be retrained at least once every 2 years. Currently, cascaded training is employed in China, whereby laboratories at each level train laboratories at the lower level. The NHRL is responsible for the development and implementation of national training courses (Table 5.4), centralized

Table 5.4 Content of annual training provided by the National HIV Reference Laboratory (NHRL), 1998–2017

Year	Content of training	Number of participants
1998	Antibody assays	75
1999	Antibody assays; QA	50
2000	Pre- and post-test counseling; laboratory biosafety	65
2001	Antibody assays; nucleic acid assays; drug resistance assays; maternal-neonatal transmission	131
2002	Maternal-neonatal transmission; early-stage diagnosis; immunology assays; nucleic acid assays; confirmatory assays; QC	408
2003	SOP; LDMS; biosafety; hazardous materials disposition; QC; CD4 cell count testing; VL testing	211
2004	Normalized regulation; substitutional strategy; occupational exposure; QC specific to CD4 and VL testing; PT	1419
2005	PT; comprehensive training; IQA; VQA	485
2006	PT; biosafety; assays for diagnosis of recent infection (BED); DBS-DNA; GCLP; RT	522
2007	HCV assays and QC; DBS-DNA; RT strategy; substitutional strategy; biosafety	643
2008	HCV assays and QC; DBS-DNA; RT strategy; substitutional strategy; biosafety; pooled PCR; assays for diagnosis of recent infection (BED)	840
2009	DBS-DNA; QC for CD4 count assays; electronic system for PT; NAT for DR testing	290
2010	Assays for DR; sequence analysis for DR; training of HIV detection; pooled NAT for early diagnosis	186
2011	Assays for diagnosis of recent infection; reporting system and QC for CD4 PT program; VL assays and QC	153
2012	CD4 assays and QC; QC for DR testing; HCV assays and QC; informatics system for laboratory regulation; viral load assays and quality control	307
2013	Informatics system for laboratory management	182
2014	DBS assay for DNA assay; SQA, IQA, and VQA	208
2015	Urine ELISA, avidity assay for recent infection, biosafety, QA/QC	170
2016	Avidity assay, urine ELISA, CD4 assay, VL, DR, SQA	250
2017	Urine ELISA, QA/QC for CD4, VL, DR/DBS	210

Note: In 2010, HCV surveillance became one of the duties of China's national HIV laboratory system, and related trainings were also integrated into the national training program

QA quality assurance, *QC* quality control, *SOP* standard operating procedure, *LDMS* laboratory date management system, *VL* viral load, *PT* proficiency testing, *IQA* immunological quality assurance, *VQA* virological quality assurance, *DBS-DNA* dry blood sports DNA, *GCLP* good clinical laboratory practice, *RT* rapid testing, *HCV* hepatitis C virus, *PCR* polymerase chain reaction, *NAT* nucleic acid testing, *DR* drug resistance

provincial confirmatory laboratories are responsible for organizing training at the provincial level, and confirmatory laboratories are responsible for the training screening laboratories and testing sites. Training usually takes place in a lecture format. However, field training is also occasionally delivered. In order to increase training efficiency, NHRL produced an instructional film for HIV screening laboratories in 2005 and conducts online training sessions to reduce costs.

5.6.2 Proficiency Testing (PT)

Proficiency testing is an external QA program, which improves the overall accuracy and comparability of work performed at different laboratories within the testing network. NHRL has organized national-level PT programs since 2003. The present PT programs for serological quality assurance (SQA), IQA, and VQA include but are not limited to the following: HIV antibody tests (ELISA, rapid test, Western blot), $CD4^+$ T cell counting, HIV-1 VL test, HIV-1 incidence assay (BED method), DBS-DNA detection, and HIV-1 DR testing (Table 5.5). Provincial-level PT programs organized by centralized provincial confirmatory laboratories mainly focus on HIV antibody testing and CD4 count testing. In most cases, provincial-level PT is organized once a year, with a few provinces organizing PT twice a year. PT at laboratories of all levels has been scaled up dramatically as the network has expanded (Fig. 5.10).

PT specimens are prepared or purchased by the NHRL and distributed to all participating laboratories. To reflect the quality of routine testing at the participating laboratory, the PT specimens are to be treated exactly the same as all other samples. After testing, a report is completed, and laboratory management then verifies the data and signs off on the report. Reports must be submitted electronically prior to the reporting deadline.

Table 5.5 Types of PT testing and composition of PT sample panels, used for serological, immunological, and virological QA testing within China's HIV laboratory network

PT item	Composition of PT panel
Serological (SQA)	
HIV antibody	5 samples (number of samples with positive or negative varied from round to round)
HIV incidence (BED/LAg)	8 samples (with varying OD values)
Immunological (IQA)	
$CD4^+$ T cell count	2 samples (1 low-value and 1 high-value sample)
Virological (VQA)	
HIV VL	10 samples (2 below the detection limit, 8 with varying values)
HIV DR	5 samples (3 with drug resistance)
DBS-EID	5 samples
Urine	
HIV antibody	5 samples (3 positive samples or 2 negative samples)

Before distribution, NARL retests the samples and sends identical specimens to participating laboratories periodically for evaluating the stability of laboratory detection. If the participants disagree with the evaluation result, they may submit the dissent within 10 days after receiving the result to the NARL. For laboratories with unsatisfactory results, the NARL will send a technical expert group for on-site

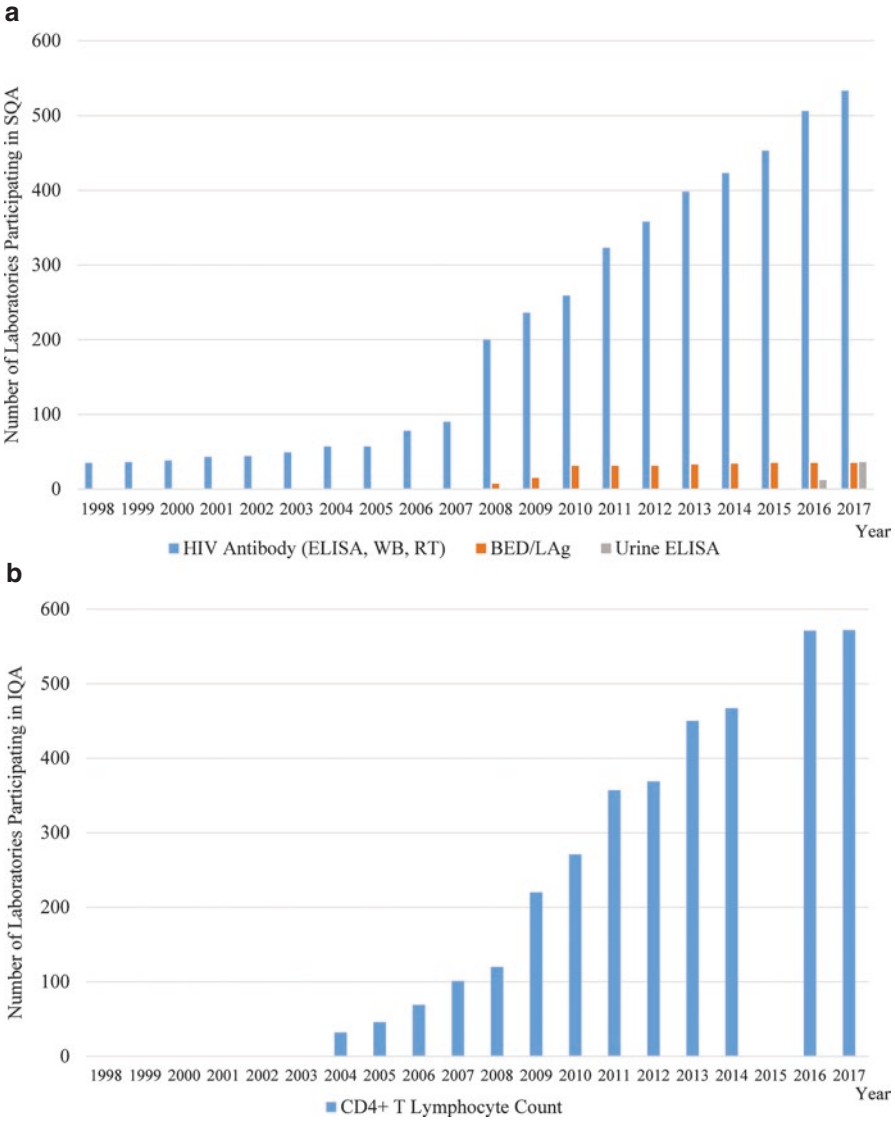

Fig. 5.10 Scale-up of the national HIV laboratory network proficiency testing (PT) program, 1998–2017: (**a**) serological quality assurance (SQA), (**b**) immunological quality assurance (IQA), and (**c**) virological quality assurance (VQA)

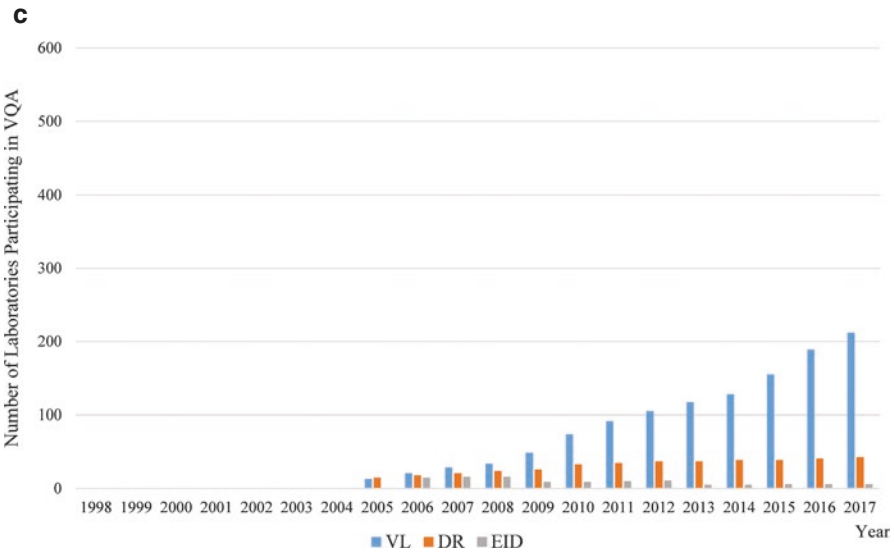

Fig. 5.10 (continued)

inspection. This inspection includes components such as auditing experimental data, the layout of laboratory, instruments, calibration status of auxiliary equipment, quality of experimental disposables, storage conditions for samples, use of reagents, personnel training records, and QA and QC activities. During this inspection, root causes of failures are investigated, and corrective actions are taken.

5.6.3 Laboratory Assessment

HIV testing laboratories enforce a strict access system for HIV testing. Only those laboratories passing the laboratory technical and conditional examinations are permitted to conduct HIV testing. Provincial health authorities organize expert groups to conduct the examinations annually. Laboratories that failed the examination must rectify errors and are not permitted to conduct HIV testing until the recommended changes are made.

Evaluations of the functional work of each laboratory are conducted annually. The evaluation items cover staff training, biosafety, SOP documents, QC charts, testing reports, equipment calibrations, and "on-the-spot" guidance. The NHRL is responsible for the evaluation of centralized provincial confirmatory laboratories, especially regarding technical guidance and management of the provincial HIV testing laboratory network. The centralized provincial confirmatory laboratories are responsible for an evaluation of all HIV testing laboratories in its jurisdiction, and results are reported to the NHRL.

5.6.4 Quality Evaluation of Reagents and Kits

After approval by the CFDA, all reagents and kits must be evaluated for quality by CFDA. According to current guidelines, only ELISA reagents and kits must pass batch inspections, while chemiluminescence and RT reagents and kits are not required to do so. To ensure post-market quality, NHRL organizes quality evaluations annually. Products are sampled in the field (multi-province sampling) and evaluated at NHRL. Evaluation reports are published annually so that the entire HIV testing laboratory network is informed of the results. This work also enables local manufacturers to continuously strive toward improved quality. Such results are a meaningful reference for laboratories in reagent and kit selection and also are an important basis for centralized provincial confirmatory laboratories to make large-quantity purchasing decisions.

5.7 Limitations and Challenges

In China, 586 confirmatory laboratories have been established at of the end of 2017. Most are a part of the CDC system, yet a majority of new infections are being discovered in hospitals. This creates challenges and inefficiencies as hospital laboratories must normally send samples in need of confirmatory testing out to the already-overburdened CDC laboratories. Currently, there are many barriers to transferring confirmatory testing responsibilities from CDC sites to hospitals. For example, hospitals are not incentivized to perform confirmatory testing, as there is no state subsidy for the hospitals to provide public health services, nor is there a standard fee structure implemented for such testing. Additionally, new, more highly trained staff and further investment in laboratory space and equipment would need to be made.

There are still not enough RT sites throughout China. Coverage must be increased in rural counties and areas with high concentrations of key, at-risk populations. For existing RT sites, sustained training and effective QA continue to be a challenge yet are critically important to testing quality. Additionally, the recording of RT results, notification of RT results, and referral and counseling after notification all require standardization.

PT is becoming increasingly challenging because of the large numbers of laboratories and the large numbers of techniques for which the laboratories are responsible. Every aspect of the PT program becomes more challenging as it grows in size. For example, because it is solely organized by NHRL, a huge number of samples require shipment over long distances, yet under strict storage conditions, each year. Therefore, NHRL is considering changing to a cascaded PT program in the future that is organized by the centralized provincial confirmatory laboratories.

QC/QA is a continuously challenging process. Many factors may impact testing quality, such as turnover of staff, changes in reagent supply, funding, and effectiveness of the regulatory system. Consistent and persistent funding from central and

local governments is a primary determinant of a high-quality testing program. Unfortunately, because of shortages in training funds, not every laboratory technician receives regular and effective training. Furthermore, in China, CDC employees are generally low-paid and transient, resulting in constant challenges to retain existing staff members and onboard and train new employees.

5.8 Conclusions

Over the past 30 years, China has established a competent, nationwide HIV laboratory network, which has been indispensable to the diagnosis of infection and monitoring of treatment. Both the combined support of the Chinese central government and international organizations and this hierarchical model of laboratory management have been critical for promoting the rapid expansion of this network as well as the dissemination of current laboratory technology to address the growing HIV epidemic in China. However, China's HIV laboratory network still faces many challenges, and continued political and financial support is needed in order to maintain its current service and coverage level and to expand further to meet the demands of a changing epidemic.

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Part II

Prevention

Protecting Blood Supplies

6

Wei Guo, Li Li, Cynthia X. Shi, and Nanci Zhang

Abstract

Blood donation is an effective way for the public to directly contribute to saving lives, and its safety is an essential component of public health. In central China in the 1990s, the failure to ensure basic safeguards in the commercial blood donation process had devastating consequences for the HIV/AIDS epidemic that still reverberate today. An estimated 55,000 people were infected with HIV through unsafe blood donation. The outbreak systematically destroyed family, social, and economic structures, and over two decades later, the death toll is still rising. The advent of blood commerce in Henan province and the subsequent catastrophic HIV outbreak were unsurprisingly precipitated by various economic, governmental, and socio-behavioral factors. After the outbreak was discovered, an extensive HIV screening campaign was conducted, followed by ongoing surveillance among blood donors. It is important in the examination of the disaster to acknowledge contributing forces which gave rise to one of China's most severe HIV outbreaks, which continues to shape the landscape of blood donation and blood supplies in China today.

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6.1 Introduction

Blood transfusion is a life-saving medical procedure used in routine and emergency care. Maintaining a safe and adequate national blood system to collect, store, and use blood products is vital for a country's health outcomes. Inability to ensure the reliability and availability of blood can have dire consequences. As such, the vigilant management of a country's blood supply is paramount for the effective prevention of transfusion-transmitted viral infections from pathogens such as viral hepatitis B (HBV), hepatitis C (HCV), and human immunodeficiency virus (HIV).

Major incidents in the recent past have affected blood supplies throughout the world. The availability of safe blood and blood products was compromised during the nascent stages of the HIV/AIDS epidemic in the 1980s. Contamination of blood supplies and blood products in developed nations, including the United Kingdom, Japan, and the United States, resulted in tragedy: the infection of thousands of individuals with HIV (Darby et al. 1996; Keshavjee et al. 2001; Nakasone et al. 2004). In fact, since the earliest period of the HIV/AIDS crisis in the 1980s and 1990s, the risk of blood-to-blood transmission was considered so high as to place people living with hemophilia, who need regular transfusions of blood products to maintain their clotting system, as among those at highest risk of HIV infection.

In the early 1990s, China also experienced similarly tragic HIV/AIDS outbreaks through tainted blood supplies, but the situation in China was distinct from countries that were relying on imported blood products later found to be contaminated. This chapter covers the events, responses, and policies that have shaped the landscape of blood donation and supplies in China today. We seek to present the lessons learned and to offer insights on future measures to prevent HIV transmission. In order to address the numerous challenges in the design and implementation of China's current blood donation system, technological and infrastructural steps toward change must be taken with utmost caution and care.

6.2 Blood Supplies in China: Before the HIV Epidemic

Oswald Hope Robertson is credited with establishing the world's first "blood bank" on the frontlines of World War I, although the term was not coined until 1937 (Fishbein 1976; Hess and Schmidt 2000). In 1946, the International Red Cross and Relief Society first called for a voluntary donor program. Several decades later, the World Health Organization's (WHO) 1975 Resolution 28.72 officially advocated for an entirely voluntary in-country blood contribution system as it saw the need to inspire a sense of responsibility for consistent donation without promise of remuneration (World Health Organization 1975). In this era, China's Ministry of Health had also taken major steps in establishing a blood system, documented in the 1979 Regulation on Blood Donation.

While the original intent was for the system to rely on unpaid public donations, the program was met with resistance in a Chinese demographic. Principles, beliefs, and subsequent behavioral norms aligned with traditional Chinese medicine (TCM)

dissuaded a large majority of the population from participation. TCM is based on balancing humors and meridians, positing that parting with one's own blood dramatically damages aspects of an individual's constitution and, as an effect, one's health (Shi et al. 2014a). As such, the movement gained little traction among its intended audience.

Blood donation is commonly differentiated between "whole blood" and "apheresis." While the former refers to the permanent extraction of whole blood, the latter allows for the return of some blood components back into the donor's system, thereby rendering it more acceptable in the eyes of Chinese donors. The perceived depletion of energy and vitality was substantially lessened with a promised return of blood components into the system. For blood plasma donations ("plasmapheresis"), whole blood is removed from the donor, the blood cells and plasma are separated, and the blood cells are returned to the donor. Plasma contains dissolved proteins, electrolytes, and clotting factors and was first imported in high volume to China as the country lacked the structural enterprises to support a growing need. The emergence of a commercial Chinese blood market was borne out of demand for plasma on a global scale, yet the fledgling infrastructure was still weak in terms of consistency and technical quality. In 1979, the Chinese Ministry of Health put forth a set of guidelines developed from numerous site visits countrywide for streamlining the technical aspects of donation. The Regulations of Blood Donation sought to prevent errors and to install safeguards to protect blood donors and recipients in a quickly developing commercial landscape.

When the HIV/AIDS epidemic was reported in the United States and in European countries in the early 1980s, scientists started to track the movement of the epidemic globally and tried to identify the first cases of HIV in China. It was clear that people infected with HIV are asymptomatic during long periods of clinical latency. Detecting an outbreak of HIV within a population or a region would require active screening mechanisms to be in place. In the 1980s, Professor Yi Zeng and his team tried different strategies to diagnose early cases of HIV. In 1984, he used LAV/HTLV-III antibody tests to examine 310 blood specimens from healthy people and leukemia patients, which returned no reactive results (Wang et al. 1985).

Reports showed that among hemophilia patients who had received Factor VIII (a blood clotting protein), about 70–90% had antibodies against LAV/HTLV-III (Blattner et al. 1985). The findings suggested that if HIV had spread to China, hemophilia patients were the most likely to have been infected. Therefore, Zeng and colleagues collected blood specimens from hemophilia patients who had received Factor VIII in 1984–1985. They collected samples from a total of 28 patients, including 18 patients from Zhejiang who had received Factor VIII manufactured by American Armour Pharmaceutical Company and 8 patients from Beijing who had used Factor VIII manufactured by American Alpha Pharmaceutical Company. The remaining two patients were from Zhejiang and had received locally manufactured Factor VIII. They found 4 patients to be HIV-positive, all from Zhejiang who had used imported Factor VIII from American Armour Pharmaceutical Company (Zeng et al. 1986). This study provided evidence that HIV had entered China by way of contaminated imported blood products.

Immediately thereafter, the Chinese government implemented a national ban on the importation of foreign blood products.

In order to prepare for a potential HIV/AIDS epidemic in China, the Research Office of the State Council set up a special AIDS Research Team. The research team was tasked with studying the HIV epidemics and responses in other countries and to prepare recommendations for China based on lessons learned globally. The findings were published in a book entitled "Beware of AIDS: For the Survival of the Chinese Nation" published by Xinhua Publishing House in 1993 (Chen et al. 1993). In the first chapter of the book, Chen and colleagues warned that the risk of HIV infection via exposure to contaminated blood was extremely high and emphasized that preventing nosocomial HIV transmission was particularly important in developing countries (Chen et al. 1993). They cited that among paid blood donors in China at that time, the prevalence of HCV infection was 20–70%. This suggested blood product donors and recipients were the most likely to become infected if appropriate preemptive measures not taken. To this end, they were alarmed that HIV screening was not yet a mandatory test for blood donors, which had very dangerous medical and public health implications. Tragically, the research team's warning was not heeded by health authorities, who did not undertake timely policy actions to stave off potential risks. By the time officials recognized the severity of the problem, economic and structural forces had already converged to create an environment ripe for tragedy.

When foreign blood products were banned, this resulted in an unprecedented demand for blood products which intensified in the early 1990s. This created a lucrative domestic market, and the drive for blood profits collided disastrously with the nascent HIV epidemic and weak legal oversight of basic healthcare tenets. In the post-Mao era, Deng Xiaoping pushed for large-scale privatization of formerly state-run entities, but modernization of the economy came at a cost. Government support for rural clinical health and disease control systems waned. Government-funded programs for hygiene, sanitation, and basic medical care had saved millions of lives and prevented the spread of communicable diseases through immunization, education, and treatment. Despite these successes, public health systems run by local governments experienced severe cuts in funding and other support, including dissolving of the "barefoot doctors" program in 1981. Within a newly privatized market, the increased fiscal instability of public health ministries led to the opening of blood banks as a means to address cost fluctuation or even to provide basic health services (Erwin 2006). Faltering local economies led to lax adherence to safety regulations. In this context, there was a rapid proliferation of blood donation centers in rural regions. At the height of the boom, there were as many as 200 registered plasma donation centers in Henan province. The new dearth of public health personnel, unstable fiscal grounding, and poorly regulated blood collection stations precipitated further misuse of medical equipment. Blood collection sites varied greatly in sterile conditions or lack thereof. To increase profit margins, donation centers often flagrantly violated proper compliance to sanitation and sterilization practices. Centers would go as far as to approach farmers to sell blood in the very fields where they worked. Negligence and intentional abuse were common in the interest of

saving time and capital, leading to large-scale contamination of blood supplies. In this environment, basic procedures for extracting blood and for sterilizing equipment already posed high risks for donors, but shockingly, some collection centers would go even further in their brazen disregard of safety by pooling the blood donated from different individuals. The pooled blood would be separated into components, and after extracting plasma, the leftover blood cells—a mix of cells from multiple individuals—would be reinjected back into the donors. This enabled widespread transmission of HIV, and in 1995, catastrophic outbreaks of HIV infection were first identified and reported among commercial plasma donors (Wu et al. 1995; Chaddah and Wu 2017). The HIV epidemic ravaged entire villages in the rural Chinese countryside (Rosenthal 2001; Shi et al. 2014b).

6.3 HIV Outbreak Among Blood Donors in China: Disaster and Response

In September 1994, a feedback report from a random quality assurance check by Shanghai RAAS Blood Product Company Ltd. found that a plasma donor from Lixin County in Anhui province had HIV infection. This was the first report of an HIV case in Fuyang Prefecture. The local blood collection center, however, dismissed this result because at the time, HIV was not a widely known condition. In November, the company again informed the Lixin County Blood Collection Center that the plasma from the same donor was HIV-positive. A research team traveled to Lixin County to interview the donor and her family members, which included two other individuals found to have HIV infection. After ruling out the possibility of heterosexual transmission and injection drug use, investigators found that all three women had donated blood plasma at the Lixin County Blood Collection Center as well as at other nearby commercial blood collection centers.

Within rural villages and predominantly agricultural regions of China, blood "donation" was largely a misnomer at that time. Much of the blood and plasma within the supply system was procured from impoverished farmers. Profit motivated selling blood—however unregulated—and contributed handsome supplementation to otherwise meager agricultural incomes. Generous remuneration schemes allowed poor rural villagers a lifestyle which was at one time far beyond their means. Because plasma donation returned blood cells back to the donor, it did not elicit fatigue in the same way as whole blood donation. Blood was a self-replenishing commodity for which the market was all too eager. It was not uncommon for individuals to donate at a dangerous frequency—sometimes using fake identities to skirt any nominal restrictions—or to recruit multiple family members for donation.

In December 1994, a farmer from Yongqing County of Langfang City, Hebei province, went to a hospital in Tianjin for blood donor's health checkup and tested positive for HIV antibodies. In January 1995, the retest was still positive. In February 1995, a confirmation test conducted in Beijing was also positive, prompting a report to Hebei province authorities. This report tipped off public health officials to a

hidden disaster and became an important clue for epidemiological investigations among paid blood donors in rural areas. The farmer with HIV infection was a married man with no history of drug use or multiple sexual partners. He had been selling plasma and whole blood at collection centers in Beijing, Tianjin, Hebei Gu'an, and Yongqing since 1992. In February 1995, 50 blood samples were collected from paid blood donors living in his home village and in surrounding villages. Test results found a stunning HIV prevalence of 74.0% (37/50 samples). This was the first time in China that clustered cases of HIV have been discovered among paid blood donors (Chen et al. 2018).

At the end of February 1995, Hebei province launched an urgent response into this major HIV crisis and conducted a large HIV screening campaign targeted primarily at blood donors. At that time, there were seven plasma collection stations and ten whole blood collection stations in Langfang City. It was estimated that there were 22,500 paid and unpaid blood donors, mainly concentrated in Yongqing, Gu'an and Bazhou. Among all individuals tested, the HIV prevalence was 2.14% (255/11,933). Among the 10,122 paid donors, HIV infection was slightly higher at 2.48% (251/10,122). There were 1811 villagers without history of blood donation, of which 0.22% (4/1811) were found to have HIV infection. Cases also included migrants from other provinces, such as Jilin, Liaoning, Heilongjiang, Sichuan, Shandong, and Henan (Chen et al. 2018).The immediate aftermath of the blood donation disaster in China illustrates the unparalleled importance of swift and effective responses. By the spring of 1995, all blood donation centers were mandated to shut down, and blood and blood products were secured. Given the rapid spread of HIV, the efficient utilization of time was crucial; even a 1-day delay in closing facilities translated into hundreds of more infections. Teams moved quickly in conjunction with the central and local governments to oversee the shutdown of blood donation centers, outlawing further blood and plasma commerce (Fig. 6.1).

Although authorities were fully aware of the HIV outbreak by spring 1995, the scale and characteristics of the epidemic were largely unknown. This information would be essential for developing interventions to prevent secondary transmission through sexual contact and to develop a system for providing appropriate medical and social welfare services.

In 1996, an epidemiological survey with 1517 participants was conducted in Fuyang County in Anhui province by the Chinese Centers for Disease Control and Prevention (Table 6.1). A total of 1043 participants were former plasma donors, and 12.5% were infected with HIV. The infection rate among non-donating spouses was 2.1%. The results also found a direct relationship between the frequency of donation and the likelihood of infection. The highest rates of HIV infection were among donors aged 30–39 years who reported the highest frequency of plasma donation (Wu et al. 2001).

In 1999, a medical team from Zhongnan Hospital and Wuhan University arrived in Wenlou village of Shangcai County, Henan province, to investigate a "strange disease." It was quickly clear that there was a connection between HIV infection and a history of blood plasma donation. Media coverage of the investigation precipitated an increasing interest in the epidemic, garnering national attention and alarm. In the same year, a blood serum survey carried out among 730 village members in affected

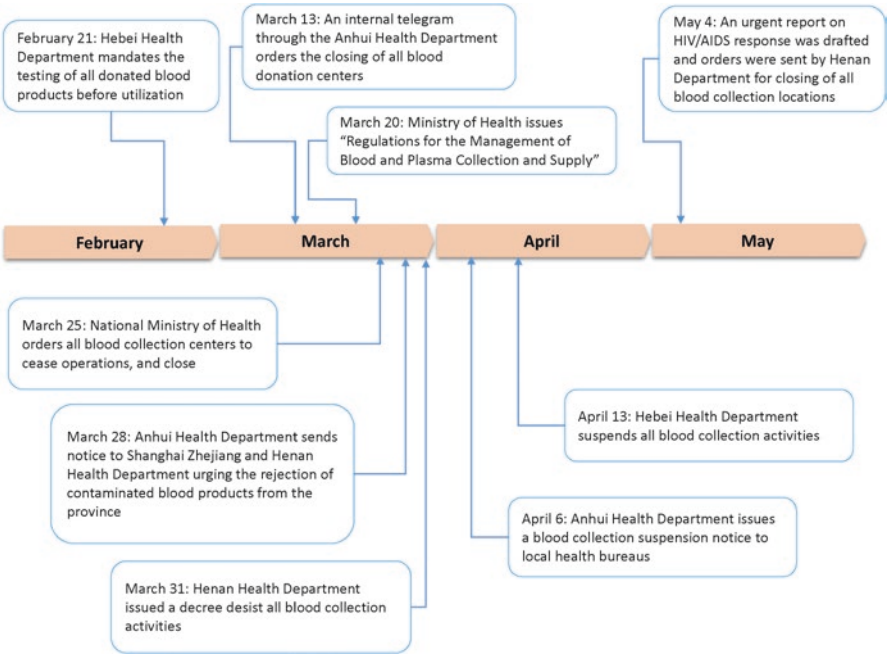

Fig. 6.1 Responses to blood supply contamination in three provinces in 1995

Table 6.1 Risk factors for HIV infection among village members of Fuyang district in 1996

Variable	HIV-positive participants/*N* (%)	OR (95% CI)	*P* value
Invasive medical care			
No	96/1019 (9.4)	1	
Yes	39/498 (7.8)	0.8 (0.6–1.2)	0.3
Multiple sexual partners			
No	127/1309 (9.7)	1	
Yes	8/84 (9.5)	0.98 (0.5–2.1)	0.96
Blood donation			
No	4/317 (1.3)	1	
Yes	130/1043 (12.5)	15.6 (5.7–42.3)	<0.001
Refuse to answer	1/33 (3.0)	3.4 (0.4–31.5)	0.28
Type of donation			
Whole blood donation	2/362 (0.6)	1	
Plasma donation	74/472 (15.7)	22.0 (10.1–48.2)	<0.001
Both	54/209 (25.8)	41.3 (18.4–92.4)	<0.001
Frequency of donation per month			
1–2 times	86/564 (15.3)	1	
3–5 times	22/79 (27.9)	5.3 (3.1–9.0)	<0.001
6–9 times	8/13 (61.5)	22.0 (7.0–68.4)	<0.001
10 or more times	9/12 (75.0)	41.2 (11.0–154.5)	<0.001
Frequency of blood/plasma donation per year			
1–10 times	83/876 (9.5)	1	
11–20 times	15/96 (15.6)	2.6 (1.4–4.6)	0.002
21–30 times	14/29 (48.3)	13.0 (6.1–27.7)	<0.001
30+ times	14/21 (66.7)	27.8 (11.0–70.6)	<0.001

Reference: Wu Z, et al. *Health Policy and Planning* 2001; 16:41–46
OR odds ratio, *CI* confidence interval

villages identified 22 HIV cases and found an HIV prevalence of 3%. Among these villagers, HIV infection rate in former paid blood donors was 9.1% (19/210) and 0.6% (3/530) among non-donors. Among the 210 former blood donors, 25.9% of former blood plasma donors had HIV infection, a prevalence ten times higher than that of donors who gave whole blood only (2.6%), i.e., donors with no history of donation of plasma. HIV infection was more common among people who donated more than ten times per year (13.5%) compared with those who donated fewer than ten times per year (2.8%). Those who donated before 1995 or had stopped donating by the end of 1995 were also more likely to be infected than those who began to donate after 1996 (18.3% compared to 1.4%) (Yan et al. 2000).

By September 2003, with the exception of Tibet, cases of HIV infection through plasma donation had been reported from all provinces, municipalities, and autonomous regions (Bharmal and Tiwari 2007). To better evaluate the HIV/AIDS epidemic, the Henan provincial government organized an HIV screening campaign from July to August 2004 that aimed for comprehensive coverage of all former paid blood donors. In September 2004, the Henan Provincial Health Department held a press conference to announce the result of this testing campaign: a total of 51,187 administrative villages (or communities) had participated, and 280,476 paid blood donors in the province were registered and tested. In all, 21,703 individuals were confirmed to have HIV infection. At that time in Henan province, there were a total of 25,036 cases of HIV infection and 11,815 were symptomatic AIDS patients. A vast majority (86.69%) were infected through paid blood donation, including plasma donation (Cui et al. 2006).

Based on the HIV testing campaign results in Henan, the Chinese Ministry of Health issued "An Announcement Regarding HIV Screening Among the Former Blood and Plasma Donors" on September 17, 2004, requesting all former plasma donors to take an HIV test, an edict that lasted until June 2005. Based on this screening effort and other epidemiological surveys, the government was able to gain a much clearer picture of the epidemic among former blood donors. With the assistance of the WHO and UNAIDS, the government calculated a 2005 estimate that approximately 55,000 people had been infected with HIV through blood donation and a further 14,000 through transfusions (Ministry of Health of People's Republic of China et al. 2006).

6.4 Laws and Initiatives for Further Prevention

The painful lessons taught by the commercial blood donation crisis in the 1990s led directly to the ratification of various regulations and laws on blood supply and blood-derived products. After initially closing down all blood collection centers in 1995, the "Law of Voluntary Blood Donation of the P. R. China" was formally issued on October 1, 1998. This federal law stated that China would operate a blood donation system without remuneration practices and called on healthy people aged 18–55 years old to donate their blood voluntarily. This law marked a significant transformation in Chinese blood donation practices by only permitting voluntary

unpaid blood donation. This law was followed up with the ratifications of additional national policies, administrative regulations, and codified standards to reform and uphold a safe blood system.

On October 26, 1998, the Ministry of Health, National Development and Reform Commission, the Ministry of Science and Technology, and the Ministry of Finance jointly issued the "Long- and Medium-Term Plan on HIV/AIDS Prevention and Control (1998–2010)" which strengthened the reorganization and management of blood collection practices, blood supply centers, and blood product manufacturing. It reemphasized the government's condemnation of illegal blood collection and supply activities and required testing and supervision of all donors, blood supplies, and related products. In 2001, the Ministry of Health assessed 223 plasma collection centers. Of these, 156 plasma collection centers were approved, 59 centers shut down, and 8 centers were suspended pending reorganization.

On May 24, 2004, the "Special Operative Plan on Reorganization of the Illegal Blood Collection/Supply and Plasma Collection" was issued by the Ministry of Health, the Ministry of Public Security, the Ministry of Supervision, and the State Food and Drug Administration. The plan mandated examination and supervision of blood collection centers and blood products. On March 20, 2006, the Ministry of Health issued the "Chinese Containment and Control of AIDS Action Plan (2006–2010)", which highlighted the banning of illegal blood and plasma collection, updated policies on the supervision and quality assurance system for blood collection centers and companies, and improved guidelines for the clinical management of blood products.

By the mid-2000s, China had implemented a national voluntary unpaid donation system that covers urban and rural areas and ensures the safety, quality, and availability of blood supplies, which has improved the public's confidence in social welfare (Yin et al. 2015). In China, whole blood donation, primarily done in clinical settings, is regulated by the Ministry of Health and is integrated into the public health services. However, plasma donation was primarily done through the blood products industry, and the government deemed that further efforts were needed to prevent the transmission of HIV and other blood-borne diseases and to install stricter supervision and management of the plasma collection centers. In April 2006, a work plan was formulated by the Ministry of Health in conjunction with the State Commission Office of Public Sectors Reform, National Development and Reform Commission, Ministry of Personnel, Ministry of Labor and Social Security, State-owned Assets Supervision and Administration Commission of the State Council, State Administration of Taxation, State Administration for Industry and Commerce, and State Food and Drug Administration. This work plan created a new oversight structure for plasma donation. The plasma collection stations would be built and managed by blood product manufacturers, and one-to-one relationships would be established between the plasma station and the manufacturer. The county-level health administrative departments undertook the duties of supervision, inspection, and corresponding administrative responsibilities. Any plasma stations originally set up by the health administrative departments were transferred to blood product manufacturers.

Two years later, the Ministry of Health issued the follow-up guidance "Regulation of Plasma Station Management," which took effect on March 1, 2008. This prohibited the establishment of plasma stations in high-risk areas where endemic or blood-borne diseases are prevalent. Plasma stations must collect plasma only by machine; any manual collection of plasma was strictly outlawed. It also mandated that the original records on plasma collection, testing, and storage should be kept for at least 10 years.

Since the enactment of the Blood Donation Law in 1998, voluntary unpaid blood donation has increased from 5.5% in 1998 to 99% in 2009. By 2010, 9 of 31 provinces in mainland China had achieved 100% clinical use of voluntary unpaid blood donations (Shi et al. 2014b). Before the 1998 Blood Donation Law, testing for blood-borne diseases was only conducted at one point when donors were screened before blood collection. Changes were made so that the collected blood also underwent comprehensive testing twice, using different equipment and/or reagents by different personnel (Li et al. 2017a). Pre-donation screening of donors was later updated to use rapid screening tests, thereby reducing donor wait times.

Continuous improvement of laboratory-based monitoring and networks also paved the way for improved HIV epidemic surveillance among blood donors. There is ongoing screening for former paid blood donors. A national database of individuals who donated blood before April 15, 2005, was established to store results from testing campaigns. In order to strengthen the HIV/AIDS reporting system management, ensure its secure and effective operation, and improve the overall data quality, the Ministry of Health issued a notice about the system in March 2005 requiring local health bureaus to accurately and regularly report HIV/AIDS cases. For example, in Hebei province—which reported the first cluster of HIV cases among paid blood donors—a total of 383 cases with registered addresses in the province were reported from 1995 to 2015. The last diagnosis of HIV infection via paid blood donation was identified in February 2012 (Chen et al. 2018).

As part of HIV prevention and control efforts, the government began promoting health education and social marketing to raise awareness about HIV/AIDS using language that was both easy to understand and culturally acceptable. It engaged mass media through broadcasting, television, and newspapers to help the public learn how to prevent HIV transmission and to reduce the heavy burden of HIV/AIDS-related stigma. Condom promotion initiatives engaged well-respected doctors who were able to effectively talk about sexual behavior. Doctors came to regard condom use and HIV prevention as common sexual health issues, and they provided medical care, psychological counseling, and condom use instructions for people living with HIV. In Henan province, after the HIV screening campaign among former blood/plasma donors was completed, a condom use intervention program for preventing sexual HIV/AIDS transmission was conducted among 12,159 serodiscordant couples. In order to facilitate the successful implementation of the program, the government provided a healthcare credit of 40 RMB per year per family, of which 30 RMB could be used at the village clinic and 10 RMB could be used at township hospitals.

6.5 Blood Supply Management Today

Since 2012, nucleic acid testing (NAT) has been used to monitor blood supplies. NAT detection can directly detect the presence of viral nucleic acid in the blood; this can effectively shorten the window period of virus detection and reduce the risk of transfusion-transmitted diseases such as HBV, HCV, and HIV (Ye et al. 2013).

Between 2012 and 2014, the State Council of China requested the use of NAT in the blood collection process as an HIV prevention strategy. To follow-up, the Ministry of Health established the "Expansion and Development of Nucleic Acid Test in Blood Stations," which introduced NAT at 15 pilot blood banks in 12 provinces. In April 2013, the Ministry of Health designed the "Implementation Plan for the Comprehensive Promotion of Blood Station Nucleic Acid Detection (2013–2015)" to systematically use NAT in blood banks, and the NAT program has also been integrated into the 12th 5-year plan of the Health Service Development. The Ministry of Health continues to promote and expand the national NAT capacity in blood centers and has published technical requirements for different pathogens (Li et al. 2017a).

In 2015, a terrible setback occurred when a 5-year-old girl in Fujian province was infected with HIV through a blood transfusion. The blood donor had been recently infected with HIV and the infection was still in the window period, undetectable by routine antibody-based screening. This case generated a strong public reaction. The response from the public prompted an increased investment in NAT (Li et al. 2017a). The central government created a one-time appropriated special fund for the construction of NAT laboratories in blood banks across the country with the remaining running expenses to be covered by local governments (Yu et al. 2016). Currently, officials and expert panels recommend screening for blood types, HIV, HBV, HCV, alanine aminotransferase, and syphilis by advanced testing methods (Li et al. 2017a).

In 2017, the National Health and Family Planning Commission held a press conference on the WHO's 2016 Global Status Report on Blood Safety and Availability (World Health Organization 2017). The report noted that China had scored well on three indicators, indicated that the safety level of China's blood supply is among the highest in the world. First, the proportion of unpaid blood donation continues to rise, achieving a continuous growth of nearly 20 years. The number of unpaid blood donors and the amount of blood collected in China rank first in the world. The proportion of voluntary unpaid blood donation reached 96.3%, exceeding the average of 95% in high-income countries. Second, blood safety has improved significantly in the past two decades. Including China, only 24% of countries were carrying out blood NAT at the time. Detection of HIV in donated blood is 0.17%, which is consistent with rates from middle- and high-income countries. Third, significant improvement was found in the appropriate clinical use of blood: the clinical blood transfusion rate reached 99.6%, exceeding the average rate of 97% in high-income countries, and the blood wastage rate was 5.95%, lower than the average of 6.7% in

middle- and high-income countries. By the end of 2016, China had 321 central blood stations, 99 central blood banks, 1262 blood donation centers, and 1584 mobile blood donation coaches. The number of unpaid blood donors reached 14 million, up 6.1% from the previous year, and total blood collection reached 23.6 million units.

6.6 Challenges

China has directed significant effort toward transforming its blood donation and supply system to meet two national health needs: reducing the spread of transfusion-transmitted infections while increasing its supply of safe blood. Several challenges remain to be addressed.

First, a crucial challenge for any country is maintaining a sufficient population of blood donors. The WHO estimates that a country requires blood donation by 1% of the population to fulfill the minimum demand (World Health Organization 2010). The demand for whole blood and blood products in China remains high, particularly in large cities with hospitals that serve nonresident patients who have traveled for advanced medical treatments that are unavailable in their local area. China must address persistent cultural and social barriers in donor recruitment and retention (Shi et al. 2014b). Unsurprising, among the public, there is a persistent societal fear of the blood donation process resulting from the historical HIV scandals as well as negative beliefs regarding the depletion of blood. China's post-socialist reforms of the 1980s brought about significant and enduring financial disparity and thereby in many ways contributed greatly to the current state of HIV infection through the blood transfusion market. Additionally, after the medical reforms of 2009, health-care demand increased dramatically, including an increase of 18.6% in the number of surgeries conducted in hospitals, but donated blood supplies only increased by 7.7%. The country's blood supply system must urgently identify how to increase blood donation from a mistrustful general population in order to meet the high demands for safe blood transfusion.

Second, China needs to maintain its commitment to a completely voluntary donor base, which has been met with some resistance rooted in enduring public mistrust, low community awareness, and insufficient understanding of the blood donation process. Currently, a large majority of volunteer blood donors are first-time donors (Shi et al. 2014a). The need for a comprehensive and concerted effort to strengthen engagement with the volunteer blood donor population and to increase awareness among potential new donors (Hong et al. 2012). While China has banned monetary compensations to donors regardless of source (e.g., blood collection station or blood product recipients), federal policies permit some incentives for donors. One major benefit extended to donors is that if needed, donors and their immediate family members can receive blood transfusion at no personal cost; this is called the "Give Blood Voluntarily and Use Blood for Free" provision. However, this benefit is controversial because it can be argued that the assurance of free future

transfusions in exchange for donations serves as de facto compensation and is thus inconsistent with the altruistic principles of voluntary unremunerated blood donation. The sustainability of "Give Blood Voluntarily and Use Blood for Free" model is under debate (Chen et al. 2015; Sun et al. 2016; Zhu et al. 2017). Overall, the transition to a fully voluntary national donation system was necessary and beneficial, and it has led to the elimination of paid donations while increasing the overall quantity of stored blood.

Third, HIV transmission is possible when blood is collected from a recently infected donor still in the detection window period. While the use of NAT in blood screening has substantially contracted the window period, the risk is still present. In recent years, there have been multiple cases of HIV linked to transfusions with blood donated during the window period. It is possible that more cases have occurred but were not identified as being linked to transfusions. Characteristics of the blood donor population have also been influenced by societal factors, including stigma. There is a growing number of individuals—predominately men who have sex with men (MSM)—who initiate blood donation as a pretext for receiving HIV screening after engaging in high-risk sexual behaviors (Hong et al. 2012; Li et al. 2017a). Almost all recent cases of HIV infection via blood transfusion were linked to blood donated by newly infected MSM in the HIV screening window period. Because homosexuality is heavily stigmatized, MSM are often reluctant to initiate HIV testing in healthcare settings. By becoming blood donors, individuals are able to discretely ascertain their HIV status through pre-donation screening. But because China is experiencing very high HIV incidence rates among MSM, it is possible that this has led to a higher risk for contaminated donations that were collected during a donor's window period (Xu et al. 2013). For example, in 2017, among 13,827,708 voluntary blood donors, 2500 blood donors who were MSM screened HIV-reactive (0.02%), which was much higher than among non-MSM blood donors (0.002%, 267/12,363,252) (National Center for AIDS/STD Control and Prevention/China CDC 2018). It is not sufficient to rely on screenings to eliminate potential risk of HIV infection via "window period" donations. Screening donors for risk behaviors could be a viable, but possibly controversial, stance (Hong et al. 2012).

Fourth, China needs to remain on alert to prevent HIV and other transfusion-transmitted infections from entering the blood supply. Although the implementation of mandatory testing for the most common transfusion-transmitted infections—HIV, HBV, HCV, and syphilis—has reduced the transfusion risk of these pathogens, the potential threat of various new emerging and reemerging pathogens has posed significant threats to blood safety in China. In recent years, reports have indicated that human T cell lymphotropic virus (HTLV) infection is increasing among blood donors. In 2015, the National Health and Family Planning Commission issued a notice that HTLV screening should be conducted for all blood donors from Guangdong, Fujian, and Zhejiang provinces; for other provinces, at least 10% of blood donors should be tested (Li et al. 2017a). Some emerging infectious diseases agents among Chinese general population, such as human parvovirus B19 (B19V), malaria, hepatitis E virus, dengue virus, brucellosis, HTLV, thrombocytopenia

syndrome virus, leishmanial, and *Coxiella burnetii* infection may emerge as great threats to blood supply safety. For instance, it has been determined that B19V can be transmitted through transfusions (Slavov et al. 2011). However, while there are limited data on B19V prevalence among blood donors and blood product recipients, it is thought that the estimated prevalence rate could be as high as 3.5% in the general Chinese population and 4.5% among people living with HIV (He et al. 2017).

Fifth, China needs to increase the workforce capacity of clinicians and researchers with specific expertise in transfusion medicine and blood supply utilization. Physicians and technical consultants specialized in transfusion medicine are important in maintaining an adequate blood supply and providing clinical oversight on the appropriate use of blood products, but there are very few such experts in China. Under the current Chinese medical system, transfusion medicine is not considered a stand-alone medical specialty. Most doctors receive only minimal training in transfusion medicine in medical school; this training is usually integrated into surgical training and addresses only the most basic technologies such as blood typing. Doctors who hold a bachelor's degree or above in clinical medicine and have a practicing physician license account for only a small portion of staff in blood transfusion departments. There is a critical need to increase the number of physicians and technical consultants with advanced training in transfusion medicine (Li et al. 2017b). Furthermore, appropriate clinical practices in blood utilization is an understudied area. To promote the appropriate and efficient use of blood products, there is an urgent need to collect utilization information and to conduct research on how blood supplies are used in clinical practice. A national data system is urgently needed to monitor and improve the effectiveness, efficiency, quality, and safety of blood transfusion practices (Shi et al. 2014b).

6.7 Conclusion

In the 1990s, a poorly regulated blood product industry collided with China's nascent HIV epidemic, resulting in massive outbreaks of HIV among paid blood donors. In the decades since this devastating crisis, China has reformed its blood donation system, most notably by banning financial compensation for donation and installing strict oversight mechanisms. The federal and local governments have implemented policy changes, conducted screening campaigns, and invested in laboratory improvements in order to increase fidelity to the best practices in blood donation and supply management.

On an international stage, the WHO reported that between 2002 and 2008, the number of countries collecting un-incentivized blood had increased by 50%. The goal projected for 2020 is a completely voluntary blood donation system worldwide. Although China has accomplished a great deal toward improving donor screening processes and establishing optimal strategies, more work is needed to sustainably and reliably maintain a sufficient nationwide supply of safe blood.

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Prevention of Heterosexual Transmission of HIV

7

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Abstract

Heterosexual transmission now accounts for over two-thirds of all newly diagnosed HIV cases in China, making it the dominant transmission route. The significant societal changes, brought about by the opening of China's boarders and the dramatic economic reform in the late 1970s and early 1980s, have increased personal wealth disparities, created large-scale internal labor migrations, and liberalized sexual norms, all of which have facilitated the rapid growth in heterosexual transmission of HIV. Currently, prevalence in the general population remains low. Therefore, prevention and response efforts for the heterosexual epidemic have concentrated on key populations, including female sex workers, migrants, attendees of sexually transmitted infection clinics, and serodiscordant couples. While interventions such as condom promotion, testing, and health education have been successfully implemented for these long-recognized key populations, the rapid growth of HIV cases in populations such as older adults indicates that there is a need for new approaches to HIV prevention in an evolving epidemic. Additional research is needed to understand transmission dynamics and sexual networks and implementation of effective interventions. Finally, difficult questions that have arisen following opening up and reform, such as economic inequality, the criminalization of sex work, and internal migration, must be addressed to further facilitate HIV prevention efforts.

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7.1 Introduction

Sexual transmission is now the primary mode of HIV transmission in China, with 95% of newly diagnosed people living with HIV (PLWH) having been infected through sexual contact. Two-thirds of sexually acquired HIV cases were by heterosexual contact in 2017 (Wu 2018). While the prevalence of HIV in the general population remains low, the epidemic has already spread beyond the original risk groups—people who inject drugs (PWID), men who have sex with men (MSM), female sex workers (FSW) and their clients, and former plasma donors (FPD)—in the context of rapid social change over the past three decades. HIV prevention interventions and responses have evolved considerably to address the changing dynamics of the epidemic. This chapter will detail the social and epidemiological context of heterosexual transmission of HIV in China and current approaches to prevention.

7.2 Social, Economic, and Political Context

The economic and political reforms that began in 1978 are closely tied to the course of the heterosexual epidemic in China. These reforms included a change from the planned socialist economy to a market-based economy and the dismantling of agricultural collectives and state-owned enterprises (SOEs), both of which provided lifelong employment and social welfare support for workers. This was accompanied by a relaxation of laws against migration within the country and the opening up of China's borders, allowing the influx of foreigners (Leung 1994). Large-scale rural-to-urban migration and urbanization ensued (Chen 1987), and social change including increased gender inequality developed (Ren 2000). By the early 1980s, sexual norms and behaviors had changed, and sex work and syphilis, both nearly eradicated under Chairman Mao Zedong, reemerged (Chen et al. 2011) (see Chap. 17 for more information).

7.2.1 Economic and Political Changes

Since the 1950s, China had only known an economy based on SOEs, large-scale agricultural collectivization, and centralized economic planning (Qian 2000). However, after Chairman Mao's death, his successor, Deng Xiaoping, sought to help China recover from widespread poverty compounded by years of unrest, natural disasters, and lack of economic growth (Qian 2000; Tisdell 2009). Thus, he gradually began implementing a range of policies aimed at transitioning the country to a market-based economy. Specifically, Deng's reforms included allowing farmers to sell their surplus produce, reintroducing private enterprises and market-based pricing of consumer goods, and closing unprofitable SOEs (Qian 2000). In 2001, as a condition of joining the World Trade Organization, China dismantled its system of lifelong employment and social security benefits for many workers employed by

SOEs (Tung 2005). Deng also reestablished foreign relations and, after 1985, relaxed controls on tourism and emigration (Tisdell 2009). Special economic zones were also carefully selected and established. For example, Shenzhen and Xiamen, were initially chosen for development due to their relative proximity to investors in Hong Kong and Taiwan. Deng was paving the way for direct foreign investment (Tung 2005). While these reforms have lifted hundreds of millions of people out of poverty, stark economic inequality developed quickly along with mass migrations of rural laborers into urban areas to meet the high demand for workers that the sudden and rapid economic growth demanded (Zhang and Song 2003). Although these migrant workers enjoyed the benefits of the higher wages and broader employment opportunities in urban areas, they also experienced limited access to health, educational, and social welfare services since all of these usual benefits remained tied to their hometown registrations (Gao 2008; Mou et al. 2013).

7.2.2 Increasingly Liberal Sexual Attitudes, Norms, and Behaviors

The opening of China's borders also led to an influx of Western culture and media at precisely the same time as the Chinese government was loosening its strict surveillance and controls on behavior. The result was a switch, over a relatively short period of time, to widespread sexualized images in the media and dramatically increased prevalence of premarital, extramarital, and casual sex (Gil et al. 1996; Smith 2010). However, despite this liberalization in sexual practices, sexual health knowledge remained low, as discussion of sex was still culturally taboo (Gao et al. 2001). Additionally, although unofficially tolerated, both selling and buying sexual services continue to be illegal in China, and law enforcement periodically engages in crackdowns on the commercial sex trade. During these crackdowns, FSW, particularly low-tier FSW, are arrested and punished more often and more severely than their male clients (Asia Catalyst 2013; Yi et al. 2010). This has not resulted in eradication of the commercial sex trade. Rather, it has caused it to be increasingly hidden (Huang and Pan 2014).

7.2.3 Gender, Migration, Economic Inequality, and HIV Risk

Rapid economic development in urban areas has led to massive internal rural-to-urban migration (Chen 1987). This migration is theorized to facilitate the spread of disease—increased numbers of people come into contact with each other and then carry disease across distances (Yang 2004). In China, migrants are more likely to engage in risky sexual behaviors and have sexually transmitted infections (STIs) compared to permanent urban residents and nonmigrant rural residents (Li et al. 2007; Yang et al. 2007; Zhang et al. 2013a). However, unlike other infectious diseases, STIs, including HIV, require intimate contact for transmission (Yang 2004). Beyond population mixing and the physical carrying of viruses, bacteria,

and parasites across geographies, there are several other factors related to migration that may explain these risks. First, the process of migration often selects for young adults and men, who are, in general, more likely to practice risky behaviors such as drug use and unsafe sex compared to older adults and women. Many migrants travel to cities alone, often without long-term partners, and may seek out sexual services to address their needs. Additionally, increased anonymity and feelings of social isolation in the destination city may encourage casual sex and patronage of commercial sex (Yang 2006).

Migration is a gendered process with differing impacts on HIV/STI risk for male and female migrants. For women, migration and poverty may increase HIV acquisition risk (Türmen 2003), and more risk behaviors have been reported among female migrants compared to non-migrants (Yang and Xia 2006). These differences, often rooted in gender inequality, originate prior to migration. Female migrants are more likely than male migrants to be young and single. However, as rural-to-urban migrants are generally unable to obtain urban residence permits that facilitate access to health, social, and educational services, most migration is relatively short term. For many rural women, migration to the cities ends when they return home to get married. Additionally, prior to migration, women and girls often have received less education and may not have the skills or credentials needed for higher-paying work. Strong focus on cost-minimization incentivizes factories to hire a low-skilled, short-term, migrant workforce that can be housed together cheaply. Thus, many factories deliberately seek out a workforce made up of young, poorly educated, rural, migrant women. Furthermore, among this labor pool, employers frequently prefer to hire those who are single since they will not require days off or higher pay to care for their families (Fan 2003). Also, compared to male migrants, a larger proportion of female migrants tend to work in the service and entertainment sectors, which are generally low-paying and may involve providing sexual services. Since choice of destination city and type of work sought are often shaped by migrants' social networks, female migrants are funneled toward low-paying service and manufacturing jobs (Yang and Xia 2006). Female migrants furthermore face discrimination, including sexual harassment, in the workplace (Ren 2000).

Given the low pay and physically tiring work associated with these manufacturing and service industry jobs, many women begin working in the commercial sex industry. Coupled with the weakening of social safety nets, many migrant women also enter sex work to support their families and themselves after a divorce or a major illness (Hao et al. 2014). Beyond the obvious risks, several additional factors render sex work risky for acquiring an HIV infection for female migrants. Firstly, gendered sexual norms such as submission during sex are prevalent in China (Xiao et al. 2011). Secondly, economic drivers may discourage condom use. For example, FSW may be able to demand higher pay and clients may be willing to pay higher prices for sex without condoms (Choi and Holroyd 2007). Finally, FSW may experience violence from clients who feel entitled to sex without the use of condoms (Choi et al. 2008).

Among male migrants, gender and migration also influence the context of sexual risk behaviors. For men, the context of HIV risk originates in the uneven gender

ratio that has been caused by a strong preference for having sons, not daughters, and gender-selective abortion in the era of China's one-child policy (1979–2015). As a result of this imbalance, there were an estimated 8.5 million so-called surplus men in 2005 (Tucker et al. 2005), which has since swelled to an estimated 34 million (Denyer and Gowen 2018). These men are more likely to be poor, have low levels of education, come from rural areas, and may be motivated to migrate to enhance their marriage prospects. However, because of their inability to find long-term female partners once they reach their urban destinations, they are hypothesized to drive the demand for commercial sex. Although surplus men typically work in low-paying jobs, there is broad enough availability of low-fee commercial sex workers in China to meet their needs. As these men age and accumulate some wealth over time, many are hypothesized to transition back to their rural hometowns and to partner with lower-risk women who are not selling sex (Tucker et al. 2005). HIV/STI-related knowledge, attitudes, and behaviors may also be shaped by male gender. Migrant men who engage in increased sexual risk behaviors are more likely to view themselves as being at low risk for contracting HIV or other STIs, whereas this association is not observed in migrant women. (Wang et al. 2007a).

While economic vulnerability intersecting with an unbalanced gender ratio may shape the risk for surplus men, affluent men are also at risk for HIV infection. The market economy has created another new class of men, the so-called mobile men with money. These are businessmen and government officials who travel frequently for purposes related to their positions and careers and have the time and money to engage in high-risk behaviors on a frequent basis. The emergence of this group has created a demand for entertainment services, including commercial sex, whose workers are often poorer rural women. Emerging social norms dictating business practices often involve behaviors such as heavy drinking and procuring sexual services as part of establishing relationships necessary for successful business transactions (Uretsky 2008). In an entertainment venue environment, consistent condom use may be hindered due to men's perceptions of decreased pleasure, negative peer norms toward condom use, and attitudes toward contraceptives as being the sole responsibility of the female partner (Zheng 2009).

7.3 Key Populations in the Heterosexual Epidemic

China's HIV epidemic began among rural ethnic minorities in the Southwest who shared contaminated drug injecting equipment and then expanded dramatically among poor rural residents of central China who frequented unsafe donation centers (see Chap. 1 for more information). The epidemic then spread to other groups via secondary transmission of the virus. Changes in gender norms around injection drug use resulted in women beginning to use drugs also and then often becoming sex workers to fund their drug use habits and/or that of a partner (Choi et al. 2006; Xiao et al. 2007). Early in the epidemic, key populations at risk for heterosexual transmission and acquisition of HIV included sex workers, female partners of PWID, and STI patients (Yang et al. 2005b). However, the epidemic has since

transitioned to one where the majority of transmission events are attributable to heterosexual sex. As such, these populations as well as several additional groups are now recognized as being at high risk for heterosexually transmitted HIV.

7.3.1 Migrants

Internal migrants have been studied extensively in China as a key population due to the long-established link between migration and transmission of HIV (Weine and Kashuba 2012). In China, the migrant population is quite heterogeneous, including subgroups as diverse as market vendors, miners, construction workers, factory workers, and service industry workers. Thus, HIV risk and risk behaviors among migrants vary considerably.

Estimates of HIV prevalence among internal migrants range from 0% to 16% (Yang et al. 2005b; Zhang et al. 2013a). A systematic review and meta-analysis found that the overall HIV prevalence among rural-to-urban migrants was 0.15%, 2.6 times that of the general population. For female migrants specifically, HIV prevalence was significantly higher than the general migrant population at 0.69%. Risk factors for HIV infection among migrants included stage of migration—those migrating home to rural areas from urban areas were at higher risk compared to those migrating out to urban areas (Zhang et al. 2013a).

A high prevalence of other STIs has also been documented among migrants. One research team estimated that 17–20% of migrants had an STI at the time of their study. Specifically, 9% were estimated to have chlamydia, 1% gonorrhea, and 7% herpes simplex virus 2 (HSV-2; Detels et al. 2003; Wu et al. 2007a). As for syphilis, prevalence estimates have ranged between 0.5% and 1.2% (Hesketh et al. 2006; Pan et al. 2013; Wu et al. 2007a).

High-risk behaviors, such as engaging in commercial sex, are also associated with STIs among migrants (Liu et al. 2005b). In a study in Zhejiang, 4% of migrants reported having bought sex, though the migrants in the study were not more likely to have bought sex than nonmigrant urban residents (Pan et al. 2013). Additionally, condom use among migrants is inconsistent and infrequent (Zou et al. 2012b). Among male migrants who sought commercial sex, 59% did not use condoms consistently (Pan et al. 2013). Among female migrants, 24% reported ever selling sex, and 84% reported not using condoms consistently during their last three sexual encounters (Yang and Xia 2006; Yang et al. 2005a).

In a study of HIV knowledge among migrants, most knew the common routes of HIV transmission—79% knew of mother-to-child transmission, 87% knew of transmission via sharing syringes, and 86% knew of transmission via blood transfusions. Moreover, most knew that condoms prevented HIV infection (76%). However, many migrants also thought that they could acquire HIV through the food they ate or via mosquito bites (Pan et al. 2013). In another study, less than 4% of migrants perceived themselves as likely to be currently infected with HIV or as having some risk of becoming infected (He et al. 2009).

Across settings, while almost 50% of migrants had heard of HIV voluntary counseling and testing (VCT), few had ever attended these services (2–6%; He et al. 2009; Wang et al. 2010; Zhang et al. 2012b). Migrants who were male, had multiple sexual partners, and worked in entertainment venues (compared to factories) were more likely to have been tested for HIV (He et al. 2009). Involvement in commercial sex and use of health services were associated with HIV testing, as were young age, history of selling blood, perception of peer sexual risk, and life satisfaction (Wang et al. 2010). When made aware of HIV risk, 65% of migrants reported willingness to use VCT. Women, those who lacked HIV knowledge, those who were unwilling to interact with PLWH, and those who were unaware of their HIV risk were less willing to seek HIV testing (Wang et al. 2010; Zhang et al. 2012b). Other factors such as a higher perceived severity of HIV and STIs, utilization of healthcare services, and having had premarital sex were associated with willingness to be tested for HIV and STIs (Wang et al. 2010).

7.3.2 Female Sex Workers

FSW have been a target population for HIV prevention since the beginning of the epidemic in China (Hong and Li 2008). Public health research has generally focused on venue-based workers and ignored non-venue-based sex workers (Poon et al. 2011). The heterogeneity of China's FSW population was conceptualized in detail by Huang et al. (2004) who described seven major categories of sex workers in China based on venue, organization of work, income, and demographics. In order of highest to lowest prestige and income, this model includes second wives; courtesans; women working at karaoke bars, massage parlors, and beauty parlors; street-walking women; and women soliciting at factories (Huang et al. 2004).

HIV risk is shaped significantly by factors outside of individual-level attributes and differs qualitatively for different categories of sex workers. Overall, the prevalence of HIV and STIs decreases as FSW status increases. HIV prevalence among FSW working in low-, middle-, and high-fee venues was 1.4%, 0.3%, and 0.07%, respectively (Chen et al. 2012b). Syphilis prevalence was 10%, 4%, and 2%, respectively (Chen et al. 2012c).

Condom use among FSW varies widely. A review of the literature found that the prevalence of consistent condom use ranged between 15% and 58%, but sentinel surveillance data indicated that 88% reported having used condoms with their most recent client (Ministry of Health, People's Republic of China 2012; Zou et al. 2012b). Several factors are associated with increased likelihood of consistent condom use among sex workers: having commercial sex partners (compared with having noncommercial partners; Lu et al. 2009), being venue-based rather than street-based (Choi and Holroyd 2007; Li et al. 2012), not injecting drugs (Lau et al. 2007), and having fewer depressive symptoms (Hong et al. 2007). Additionally, the context of condom usage differs among low-, medium-, and high-tier sex workers. For low-tier, street-based sex workers, condom use was deterred by economic

pressure, threat of client violence, and low-risk awareness of clients regarding HIV and STIs. For medium-tier workers, client intoxication and higher prices for sex without condoms are factors inhibiting condom use. While prevalence of HIV and other STIs among high-tier, or high-fee, sex workers is generally the lowest, condom use may also be inconsistent. Many of these sex workers have regular, intimate relationships and may feel pressured to abandon condom use in the context of these relationships (Choi and Holroyd 2007).

A substantial proportion of sex workers are also PWID, and sex work may help fund their drug use and/or that of a partner. For many drug users, sex work provides a steady source of income in the face of limited economic options (Choi et al. 2006). Between 0.8% and 7% of FSW have reported ever using injection drugs in their lifetime (Hong and Li 2008). However, engaging in sex work and at the same time injecting drugs increases HIV risk. FSW who had used injection drugs had a higher prevalence of HIV and HSV-2 than those who had not and were also more likely to have a recent HIV infection (Xu et al. 2012). Compared with nonusers, FSW-PWID were more likely to report sexual risk behaviors, including being less likely to use condoms with clients, seeing more clients in the previous week, working in commercial sex for a longer duration, and working in low-fee venues (Lau et al. 2007; Xu et al. 2013; Yao et al. 2012). For FSW who also inject drugs, psychosocial and environmental factors impact risk behaviors. Drug-related factors such as addiction and associated cravings may place these FSW in a vulnerable position for negotiating condom use with clients (Gu et al. 2008). Because many do not have other ways to obtain money, they may be more willing to have sex without condoms (Choi et al. 2006). Finally, FSW who inject drugs face additional barriers to addressing drug use, as they are more likely to be denied access to methadone maintenance treatment (MMT) than PWID who were not sex workers. This may indirectly increase their risk for HIV (Choi et al. 2006).

Poor mental health and stigma are also associated with HIV risk. Mental illness is likely to be widespread among FSW. In one study in Guangxi, 30% of sex workers reported having a history of severe depression, 18% had ever had suicidal thoughts, and 9% reported having attempted suicide (Hong et al. 2010). Poorer mental health status has also been linked to HIV-related risk behavior, such as inconsistent condom use (Hong et al. 2007).

Sex workers experience violence from multiple sources, including clients, venue managers, law enforcement, noncommercial partners, and community members. This violence may be emotional, physical, or sexual in nature and include sexual coercion as well as being called names, spat on, and beaten and may result in negative mental health outcomes and HIV risk behavior (Asia Catalyst 2013; Choi and Holroyd 2007; Choi et al. 2008; Hong et al. 2013; Wang et al. 2007b; Yi et al. 2012; Zhang et al. 2014; Zheng 2008). In one study, 55% of FSW reported having experienced violence from their noncommercial partners and 45% from their clients (Zhang et al. 2012a). Partner violence was associated with a range of HIV-related risk factors for FSW. These included increased alcohol abuse, drug use, suicidal behavior, and feelings of depression and loneliness. Having ever experienced violence from a stable romantic partner was significantly associated with inconsistent

condom use with stable partners during last three sexual acts and intention toward future inconsistent condom use. Sex workers who experienced partner violence from clients were more likely to have ever used drugs and to have a history of STIs (Hong et al. 2013).

Adolescent and older sex workers face additional, unique risks. One study found a 30% prevalence of STIs among adolescent female sex workers between the ages 15 and 19. Almost half of adolescent sex workers did not use condoms consistently during the past month, and only 22% reported consistent condom use with their non-commercial, regular partners. Younger age, earlier age at sexual debut, isolation from school and family, and a shorter time in sex work were associated with increased risk of unprotected sex and STIs (Zhang et al. 2013c). Older sex workers (defined as those over the age of 35) typically start sex work in their 30s, due to economic reasons resulting from, for example, unstable marriages or children's expenses (Hao et al. 2014). Many of these women provide sexual services to manual laborers and older men. Barriers to condom use for older sex workers include economic incentives for not using condoms, erectile problems among older clients, and perceptions of condom use hindering the progression of intimate relationships with regular clients.

7.3.3 Male Clients of FSW and Other Key Male Subpopulations

Male clients are an important population that has begun to receive more attention with respect to HIV prevention in recent years. A population-based survey estimated that 7% of men between 18 and 49 have ever paid for heterosexual sex, including 10% of men in urban areas and 2% of men in rural areas. Clients were more likely to have high incomes, travel frequently, entertain for business purposes, be between the ages of 25 and 39, and have earlier sexual debuts than non-clients (Pan et al. 2011). Among migrants, those who have been commercial sex clients were more likely to have worked in industrial sectors or in construction, have had multiple sexual partners, have had a stable sex partner who also had sex with others, and have had a history of drug use (Wang et al. 2007a).

A systematic review estimated that the prevalence of HIV among clients of FSW was 0.68% and that there was a 0.0023 chance of HIV transmission from client to sex worker with each act of unprotected intercourse (Ma et al. 2010; McLaughlin et al. 2013). Additionally, the prevalence of syphilis, gonorrhea, and chlamydia among clients of FSWs was estimated to be 3%, 2%, and 8%, respectively (McLaughlin et al. 2013). Compared to the general adult population, clients of FSWs had an estimated 6 to 44 times the risk of having these STIs, which increases their risk of also acquiring and transmitting HIV (Fleming and Wasserheit 1999; Huang et al. 2011; McLaughlin et al. 2013).

Client risk behaviors are shaped by social norms, environment, relationships and social networks, and individual attributes (Yang et al. 2010b; Zheng 2009). Visits to sex workers are often made in a social context or for the purpose of entertaining as part of conducting business. As a result, condom-related decisions are influenced by

perceived social norms, low-risk awareness of HIV infection, perceived decreased pleasure, and the availability of condoms in the venues (Yang et al. 2010b). Thus, consistent condom use with FSW was reported by only 31% of clients in one study (Yang et al. 2010a).

Like sex workers, subpopulations of clients face different levels of HIV risk (Tucker et al. 2005; Uretsky 2008). In a meta-analysis of studies on China's millions of "surplus men," those who were also migrants were more likely to have engaged in commercial sex than non-migrants. Additionally, unmarried male migrants were more likely to engage in commercial sex and be infected with STIs than married male migrants (Liu et al. 2012). The other new class of men in China, the so-called mobile men with money, have not previously been considered a risk group, and thus, few outreach efforts have yet targeted them (Parish et al. 2003). However, men who were managers or owned an enterprise as well as men with monthly incomes of at least CNY 1500 (~180 USD at the time of the study) were more likely to seek out sexual services (Pan et al. 2011). Additionally, women partnering with men who earned high incomes and socialized often were more likely to be infected with STIs (Liu et al. 2012; Parish et al. 2003).

7.3.4 Elderly Men and Women

Newly identified cases of HIV among older men and women (age 50 and above) have been rapidly increasing, causing growing concern for China's aging population. In the 20 years between 1989 and 2009 across China, newly reported HIV cases among elderly (defined as age 65 and above) migrant men have increased more than 700%, and among elderly nonmigrant men, nearly 2700%. Among elderly women who were migrants, a 350% increase has been observed in newly identified HIV cases in the same period, while among elderly women who were not migrants, this figure was over 1500%. Although these shockingly large increases are likely to be due in part to increased HIV screening among the general population, increasing prevalence of sexual risk behaviors in this demographic have also been observed (Jia et al. 2011).

Although VCT campaigns primarily target key affected populations, access to HIV testing for the general population has been expanded through health communication campaigns and provision of free testing under the Four Free and One Care Policy (Wu et al. 2007c) (see Chap. 25 for more information). Other measures such as routine patient screening performed prior to surgical procedures may have also contributed to the increase in newly identified cases among older adults, who may be more likely to undergo surgery than younger adults (Jia et al. 2011) (see Chap. 12 for more information). In one small cross-sectional study in rural Hunan, the mean age of HIV diagnosis was 66 years for men and 60 years for women, suggesting that these individuals likely acquired HIV after age 50 (Chen et al. 2012a). However, a large-scale study of 215,441 older adults in Zhejiang province found a higher crude HIV prevalence for men aged 50–59 compared to those aged 60–69 (1.12 per 10,000 versus 0.82 per 10,000; Xie et al. 2014). Additionally, this study

found that within the 50–59 years age group, men had a significantly higher HIV prevalence than women, with an overall prevalence of 0.84 per 10,000. Yet 94% of those newly diagnosed with HIV infection in the study reported that they had become infected through heterosexual contact (Xie et al. 2014).

Older adults and, in particular, older men are beginning to be recognized as sharing many risk behaviors with younger adults. In one study, 98% of sampled men reported having commercial sex before receiving their HIV diagnosis, and 97% of these men did not use condoms during commercial sex. It is likely that these behaviors began relatively recently, as the average age of these men when they first engaged in commercial sex was 57 years (Chen et al. 2012a). Many older clients also prefer to patronize low-tier FSW, who typically have higher levels of HIV compared to other FSW groups. This preference may be due to the fact that more of these older clients may be poorer migrants compared to younger clients (Chen et al. 2016). Additionally, among older male clients, aphrodisiac use was associated with HIV infection, which may be due to its correlation with higher levels of commercial sex patronage (Tang et al. 2014).

For elderly women, evidence on sexual risk behaviors is mixed: one case study found no self-reported risk behavior such as extramarital sex, but another study found that 18% of women over 50 years of age reported multiple sexual partnerships over the course of a lifetime (Chen et al. 2012a; Yingying et al. 2011). While traditional Chinese gender norms are restrictive toward women's sexuality, practices such as multiple sexual partnerships and extramarital sex are growing among women (though there is little information specifically on elderly women's risk behaviors; Xiao et al. 2011; Yingying et al. 2011). However, given high levels of risk behavior in elderly men, many elderly monogamous women who are now HIV-positive likely acquired their infections from their long-term male partners (Chen et al. 2012a).

In other settings, there are several other factors that place elderly adults at risk, including low levels of HIV knowledge and risk awareness and lack of prevention interventions targeting this group (Bendavid et al. 2012; Milaszewski et al. 2012). It is possible that many of these factors are also relevant in China. However, little is known about sexual norms, practices, and networks of elderly Chinese men and women.

7.3.5 Men Who Have Sex with Men and Women (MSMW)

A significant number of MSM also have sex with women, including bisexual men, heterosexual male sex workers who primarily service male clients, and married men. A meta-analysis estimated that the prevalence of bisexual behavior among MSM was 31% (Yun et al. 2011). However, there is wide variability of the estimates of the prevalence of bisexual behavior; in one study, up to 59% of MSM reported ever engaging in bisexual behavior (Lau et al. 2008; Yun et al. 2011). A meta-analysis found that 17% of MSM are currently married, though a more recent study of MSM in Beijing estimated that 27% of MSM were married (Tao et al. 2013; Yun

et al. 2011). Among MSMW, HIV prevalence was estimated to be 5%, which did not differ from the overall MSM group (Yun et al. 2011) (see Chap. 8 for more information).

7.3.6 Adolescents, Youth, and Students

The changes brought about by China's social, political, and economic reforms have also impacted young people's risk for HIV. Despite increased societal tolerance for casual and premarital sex, early sexual health education has not been widely implemented (Gao et al. 2001) (see Chap. 11 for more information). Additionally, many young people are left behind in their hometowns while one or both parents migrate into the cities and may have more opportunities to engage in risk behavior due to reduced adult supervision. Finally, many young people themselves leave home to migrate due to lack of educational and economic opportunities in their hometowns and may face similar risks as adult migrants. Between 1999 and 2000, the proportion of migrants aged 15–39 grew from 77% to 85%, and the mean age declined from 27.4 to 26.9 years, suggesting that increasing numbers of young people are migrating.

7.3.7 Serodiscordant Couples

Approximately 25% of heterosexual HIV transmission is estimated to occur between spouses in China (Ministry of Health, People's Republic of China 2011). Many of the HIV-positive partners in serodiscordant couples were FPD (Wang et al. 2012). A meta-analysis of studies conducted between 1990 and 2011 found that the overall seroconversion rate for married discordant heterosexual couples in China was 1.2 per 100 person-years (PY) and the prevalence of HIV was 11.5%. Between 2005 and 2011, the seroconversion rate decreased to 1.1 per 100 PY compared to 3.9 per 100 PY between 1994 and 2004. In heterosexual couples, an increased risk of seroconversion is significantly associated with inconsistent condom use, frequent sexual activity, and a low psychological quality of life score (Wang et al. 2012).

Although ART has been shown to reduce HIV incidence by 66% among serodiscordant couples in a rural Chinese setting (He et al. 2013), inconsistent condom use, low-risk perception, and intention to have children may contribute considerably to HIV transmission risk (Lau et al. 2013; Liu et al. 2005a). Condom use among couples is an important risk-reduction measure. A systematic review reported condom use during the most recent sexual encounter to be between 65% and 99%, but that consistent condom use varied widely from 0% to 93% (Wang et al. 2012). Availability of condoms may contribute to low rates of consistent condom use, as many serodiscordant couples reside in impoverished areas in rural China. Additionally, having suicidal thoughts within the past year was also significantly associated with inconsistent condom use in the past year (Lau et al. 2013). Perception of HIV risk was also low among many of these couples. Less than 12% of PLWH who had an

HIV-negative partner believed it was likely that their partner would contract HIV during unprotected sex, and this perception was tied to inconsistent condom use (Lau et al. 2013). For couples in stable, long-term relationships, intention to have children also impacts condom use, as those who did not plan to have children with their spouse were significantly more likely to use condoms consistently than those who did plan to have children (Liu et al. 2005a).

7.3.8 Ethnic Minorities

Regions of high HIV prevalence in China—mainly its Southern and Western provinces—are also home to many of China's 55 recognized ethnic minority groups (Liu et al. 2009). These ethnic minority populations tend to live in poor, remote, rural areas, and few interventions have been designed with the culturally specific needs of minorities in mind (Wang and Keats 2005). While prevention efforts for ethnic minorities have targeted injecting drug use, sexual transmission is growing as well. For example, in Liangshan Prefecture, Sichuan province, an area that is predominantly populated by members of the Yi ethnic group, 18% of all infections were reported to be contracted through sexual contact in 2010. Projecting forward to 2020 using a mathematical model based on local surveillance data, it is estimated that this proportion will balloon to 72.9% of cases (Liu et al. 2013b).

With 55 different minority ethnicities in China, it is difficult to generalize on the relationship between ethnicity and HIV risk. Studies have only begun to explore this link. Additionally, macrosocial factors such as economic need, globalization, and cross-border social networks are likely to affect the structure of sexual networks and influence HIV risk for many ethnic groups, especially those residing along border areas. One study in Southwest China described the migration of Dai women to work in Thailand, which also has a significant Dai population. During migration, both these women and their husbands who remained in China commonly had extramarital relationships (Deng and Lyttleton 2013).

Ethnicity is also associated with psychosocial factors, and these factors in turn may impact HIV-related risk behaviors. Among FSW, ethnic minority women in higher-priced venues felt less socially supported by their peers than nonminority women (Liu et al. 2013a). However, ethnicity may also confer protective effects. In Guangxi, which has a significant Zhuang population, Zhuang ethnicity was a protective factor against suicidal thoughts among FSW, which is important to consider, as suicidal thoughts are associated with lower rates of condom use among FSWs (Hong et al. 2010).

Additionally, external perceptions of these ethnic cultures may also influence HIV risk. For example, ethnographers have documented the commercialization of ethnic identity among groups such as the Dai to promote tourism in Yunnan (Hyde 2000). A significant component of tourism development in this region involves promoting sexualized stereotypes of minority women and cultures. For example, traditions such as the Water-Splashing Festival celebrated by the Dai have been turned into a sexualized display, and sex work venues are frequently staffed by Han

women in ethnic dress (Hyde 2000). These venues are frequented not only by tourists but also by "mobile men with money" who engage the services of sex workers in the process of business development (Hyde 2000; Uretsky 2008). Thus, this sort of tourism development may promote sex tourism and risk for HIV among FSW and minority women.

7.4 Responses to the Heterosexual Epidemic: 1980 to Present

China's response to the HIV epidemic has evolved considerably from initial recognition to the present. While early responses were often ideologically based, HIV policy, especially with respect to key populations, has been increasingly formulated based on scientific evidence. However, Chinese public health practitioners continue to navigate the contradictions between ideology, law, and international best practices. The following section discusses interventions targeting the heterosexual transmission of HIV.

7.4.1 The First 25 Years: 1983–2008

Although the rapid increase in STIs had been recognized in as early as 1983, few effective interventions were implemented. In the 1990s, HIV began to be detected among FSW employed by entertainment venues. FSW interventions during this time were limited to interventions for women who had been arrested and incarcerated. However, in 1995, China's Ministry of Health began sentinel surveillance for HIV among sex workers at 13 sites (Rou et al. 2010) (see Chap. 2 for more information). Over the course of the remainder of the decade, several pilot interventions for HIV/AIDS prevention among FSW began.

Originally, efforts to control sexual transmission focused on FSW. In 1996, formative research on prevention among FSW began with the aim of increasing condom use and knowledge of HIV. The China CDC (then known as the Chinese Academy for Preventive Medicine) led these efforts to understand the context of sex work and feasibility of implementing an intervention in Yunnan province, which was at the center of the initial epidemic. The results of this research indicated that interventions needed to take into account sex workers' low level of education, high mobility, and existing awareness of, and desire to prevent, STIs (Rou et al. 2010).

In 1997, with the support of the World Bank, the first interventional trial for FSW was conducted in Yunnan province with the objectives of (1) increasing knowledge of HIV transmission and prevention, (2) increasing perception of risk for HIV infection, and (3) increasing condom use. This intervention consisted of venue-based health education sessions conducted by outreach workers, distribution of reproductive health education materials and condoms, as well as education on the importance of condom use for both FSW and venue owners. Overall, all measures of HIV knowledge, perception of risk, and condom use among FSW significantly increased.

Additionally, those who participated in the intervention were more likely to use condoms than those who did not. This trial demonstrated the feasibility and effectiveness of behavioral interventions for reducing risk behaviors among FSW (Wu et al. 2007b).

Building on the success of this first trial, a demonstration project funded by the World AIDS Foundation to prevent STIs and HIV among sex workers was initiated in April 2000 in Anhui, Beijing, Fujian, Guangxi, and Xinjiang to measure program effectiveness in real-world settings. The intervention consisted of establishing a women's health clinic for FSW to receive nonjudgmental sexual health services and counseling (including HIV testing), health education, and free or discounted condoms. Although these five provinces varied in the predominant route of HIV transmission, the intervention was effective overall. Both the proportion of FSW correctly answering basic knowledge questions on HIV transmission and prevention and the proportion reporting condom use with their most recent client increased significantly. Additionally, the proportion of sex workers who accepted sex with clients without condoms when offered more money decreased by almost half. Finally, the prevalence of gonorrhea and chlamydia both decreased after the intervention. This multicity trial also explored avenues for becoming self-sustaining through revenue generated by charging small fees for visits to the women's health clinics and selling condoms at a discounted price (Rou et al. 2007).

Following these initial successful trials, interventions that could be applied nationally, such as health education, HIV testing, and promotion of condom use, were scaled up in China in an evolving policy environment (Kaufman 2010; Rou et al. 2010) (see Chap. 18 for more information). In 2001, the multiagency Action Plan for Reducing and Preventing the Spread of HIV/AIDS was issued, which set targets for condom use in key populations and called for condoms to be promoted through social marketing and condom vending machines in public spaces (Rou et al. 2010). From 2001 to 2003, the 100% Condom Use Program was implemented in Wuhan. This approach was also a component of a World Bank-funded project with sites in Shanxi, Fujian, Xinjiang, and Guangxi (Rou et al. 2010; Zhongdan et al. 2008). In 2004, the government ban on condom advertising was repealed (Zou et al. 2012b), and in the same year, a nationwide outreach team focused on FSW was created. Outreach teams were also created at the local levels and their activities were standardized nationally. With the issuing of a new action plan, beginning in 2006, condom use targets were increased from 50% to 90% in high-risk populations (Zou et al. 2012a).

7.4.2 New Interventions and Policies: 2008 to Present

These prior efforts provided a foundational evidence base, capacity development for public health practitioners and researchers, and proof of intervention effectiveness in real-world settings. In the context of an evolving policy environment and expanding international collaboration, more recent intervention efforts have been implemented to address the growing heterosexual transmission epidemic.

7.4.2.1 Increasing HIV Testing Uptake

China has long recognized HIV testing as an important component of HIV prevention and control, and the expansion of HIV testing has been a policy priority since 2004 (see Chap. 12 for more information).

Rates of testing among many key populations at risk of acquiring HIV via the heterosexual transmission route are low, but several interventions show promise for increasing uptake. For example, community mobilization efforts may increase testing rates among groups such as rural migrants. In an intervention study in Shanghai, rural migrants received a modified version of traditional VCT services—barriers such as fees and wait times eliminated and protesting and anti-stigma interventions added. Elevated rates of VCT uptake, increased HIV knowledge, reduced HIV stigma, and improved attitudes toward condom use were observed after 24 months (Zhang et al. 2013b).

Partner notification and testing has been an area of focus for preventing HIV sexual transmission among couples. Since 2008, the partner testing rate has increased significantly—from 31.7% in 2008 to 91% in 2015—and has remained high in both 2016 and 2017 (National Center for AIDS/STD Control and Prevention, China Center for Disease Control and Prevention 2018).

Provider-initiated testing and counseling (PITC), implemented nationwide in China in 2007, has been successful in diagnosing cases of HIV among those who do not seek HIV testing but do seek medical care for other reasons. Although still a relatively inefficient method in China, and often diagnosing HIV infection late or very late, after individuals have already progressed to AIDS, PITC does better target the general population and the older adult population than some other testing uptake interventions.

In order to reach groups who may have difficulty attending testing in a clinical setting, home-based testing and counseling (HBTC) strategies are being explored. HBTC strategies may be particularly useful for reaching populations at risk of acquiring HIV via heterosexual contact. For example, elderly men and women, who are not typically targeted by traditional prevention efforts and who may have difficulty reaching testing sites, may be well suited for HBTC initiatives. Additionally, FSW who already face stigma related to being associated with sex work may not also want to be seen approaching HIV VCT sites to seek testing for fear of also facing HIV-related stigma. A study in Shandong in 2012 found that more than 70% of FSW would accept HBTC (Xun et al. 2013). Furthermore, along similar lines, HIV self-testing has become available in China in recent years, with a broad variety of HIV self-test kits for sale online. While these kits may successfully address barriers to testing for many key populations (e.g., ease, convenience, privacy, confidentiality), they have a major downside as well—poor linkage to care.

7.4.2.2 Mobile- and Web-Based Interventions

In China today, mobile phones and mobile phone service and data packages are much more affordable than in many Western settings. Thus, there are currently more than 600 million unique mobile phone subscriptions in China, making the Internet and mobile applications, or "apps," readily accessible to a huge proportion of the

country's population. Therefore, mobile- or web-based interventions may help disseminate knowledge to rural areas and also to stigmatized populations that may not be accessible through traditional in-person health education interventions. Among key populations such as FSW, high levels of mobile phone use suggest that mobile interventions for HIV prevention may be feasible. A 2011 study found that roughly 75% of FSW were Internet users, 40% had searched for information on HIV and STIs, and 67% would be willing to participate in an online HIV intervention (Hong et al. 2011).

In a community-based intervention in rural Yunnan, content on STIs and HIV was developed for a reproductive health website targeting health workers from Women's Federations and local public health bureaus, as well as middle school teachers. Large increases in HIV and reproductive health-related knowledge across the most areas were observed, providing evidence of the feasibility of electronically delivered interventions in rural areas (Tian et al. 2007).

7.4.2.3 Female Condom Use Among FSW

Female condoms (FCs), which are thin polyurethane sheaths that may be inserted inside the vagina prior to sex, have begun to be tested for effectiveness in HIV prevention among female sex workers. One of the main advantages of FCs lies in the autonomy of women in deciding whether or not to use them. In rural areas, FSW who had used FCs multiple times were not as likely to have unprotected sex as women who were nonusers (Nie et al. 2013). At sites where the use of male condoms is relatively low, the rate of 100% protected sex in the past 30 days increased by 15% after the introduction of FCs (Liao et al. 2011). Although FCs have not been widely used in interventions, some studies have reported high rates of acceptability of this mode of HIV prevention among FSW (Wang et al. 2013; Yimin et al. 2002, 2003). In China, FCs are more likely to be acceptable to, and be used by, older women, women who have had children, women who are more sexually active, and women who have a longer history of sex work (Liao et al. 2011; Nie et al. 2013; Wang et al. 2013).

7.4.2.4 Treatment as Prevention

Despite provision of prevention counseling and condoms to HIV serodiscordant couples, seroconversion rates among HIV-negative partners was still unacceptably high, reaching 7–10%, particularly in minority groups in Xinjiang and Sichuan. However, a longitudinal study conducted in Yunnan from 2011 to 2013 found that ART prescribed to the HIV-positive partners was associated with 66% reduction in HIV incidence among the HIV-negative partners (He et al. 2013). This study served as a real-world test of the HIV treatment as prevention (TasP) strategy, previously demonstrated in a large clinical trial (Cohen et al. 2011). The Chinese government has since removed barriers to treatment for individuals in serodiscordant relationships, and the number of serodiscordant couples on ART increased from 38,196 (58% coverage) in 2011 to 114,434 (81% coverage) in 2017. The national average HIV seroconvertion rate among serodiscordant couples has declined from 2.6% in 2011 to 0.68% in 2017, a 74% reduction (National Center for AIDS/STD Control and Prevention, China Center for Disease Control and Prevention 2018).

7.5 Challenges and Future Directions

While significant progress has been made in confronting the heterosexual epidemic in China, several major challenges remain.

7.5.1 Understanding the Heterosexual Epidemic

Although the number of newly reported HIV infections obtained through sexual transmission, and specifically heterosexual transmission, is rapidly growing, it is unclear what drives the heterosexual epidemic. Prevalence among traditionally high-risk groups, such as FSW, has remained relatively low. Additionally, these groups have often been described as "bridge" populations who can transmit HIV to otherwise low-risk groups, despite the lack of direct empirical proof. This designation may shift attention from other groups who require interventions, such as non-commercial female partners of clients, wives of MSM, and elderly women.

Sexual networks and norms are also not well-understood, especially among populations such as older adults and MSMW, who have only recently begun to receive attention. Phylogenetic analysis of HIV genetic data may be useful for understanding the transmission dynamics of the heterosexual epidemic. Combined with epidemiologic and surveillance data, phylogenetics may help describe how HIV is spread through the population and facilitate identification of sexual networks. Other recent infection testing algorithm-based techniques may also help to determine the role of acute infections in driving the epidemic (Pilcher et al. 2008). Finally, the understanding of sexual risk behaviors must be increasingly nuanced. In addition to examining long-established risk behaviors, other behaviors such as sex with non-commercial partners for sex workers and sex with wives for married MSMW and the roles of these behaviors (if any) in sustaining the epidemic need to be better understood.

7.5.2 Reducing Sexually Transmitted HIV Among FSW

Over the past two decades, interventions targeting sex workers have had some success in reducing risk behaviors, increasing HIV knowledge, and reducing HIV/STI prevalence (Hong and Li 2009). While HIV prevalence among FSW is generally low, several challenges remain in preventing heterosexual transmission of HIV, both from and to this group. The prevalence of other STIs, including syphilis, is high (Poon et al. 2011). Given the amplifying effect of STIs on HIV transmission, STI prevention and control is critical for controlling the HIV epidemic (Galvin and Cohen 2004). In addition to health education for sex workers on condom use and HIV/STI prevention, condom promotion efforts must also address complex factors such as gatekeeper and venue policies on condom use with clients, clients' condom use behaviors, and condom availability (Choi et al. 2008; Li et al. 2010; Zhongdan et al. 2008). Condom quality and condom failures such as slippage or breakage must also be taken into account when designing condom promotion interventions (Choi

et al. 2008). Additionally, condom use behaviors outside of commercial sex settings must also be addressed (Cheng et al. 2010; Li et al. 2012). Finally, condoms continue to be seized by law enforcement as evidence of prostitution, despite newer regulations prohibiting this practice. Stronger measures need to be put in place to eliminate this serious barrier to increasing effective condom use among sex workers (Zou et al. 2012b).

Additionally, many sex workers are not reached by current intervention efforts. Due to the criminalization of sex work, many low-fee sex workers who work independently often must protect themselves against law enforcement surveillance and focused crackdowns, despite tolerance of sex work at the local levels (Yi et al. 2012). For this reason, many low-fee sex workers are not receptive to interventions. Also, because many of these women are independent, they are often difficult to find and are therefore under-represented in sentinel surveillance data. Thus, it is difficult to determine the scope of the epidemic among these most vulnerable women. However, for higher-fee sex workers who are based at venues, attrition is a significant issue as many sex workers migrate prior to the completion of an intervention. Venue-based sex workers who are found to be HIV-positive often leave before treatment can be initiated as many venue managers will not allow an HIV-positive sex worker to work at their venue. As eligibility for treatment requires identifiers, many sex workers may avoid treatment due to fear of exposing themselves. Similarly, the highest-fee sex workers are often hidden and also difficult to approach, and interventions have not been successful in reaching this group (Choi and Holroyd 2007). Interventions must also address the special needs of groups such as FSW who use injection drugs, are adolescents, and/or are living in rural areas. HIV prevention efforts must also extend outside of the commercial sex setting. Besides personal relationships, health promotion work should occur prior to entry into sex work as well as after women exit the sex industry.

Finally, societal stigma and current legal approaches toward sex work are significant barriers to effective HIV prevention. FSW report stigma and discrimination from community members, society at large, and clients and hide their occupation from their social networks as well as health workers. As a result, this is a significant barrier to spreading HIV prevention messages to sex workers. Additionally, despite the efforts of local health departments and national-level policies barring the use of condoms as evidence of prostitution, sex work remains illegal and is subject to periodic crackdowns (Hong 2009). These crackdowns, while ineffectual for eradicating prostitution, result in violence for sex workers at the hands of the police and increased risk for STIs in the penal system, which in turn may increase HIV acquisition risk (Tucker et al. 2010).

7.5.3 Addressing Intersecting and Underserved Key Populations

Although the routes of HIV transmission in adults—injection drug use, plasma donation, vaginal sex, and anal sex—are distinct, groups at high risk of contracting and transmitting HIV are often large, heterogeneous, and interconnected. As a

result, many who are at risk often belong to intersecting risk groups and practice multiple risk behaviors, such as adolescent migrants, FSW who inject drugs, ethnic minority serodiscordant couples, married MSM, and elderly male clients of sex workers. Interventions and policies must be able to address multiple risk behaviors and also understand these interconnected contexts of risk.

7.5.4 High-Quality Intervention Research

Despite an increasing body of research from both Western and Chinese institutions that has shed light on the complex heterosexual HIV epidemic in China, additional high-quality HIV intervention research is needed (Hong and Li 2008). There are several crucial gaps in the literature that must be addressed if prevention of heterosexual HIV transmission is to be improved.

7.5.4.1 Study Design and Measures

Many studies have used self-reported behavioral and biological data, which may be subject to social desirability bias and may thereby be under- or misreported. Additionally, many studies are designed to be cross-sectional or retrospective, and based on lifetime rather than recent practices, and may thus be unreliable and not capture recent changes in risk behavior (Yang et al. 2005b). Behaviors should be measured using standard and reliable outcomes that may be compared across studies. For example, Hong and Li (2008) recommend that for a behavior such as condom use, surveys should ask about consistent condom use (defined as 100% condom use) over a recent, short-term period. Questions on risk behaviors must also be designed in a way that captures the nuances of such behaviors. Types and concurrency of sexual partners must be measured; for example, groups such as FSW do not only practice sexual behaviors in the context of work (Yang et al. 2005b). Finally, biologically based measures such as prevalence or incidence of HIV, rather than self-reported behaviors, should be increasingly used as outcome measures (Hong and Li 2008). For these measures, uniform HIV and STI test protocols should be used to minimize variation due to differences in sensitivity of tests (Poon et al. 2011).

7.5.4.2 Study Populations

In the literature, studies of key populations have often been conducted on participants associated with a specific venue, such as sex workers employed by a karaoke bar or STI patients seeking care at a clinic (Hong and Li 2008). Thus, many transient or hard-to-find participants, such as street-based sex workers, are excluded despite the need for HIV prevention efforts for these groups (Hong and Li 2008; Poon et al. 2011; Yang et al. 2005b). Furthermore, many of these studies have focused on Southwest China, which although the site of the initial HIV epidemic, it is demographically distinct from much of the rest of China (Hong and Li 2008). As a result, many of these studies may not be generalizable to other regions and groups within China.

7.5.4.3 Research Questions

While much research on the context of the HIV epidemic and associated risk behaviors has been done in recent years, relatively few intervention studies have been undertaken thus far (Hong and Li 2008; Poon et al. 2011; Yang et al. 2005b). Given the importance of evidence-based practice as well as theoretically sound interventions, conducting more of these studies should be a priority. Much of the behavior change theory is based on Western observations and may not be applicable to a Chinese context (Hong and Li 2008). Additionally, more research on structural determinants of HIV and structural interventions are needed, especially given the rapid pace of change, complexity of macrosocial environment, and paucity of empirical data on the impact on HIV transmission.

7.5.5 Expanding Prevention and Treatment for Mobile Populations

Previously, HIV treatment policy in China required PLWH to return to their hometowns (as determined by their household registration) to access treatment. However, the policy has been modified to include those migrants who have lived long term in their new destination cities (i.e., longer than 6 months). Nevertheless, interpretation and implementation of the policy varies between provinces and municipalities and more mobile migrants, such as sex workers, often cannot return to their hometowns regularly to seek treatment. Additionally, interventions for HIV prevention, which often require significant periods of time for baseline assessments, intervention activities, and follow-up, often suffer from significant numbers of participants failing to return for follow-up study. With large numbers lost to follow-up, it becomes difficult to estimate number reached by these interventions as well as the efficacy of the intervention itself. Treatment and prevention activities for these populations must account for the significant mobility of many key populations.

7.5.6 Changes in Legal and Social Environment

Given the extent of the impact of rapid social, political, and economic changes over the past three decades on the HIV epidemic in China, changes in the larger environment are necessary to address factors fueling the spread of HIV. For example, the stigmatization and criminalization of sex work has hindered HIV prevention efforts among sex workers, despite the vulnerability of this group to HIV (Tucker et al. 2010). Among other groups, such as MSMW, the cultural pressure to get married and have children combined with the stigmatization of same sex behaviors may promote unsafe sexual behaviors (Chow et al. 2011). HIV prevention work, especially regarding sexual risk behaviors, is extremely challenging in an environment where these contradictions occur.

7.6 Conclusion

Heterosexual transmission of HIV has become the most common transmission route in China. As this may indicate a shift toward a generalized epidemic among adults is possible, or already underway, it is important to curb transmission through heterosexual contact. Since 1979, social, political, and economic changes have led to significant changes in sexual behaviors, norms, and, consequently, risks, which have contributed to the rapid growth in HIV. After the initial epidemic among people who inject drugs, populations such as FSW, clients of sex workers, and migrants were the targets of interventions. These interventions included health education, establishing specialty clinics, and condom promotion. Interventions such as tailored HIV screening and counseling have been expanded among these groups and other newly recognized, key populations, such as elderly men and women, MSMW, and "mobile men with money." Nevertheless, many challenges remain, including reaching emerging key populations, the criminalization of sex work, lack of access to testing, and addressing stigma toward groups such as sex workers. China must rise to meet these and other emerging challenges if it is to bring its heterosexually driven HIV epidemic under control.

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Preventing HIV Transmission Among Men Who Have Sex with Men

8

Jie Xu, Willa Dong, and Zunyou Wu

Abstract

Homosexuality has been documented throughout Chinese history with varying levels of societal tolerance—popular and thriving during the Ming and Qing dynasties to strictly prohibited and strongly stigmatized during the Mao era. With the dramatic social changes that have come to China as a result of its Opening Up and Reform Policy of the late 1970s, homosexuality has reemerged. However, despite liberalizing attitudes, men who have sex with men (MSM) continue to face severe stigma and discrimination as well as pressure from family to marry and bear offspring due to deep-seeded, traditional cultural values. Stigma, poor sexual health education, low rates of accurate HIV knowledge, and high rates of a broad range of sexual and drug use risk behaviors have made Chinese MSM vulnerable to infection with HIV and other sexually transmitted infections. Furthermore, the desire to remain hidden has meant that uptake of HIV prevention, testing, treatment, and care services has been suboptimal. The Chinese government has responded and MSM community-based organizations have gotten involved, but further efforts must be made to control and reverse the rapidly growing HIV epidemic among MSM in China.

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8.1 Introduction

According to surveillance data, HIV prevalence among men who have sex with men (MSM) in China has risen from less than 1% in 2003 to 8% in 2015, by far the fastest growth rate among all key, high-risk populations in China (Pisani and Wu 2017). Several major public health initiatives have been launched by international aid organizations, the Chinese government, and MSM-friendly community-based organizations (CBOs). However, heavy societal stigma remains a significant obstacle to HIV prevention efforts. Consequences of economic and political liberalization, such as migration and urbanization on a massive scale, the reemergence of sex work, and widespread Internet access, combined with this deep-seeded stigma, have contributed to the rapid evolution of the MSM HIV epidemic and thus have also influenced the response. Despite some progress in the fight for control and prevention of HIV among MSM in China, significant barriers remain.

This chapter opens with a discussion of the historical and sociological context of male same-sex behavior in China. It then moves into a description of the characteristics of the HIV epidemic among Chinese MSM and the domestic and international public health response. Finally, current approaches are described, and achievements and challenges discussed.

8.2 History of Male Homosexuality in China

From a sociological perspective, a group that shares the same sexual behaviors may not necessarily be defined as a community. For example, in many western settings, there is a gay community rather than an MSM community, as the term "MSM" names a public health concept that defines a population by behavior. However, in the context of China, the terms "gay community" and "MSM community" are often interchangeably used, as many Chinese men prefer to be identified as "MSM" rather than as "gay." In China, while most within this community are homosexual or bisexual men, some are men who identify as heterosexual. Given the diversity of men encompassed by the term "MSM" in China, it is necessary to understand the context of male same-sex behavior. Historical and sociological studies of male homosexuality are important sources of information for understanding the formation and characteristics of these communities.

8.2.1 Before 1949

While male same-sex behavior, and varying levels of societal tolerance, has been documented throughout the different periods of Chinese history, it is difficult to determine the origin of same-sex behavior and the emergence of Chinese male homosexuality. A prominent Qing dynasty scholar, Ji Xiaolan, claimed in his book *Fantastic Tales* (late 1700s) that "flirting with beautiful young men started from the Yellow Emperor," who is thought to have reigned between 2697 and 2597 BC. While

this claim has been questioned for the lack of supporting evidence, it is likely that male same-sex behavior has existed for longer than the written record. The earliest documentation of homosexuality may have appeared during the Shang dynasty, roughly 3000 years ago. The text warned against male-male sex and described this behavior as a type of social illness. Thus, as early as the Shang dynasty, homosexuality had become a social phenomenon. During the Zhou dynasty (1046–256 BC), male homosexuality became increasingly popular, and during subsequent dynasties, homosexuality was generally tolerated (though at times discouraged). Male homosexuality even thrived in the Ming and Qing dynasties (1368–1911 AD), extending into the Republican period of China (1912–1949; Liu and Lu 2005).

There are several social, cultural, and historical reasons for the openness toward homosexuality during these periods. First, Chinese culture emphasizes clan and blood relationships, which sexual relationships between men and women that were considered illegitimate may disrupt. In contrast, same-sex behavior does not involve reproduction and would not disturb familial and societal stability. As a result, rulers implemented flexible policies on homosexuality. Second, after the Tang dynasty (618–907 AD), sexual behavior was highly policed due to neo-Confucianism and the influence of feudal morality. Buying sex was restricted, and prostitution was forbidden. Additionally, seeking out prostitutes required significant wealth and was not affordable for some men. For this reason, some men engaged in same-sex behavior to cope with sexual frustration. Finally, homosexual behavior between men caused fewer family conflicts with their wives compared to extramarital relationships with women (Liu and Lu 2005).

8.2.2 Between 1949 and 1978

The establishment of Communist rule in China in 1949 had a profound impact on every aspect of social life for every social group, including MSM. This sudden, massive social change included harsh criticism of same-sex sexual contact as being part of a "decadent western lifestyle" and homosexual activity retreated underground.

According to the book *Tong Xing Ai* (Same-Sex Love), which analyzed the ideological roots of discrimination against gay men in China, scholars who shaped popular views on sexuality historically advocated for the view of sex as being solely for reproductive purposes. In the mid-twentieth century, many ideas from the feudal period (1046–206 BC) were replaced by new ideas, but these older views on sex persisted. Moreover, the perception of "traditional" sexual morality in modern China has been derived from these ideas rather than from the policies and norms of more tolerant eras. The linking of sex to reproduction "became a benchmark for Chinese society to determine the appropriateness of various kinds of sex and sexual behaviors." Thus, based on traditional sexual morals, "male homosexuality violate[d] the laws of nature because it [did] not lead to reproduction." As a result, many scholars believed that male same-sex behavior should be stigmatized (Liu and Lu 2005; Zhang 1994).

Discrimination against homosexuality was also closely tied to the political context. After 1949, leftist ideologies dominated Chinese society and imposed a singular and conservative view of sex and sexuality (Liu and Lu 2005). Not only did it become very difficult for gay men to find sexual partners, but these men also faced the risk of legal punishment. Although there were no explicit legal provisions criminalizing same-sex sexual behavior, in practice, this behavior was often treated as illegal, and MSM were frequently detained for charges such as "hooliganism," fined, and faced incarceration. In addition to being punishable by law, after 1949, homosexuality was also widely considered "paraphilic." Furthermore, although men who provide sexual services to other men have existed since ancient times, this phenomenon was strictly banned by government legislation and actions after the People's Republic of China was established in 1949. Thus, homosexual behavior retreated underground.

8.2.3 After 1978

The year 1978 marked the beginning of a period of widespread reform and reengagement in the world for China that continues today. The sweeping changes that got their start early in this period would eventually touch every facet of life in China—politics, the economy, society, and culture. In the late 1980s, with economic and social liberalization, Chinese society gradually adopted a more tolerant and understanding attitude toward homosexuality. Similarly, the Public Security Bureau (PSB), the law enforcement arm of the Chinese Central Government, which had carried out the arrest and detention of MSM, also clarified that they would no longer interfere with consensual sex between two adults (Liu and Lu 2005). Although consensual same-sex behavior was decriminalized at the end of the 1980s, discrimination against homosexuality remained (see Chap. 17 for more information).

8.2.3.1 Migration

One of the most dramatic consequences of these economic reforms was large-scale internal migration. In the 1980s and 1990s, migration flowed from north to south, from the countryside to the cities, and from the western, inland provinces to the more-developed, eastern, coastal provinces. In the twenty-first century, the process of urbanization has only accelerated, and the populations of China's cities have grown rapidly. From 1982 to 2010, China's migrant population grew 33-fold, from approximately 6.6 million to more than 221 million and from 0.7% of the nation's total population to 16.5%. According to official statistics, 236 million people did not have a *hukou* (residency registration) that matched the location where they were actually living (Lu and Xia 2016).

This massive population shift promoted the concentration of MSM in China's urban areas. A large Internet-based study of nearly 800,000 Chinese MSM from 2008 to 2012 found that nearly 35% were migrants and that the top five destination of these MSM migrants were Guangdong, Shanghai, Beijing, Tianjin, and Zhejiang (Mi et al. 2016). The rising number of MSM in cities has led to the appearance of

MSM entertainment and community venues, which have become increasingly large, widespread, and public. Beginning in the late 1970s, gay men's meeting places consisted of secluded parks and public toilets. Twenty years later, at the end of the 1990s, the first openly gay bars had appeared in Beijing and then in all major cities across the country. Gay men's bathhouses and dance halls also began to appear in big cities.

8.2.3.2 Sex Work

As the new market economy developed in the late 1970s and early 1980s, male-male commercial sex gradually returned across China. Although figures reported in the literature are variable, it is thought that up to 25% of Chinese MSM have either bought or sold sex with men (or both) in their lifetimes (Chow et al. 2014). Male sex workers servicing men are often called "money boys" or "MBs." A majority of men who become sex workers have very limited employment options and may work full or part-time as MBs in an attempt to change their circumstances through selling sex. Part-time MBs usually have another stable occupation and engage in sex work in their spare time. In contrast, professional money boys primarily work in the commercial sex industry and are often organized by a "mommy" or "mama-san." MBs are not forced into sex work, and the relationship between a money boy and his "mommy" is voluntary and based on mutual benefit. A large data synthesis and meta-analysis of 32 papers published from 2001 to 2012 found that 54% self-identified as homosexual, 30% identified as bisexual, and 6% identified as heterosexual. Nearly 9% reported having a wife, and 68% were rural-to-urban migrants (Chow et al. 2012).

8.2.3.3 The Internet

Prior to the mid-1990s, when the Internet began to be widely used in China, socializing among MSM had been conducted primarily in underground venues and secluded locations because of the severe discrimination faced by the gay community at that time. However, this all radically changed with the Internet, which opened new, rapid, continuously open avenues for largely private communication and social networking. Thus, the Internet allowed gay people in China to expand their social connections without fear of exposing their identities. It furthermore facilitated their ability to freely and anonymously obtain information on psychological counseling, legal rights, and sexual health issues.

To meet the needs of Chinese MSM communities, gay websites emerged along with expanding Internet access. By 2008, there were almost 200 different gay websites serving the Chinese MSM communities. Increasingly, these websites have become an important channel for dating and looking for sex partners, reflecting the fact that the vast majority of Internet-using MSM are young and sexually active. A very large cross-sectional survey of more than 47,000 MSM sampled from 61 cities across China in 2008 to 2009 found that 45% used the Internet to find male sex partners. Most of these Internet-using MSM were young (18–24 years of age), never married, college-educated, and self-identified as homosexual (Wu et al. 2013b).

Today, technology has again advanced, and MSM in China have quickly adopted new geosocial networking (GSN) mobile applications (apps) designed for use on smartphones and tablets for finding friends, dates, and sex partners.

8.2.3.4 Mental Illness

Scientific study of human sexuality in contemporary China lags far behind that in western countries. As such, research on homosexuality in China has been heavily influenced by the international community. For a long time, homosexuality was considered a paraphilic disorder requiring clinical treatment. As scientific research on human sexuality developed in China, homosexuality was gradually understood to be a normal social phenomenon.

In 1973, the American Psychiatric Association's Board of Trustees removed homosexuality from its official diagnostic manual, the Diagnostic and Statistical Manual of Mental Disorders, Second Edition (DSM II). The removal of homosexuality from the DSM legitimized this phenomenon as medically "normal." However, this landmark event did not immediately affect views on homosexuality in China, as the 1994 revision of the Chinese Mental Disease Classification and Diagnosis Standard (second edition) still classified homosexuality as a paraphilic disorder.

Even so, international progress in research on homosexuality ultimately impacted China. In 1996, a working group was established to incorporate the latest domestic and foreign research findings into Chinese diagnostic standards. The group completed the revision and published the Chinese Mental Disease Classification and Diagnosis Standard (third edition) in 2001. This working group clarified that homosexuality "was not necessarily abnormal in terms of sexuality." Those with a high level of "self-consistency and congruency" toward homosexuality were considered clinically normal and did not require treatment. Only those with a low level of "self-consistency" toward homosexuality would be categorized as having a disease. These people, who lack a self-identification, may suffer from serious mental or psychological problems, which would require treatment (Liu and Lu 2005). Thus, since 2001, homosexuality has not been treated as a mental illness in China.

8.3 The Chinese MSM Population

8.3.1 Estimating Size

Accurate estimation of MSM population size is necessary for conducting epidemiological research studies and for public health planning, including the equitable distribution of resources and projected expenditures for HIV/AIDS prevention and control. However, estimating the size of the Chinese MSM population is very difficult because many will still not admit to engaging in male same-sex behavior due to strong societal discrimination despite it being legalized and declassified as a mental illness. Thus, several strategies tailored to the Chinese context have needed to be developed. Currently, these include extrapolation of sociological population sampling surveys, or population-level surveys, and using statistical methods based on

small-sample surveys. Small-sample surveys employ various methods such as the multiplier method, the division method, the capture-mark-recapture method, and the network scale-up method. However, both population-level and small-sample survey approaches have advantages and disadvantages for estimating the size of a hidden population such as MSM.

The advantage of population-level surveys is that they target the entire population level using random sampling. Therefore, this method may obtain a representative sample that can be extrapolated to the larger population. This is the approach used to estimate the national MSM population in China. To supplement our understanding of this kind of a large, nationwide estimation of the MSM population size, abundant data from population-level surveys conducted by sociologists in other countries are available and may be used as comparators. However, since population-level surveys are likely to be influenced by differences in stigma directed toward MSM, caution should be exercised when comparing international survey results to the China setting.

The disadvantages of population-level surveys are that they are always large-scale efforts that are difficult to organize and implement and therefore require significant resources. Moreover, the accuracy of the survey results could be influenced due to a variety of survey limitations. For example, if interviewers are not appropriately trained to conduct the survey in a neutral and nonjudgmental way, being sensitive to the participants' potential fears of social discrimination, then survey participants may be unwilling to admit their same-sex behavior. Since currently the number of MSM who conceal their same-sex behavior is unknown, survey results are assumed to be conservative in estimates of MSM population size.

Population-level studies were first carried out in the late 1980s, by several leading sociology and sexology research institutes, to try to estimate the size of the MSM population, suggesting that the proportion of Chinese men who have practiced same-sex behaviors in their lifetime may be as high as 10–15%. However, the proportion of homosexual males may be only 2–4% of all adult males, and these men are the most sexually active in the MSM population. As a result, men who are regularly sexually active with other men make up a small proportion of all men who have ever practiced same-sex behavior. For most MSM, same-sex behavior constitutes a tiny fraction of lifetime sexual behavior. While estimations by population-level surveys are valuable and necessary for advocacy in policy development and resource planning at the national level, these results usually are not directly applicable at the individual program level. In practice, the target population of an intervention program is those who are at high risk of exposure, and reachable. Thus, several population size estimating methods have been developed, based on mathematical statistical inferences, that are widely used in HIV work among MSM in China.

Among these methods, the multiplier method is the most commonly used. In applying this method, a multiplier is first derived from a small sample, which is the reciprocal of the proportion of those who have frequented specific venues in the sample. Afterward, the number of target MSM can be estimated by the

product of the multiplier and the number of MSM at the venue. These venues can be physical locations, such as bars, parks, and bathhouses, and virtual spaces such as websites and chat rooms. For example, in 2006, using the multiplier method, it was estimated that the number of MSM regularly visiting gay bars, parks, and bathhouses in Hangzhou was approximately 1600 (Yang et al. 2006). This figure is very different from population-based estimates of the number of MSM. Given that the total population of Hangzhou was between five and ten million at the time and population-based estimates indicated that 2% of the population were MSM, then the estimated number of MSM in Hangzhou should have been 100,000–200,000. This enormous difference is caused by the multiplier method only representing those who regularly visited gay bars, parks, and bathhouses, not the entire Hangzhou MSM population. As demonstrated, the multiplier method always underestimates the total number of MSM in any given place.

8.3.2 Understanding Subgroups

In addition to estimating the population size, it is also necessary for program and policy planning to understand the various subgroups within the overall MSM population so that interventions can be tailored to their needs. For example, different subgroups of MSM may self-identify with different sexual orientations and/or gender identities. As another example, some MSM are married or otherwise have heterosexual partners. An intervention designed for one subgroup may not work with another.

8.3.2.1 Sexual Orientation

The term "men who have sex with men" encompasses men who identify as homosexual, bisexual, and heterosexual—it is not a homogeneous group of men who consider themselves "gay." Rather, homosexual men have been estimated to comprise only approximately 48–64% of the total MSM population in China (Ma et al. 2007; Wu et al. 2013b). These men are primarily attracted to other men, generally practice male-to-male sexual behaviors for their entire mature lifetimes and are seldom involved in heterosexual contact.

Bisexual men are thought to account for approximately 30–55% of MSM in China (Ma et al. 2007; Wu et al. 2013b). These are men who are attracted to and/or have sex with both men and women. Some men who self-identify as heterosexual also fall into the larger grouping of MSM. These men are estimated to make up about 1–6% of the Chinese MSM population. They generally practice same-sex sexual behavior only under specific sets of circumstances, and once these circumstances no longer apply, they discontinue it. For example, heterosexual men may engage in homosexual behavior while living in a same-sex environment for an extended period of time (e.g., migrant worker camps). Or, they may engage in male-male transactional sex as means of basic survival.

8.3.2.2 Gender Identity

Those assigned male at birth who self-identify as women (transgender women) have been included in studies on the broader MSM group in China. The reason for this is that in China, a tiny minority of transgender women have taken surgery and hormones, and because they are assigned male at birth, their sexual activities with men were considered male-male sexual contact in the context of HIV transmission. Transgender women have distinct HIV prevention and treatment needs. However, there has historically been little research conducted in China on transgender women and their health-related needs, and the size of this subgroup, though expected to be small, is unknown. One recent online survey of MSM, including transgender individuals, in China found that out of nearly 2000 participants, 4% self-identified as transgender. The 52 transgender participants had sociodemographic and sexual risk behavior characteristics similar to the MSM in the study. However, transgender individuals were less likely to ever have tested for HIV or syphilis, and although a higher prevalence of HIV was found among transgender participants, the difference was not statistically significant (Best et al. 2015).

8.3.2.3 Marital Status

Due to social pressure, many MSM choose to get married. The pressure to get married mainly originates from parents and relatives and the need to fulfill filial obligations. A large cross-sectional study conducted in 61 Chinese cities between 2008 and 2009 found that 74% of the more than 47,000 participants had never married, 20% were married, 1% were cohabitating with a female partner, and 5% were divorced or widowed (Wu et al. 2013b). However, a 2010 government survey showed that the proportion of MSM who were married varied with age—6% were married among those younger than 30 while 32% were married among those 30 and older (National Bureau of Statistics 2010). A study published in 2010 found that 42% of MSM older than 30 years old were married. It also found that 15% of MSM were divorced (Xu et al. 2010). A 2012 study by Wang and colleagues found that 34% of participants "planned to get married" while all others responded that they intended to never marry. The primary reason for getting married was social pressure (65%; Wang et al. 2012).

For some married MSM, marriage provides a kind of protection from exposure. It allows them to deflect attention to or suspicion of differences in their sexual orientation, sexual behavior, or sexual preferences. The Wang et al. study further found that among those who intended to marry, 84% said their intended marital partner would be a heterosexual woman, but 16% said they would look for a lesbian partner. Furthermore, 67% indicated that they would continue their engaging in male-male sexual contact while married, 17% indicated that they were unsure or undecided, and only 17% planned to stop (Wang et al. 2012). Gay men and lesbian women entering into marriage as a way for each to deal with social pressure and appease parents while living their own lives as they choose has become something of a phenomenon in China in recent years. It is unknown how common this is, but it is common enough that matchmaking websites and social networking apps have even sprung up to meet demand (Rauhala and Lin 2018).

8.4 The HIV Epidemic Among MSM in China

8.4.1 Case Reporting

Although in other settings, the HIV epidemic began and was largely concentrated for a long time among homosexual men, China's epidemic was concentrated primarily among people who inject drugs (PWID) and former commercial plasma donors (FPD) until 2005. Before 2005 documented cases of HIV infection acquired through the homosexual contact route were rare. The cumulative number of identified people living with HIV (PLWH) in China stood at more than 150,000 in 2005, only 0.3%, or approximately 450 PLWH had reported homosexual contact as their route of infection (Ministry of Health, Joint United Nations Program on HIV/AIDS, World Health Organization 2010a, b). One year later, in 2006, the number of newly reported infections acquired by homosexual transmission had exceeded 1100, more than double the total number of cases from all previous years combined (Ministry of Health, Joint United Nations Program on HIV/AIDS, World Health Organization 2010a, b). By the end of 2012, the number of newly identified cases of HIV obtained via male-male sexual contact climbed to 15,000, 19% of all identified PLWH diagnosed in that year (Ministry of Health et al. 2012; National Center for AIDS/STD Control and Prevention 2013), and in 2014, 25% of new cases were among MSM (National Health and Family Planning Commission 2015).

8.4.2 Surveillance

Prior to 2002, there was no systematic surveillance mechanism in place to monitor HIV prevalence and risk behaviors among MSM in China. However, some cross-sectional surveys on HIV risk behaviors in this population were conducted. Survey results from 2001 showed that HIV had begun to spread among MSM who frequented gay venues. Cross-sectional surveys conducted among MSM in the northern city of Harbin in 2002, 2004, and 2006 found that an HIV prevalence of 2% did not significantly change over the study period. In terms of risk behavior, the study found that the prevalence of unprotected anal intercourse was high but declining—90% in 2002 to 72% in 2006 (Zhang et al. 2007).

Although HIV sentinel surveillance began in 1995 in China, sites among MSM were not added until much later. The first site was launched in 2002, and fewer than four sites were reporting HIV infection among MSM until 2008. In 2009, this number was expanded to 18 and again in 2010 to 108 sites. A total of 107 HIV sentinel surveillance sites among MSM remain operational today. In general, the median prevalence of all sentinel sites is used to approximate HIV prevalence among MSM at the national level. These data confirm the high and rising HIV prevalence among China's MSM—less than 1% in 2003, 5% by 2008, and 8% in 2015 (see Chap. 2 for more information).

8.4.3 High-Risk Subgroups

HIV prevalence and high-risk behavior vary greatly between several distinct yet partially overlapping MSM subgroups. Over the past decade, HIV prevention and control efforts have been tailored to meet the needs of several key subgroups.

8.4.3.1 Money Boys

Money boys are thought to account for approximately 5–15% of the entire MSM population in China; an estimate published in 2007 placed the money boy population at roughly 400,000 men (Chow et al. 2012; He et al. 2007; Liu et al. 2012). According to a large meta-analysis published in 2012, 15% of MBs had used drugs in their lifetimes. In terms of sexual risk behavior, 74% sought out clients in traditional MSM venues including bars, clubs, and bathhouses, 50% reported engaging in both insertive and receptive anal sex with male partners, and 41% reported having participated in group sex in the prior 12 months. Compared to MSM who were not money boys, MBs had greater odds of consistent condom use with their regular male, casual male, regular female, and noncommercial casual female partners in the prior 6 months. Only 45% had ever tested for HIV in their lifetimes, and the 12-month testing rate was 32%—MBs had lesser odds of ever testing or testing in the past 12 months compared to MSM who were not money boys. A broad range of STIs were found among MBs, and the overall pooled prevalence of HIV infection was 6%. However, HIV infection was much greater in some individual cities. For example, HIV prevalence among money boys in Guangzhou and in Chongqing was greater than 11% (Chow et al. 2012).

More recent studies have found that 43% of MBs reported consistent condom use in the prior 6 months compared to only 33% of MSM overall. However, MBs typically have more male sex partners than MSM who are not selling sex (Lai et al. 2013). In addition, 43% of money boys report having heterosexual relationships as well, and only 36% of those who have female sex partners report using condoms with them in the past 6 months (Chow et al. 2014).

8.4.3.2 Bathhouse Attendees

A large survey of Chinese MSM found that roughly 14% seek sex partners in public bathhouses/saunas (Wu et al. 2013b). HIV prevalence among MSM who regularly attend gay bathhouses is higher than the general MSM population and higher than other MSM subgroups. A survey conducted in a gay bathhouse in Tianjin indicated that the HIV prevalence was 17% compared to the local general MSM population, which was found to have an HIV prevalence of 3.5% in the same study. Factors associated with having a positive HIV serostatus in the study were older age, and having had anal intercourse with men, having sold sex to men, and having engaged in group sex in the previous 6 months (Wu et al. 2013a).

Group sex is common at gay bathhouses (these venues often have rooms for this purpose), and group sex is common among gay bathhouse patrons—the above-described study indicated that 14% of bathhouse patrons had had group sex in the

previous 6 months. Having had group sex in a gay bathhouse increased risk of HIV infection for these MSM more than 11-fold over MSM who did not engage in this behavior (Wu et al. 2013a). Another risk factor of HIV infection for patrons of gay bathhouses is the large number of sexual partners present. A survey conducted in different venues in Jinan, Shandong province, suggested that the average number of sexual partners in the past 6 months was 5.2 for MSM overall and 23.6 for MSM in bathhouses (Zhu et al. 2012).

8.4.3.3 Internet Users

A 2008–2009 study among more than 47,000 MSM across 61 Chinese cities found that 45% of MSM sought male sex partners on the Internet (Wu et al. 2013b). Most Internet-using MSM were young (52% 18–24 years), never married (84%), highly educated (59% college and above), nonlocal (55%), professionals (40%), or students (27%), who self-identified as homosexual (64%). Although 44% reported having zero or only one male sex partner in the prior 6 months, 47% reported two to ten, and 3% reported more than ten. Consistent condom use with male partners in the prior 6 months was reported by 42%. Buying sex from men was reported by 3% and selling sex to men was reported by 6%. Consistent condom use during commercial sex with male clients was reported by only 33%. Only 16% reported having one or more female sex partners in the prior 6 months, but consistent condom use with female partners was reported by only 32%. Eighty-three percent had accurate HIV knowledge, and 4.5% had HIV infection, 9.5% had syphilis infection, and 1.1% had HIV/syphilis coinfection (Wu et al. 2013b). These findings have been supported by a range of other studies conducted at a similar time (Huang et al. 2014; Wang et al. 2010; Yu et al. 2010).

More recently, a serial cross-sectional study conducted from 2009 to 2014 among Internet-based sex-seeking MSM (IBM) found that the proportion of IBM among all MSM increased significantly over time from 43% to 62%. Increase in HIV prevalence over time was much greater among IBM (7–21%) compared to non-IBM (7–15%; Pan et al. 2016).

8.4.3.4 Men Who Have Sex with Men and Women (MSMW)

Bisexual men and married men who have sex with both men and women (MSMW) constitute a large subgroup of general MSM population. Generally, it is thought that approximately one-third of MSM are married and up to 70% will have a heterosexual marriage in their lifetime. Moreover, condom use during heterosexual contact between MSM and their regular female partners tends to be very low, both for reproductive reasons and reasons related to demonstration of trust and faithfulness (Chow et al. 2014).

A large nationwide cross-sectional survey more than 47,000 MSM looked specifically at the characteristics of the 25% who reported having had at least one female sex partner within the prior 6 months (Wu et al. 2013b). Half of these MSMW were married and 68% self-identified as bisexual, 5% as heterosexual, and 22% as homosexual. A majority sought male sex partners at traditional venues including bars, teahouses, and dance halls (26%), public bathhouses and saunas

(19%), and public parks (16%). Nearly half reported having between two and ten noncommercial male sex partners in the past 6 months (48%). Nine percent reported buying sex from men and 13% reported selling sex to men. Consistent condom use with men was low, but consistent condom use with female partners was even lower (29%). MSMW in this study had the lowest rate of accurate HIV knowledge among all subgroups examined (68%), had 4.3% HIV prevalence, 11.6% syphilis prevalence, and 1.3% HIV/syphilis coinfection prevalence (Wu et al. 2013b).

A more recent systematic review and meta-analysis found MSMW have a significantly higher HIV prevalence than men who have sex with men only (MSMO; 6.6% versus 5.4%). Furthermore, substance use was more common among MSMW than MSMO (alcohol: 27% versus 13%, illicit drugs 5.3% versus 2.5%; Wang et al. 2015) (see Chap. 7 for more information).

8.4.3.5 Drug Users

The prevalence of synthetic drug use surpassed that of traditional opioid drug use in 2014 among registered drug users in China. Synthetic drugs commonly used in China include amphetamine-type stimulants (e.g., methamphetamine) and new psychoactive substances (e.g., alkyl nitrite inhalants, also known as "poppers"). Since synthetic drugs are typically taken by smoking, snorting, inhaling, or swallowing, they do not carry with them the same kind of HIV risk as injecting opioids such as heroin. However, these drugs come with other risks. One of the reasons these drugs are so popular in China is that many of them have not yet been made illegal. But another reason is their well-known sexual effects. Synthetic drugs exaggerate sexual desire and suppress inhibitions, increase sexual pleasure and prolong sexual episodes, and generally promote high-risk sexual behaviors such as having multiple sex partners, having sex without condoms, and engaging in "sexual marathons," group sex, and homosexual sex (Corsi and Booth 2008; Urbina and Jones 2004; Volkow et al. 2007). Thus, synthetic drug users, particularly MSM who use synthetic drugs, expose themselves to substantial risk of acquiring and transmitting HIV and other STIs (see Chap. 9 for more information).

A large and increasing proportion of MSM use synthetic drugs and engage in risky sexual behavior while under the influence of synthetic drugs. A recent 16-city study of the drug use behavior among Chinese MSM found that 40% had a lifetime history of synthetic drug use (Luo et al. 2018). Nearly all MSM participants who reported synthetic drug use had used "poppers." Synthetic drug using MSM were more likely to be younger, single, more educated, and more likely to practice high-risk sexual behaviors. HIV prevalence was nearly 11% among synthetic drug users compared to 6% for nonusers (Luo et al. 2018).

8.4.4 Estimating HIV Incidence

Since 2007, several MSM cohorts have been established in different cities to explore HIV incidence among this population. In the Shenyang cohort, incidence of HIV was measured at 5.4 per 100 person-years (PY) in 2007. In Nanjing's cohort, HIV

incidence was 5.1 per 100 PY in 2008. In the Beijing MSM cohort, HIV incidence was observed to be 2.6 per 100 PY in 2008, and 8.1 per 100 PY in 2010. Yangzhou's MSM cohort had an HIV incidence of 6.0 per 100 PY in 2009, and finally, the Kunming cohort was found to have an HIV incidence of 3.5 per 100 PY in 2011.

BED-capture enzyme immunoassay (CEIA) for HIV-1 has being widely used in China for estimating HIV incidence at the population level. In Chongqing, BED-CEIA was used to estimate the annual HIV incidence during the period from 2006 to 2008. The study found HIV incidence of 7.0% in 2006, 7.9% in 2007, and 7.8% in 2008. The estimated HIV prevalence among MSM in Chongqing was 15.8% in 2008, which reflects the trend of high HIV incidence in this city (Han et al. 2009). The BED-CEIA technique has also been used to estimate HIV incidence among MSM in Beijing. This study found an HIV incidence of 4.8% in 2008 and 2.7% in 2009 (Chen et al. 2011) (see Chap. 5 for more information).

8.5 The Response to China's MSM HIV Epidemic

8.5.1 Between 1992 and 2004

As early as 1992, several MSM activists began advocating for HIV prevention and control efforts to include MSM in China. They worked to draw attention to the need for conducting HIV/AIDS prevention work among MSM, and they especially emphasized the potential positive impacts of grassroots organizations led by, and composed of, MSM. In 1997, the "Friends Communication" was jointly started by medical, sexual, social, and public health experts and MSM in the community. It was a bimonthly booklet that was not distributed publicly but instead was reserved for the MSM population only. The booklet included information on AIDS prevention among MSM. That same year, MSM volunteers in Beijing started to organize health communication efforts on preventing AIDS and set up the "Beijing Tongzhi Hotline," the first hotline for MSM in China to promote health within the MSM community. Five years later, in 2002, a man named Guo Yaqi and his friends, who were actively involved in HIV/AIDS prevention among MSM, set up and registered a nongovernmental health education and advocacy organization called the "Beijing Ji'ande Zixun Zhongxin" (Beijing Gender Health Education Institute). The organization mainly engaged in implementing HIV prevention interventions among MSM, such as holding trainings for MSM health education volunteers in cooperation with the Chinese Association of STD and AIDS Prevention and Control, an association that coordinates capacity building between the China CDC and nongovernmental organizations (NGOs) in many cities.

8.5.2 Prevention and Care Project: 2000–2005

The China-United Kingdom HIV/AIDS Prevention and Care Project (China-UK Project) was launched in 2000 and was completed at the end of 2005. This was an

enormous project, with a budget of GBP 20 million, for which the UK government provided a majority of the financial and technical support. As one of the largest, bilateral, international cooperation HIV/AIDS projects being conducted in China at the time, it aimed to establish sustainable and applicable HIV/AIDS prevention, treatment, and care models and promote the development of relevant national policies. The project was implemented in Yunnan and Sichuan provinces, focusing on high-risk populations including PWID, FSW and their clients, MSM, and PLWH. Project activities addressed a wide variety of issues related to HIV prevention and care including surveillance, counseling, health education, intervention, STI services, care, community involvement, and poverty relief.

Up to this point, there had been almost no government support for HIV intervention programs for MSM—the China-UK Project was the first to support prevention interventions among MSM in China. The project explored ways of promoting MSM involvement and participation in conducting HIV intervention activities. It introduced peer education, established HIV counseling hotlines, integrated HIV awareness activities into MSM community lecture programs, and started Internet-based health education. More importantly, the China-UK Project developed effective models for condom promotion and STI management, which have been widely studied and adopted (see Chap. 20 for more information).

8.5.3 A Major Turning Point in 2005

8.5.3.1 Recognition of Homosexuality and the Need for HIV Prevention Among MSM

By 2005, the widespread epidemic of HIV/AIDS in China and the steadily growing body of evidence supporting HIV being transmitted through male same-sex sexual contact finally forced public recognition of homosexuality by the government (Liu et al. 2005). Later in that same year, the Chinese Ministry of Health held a forum on HIV/AIDS prevention among MSM. Participants included government officials and representatives from the MSM community. Wang Long-de, Vice Minister of Health at that time, carefully listened to MSM participants' speeches and actively responded to their suggestions and recommendations. This meeting marked the beginning of full support from the government for HIV prevention among MSM.

8.5.3.2 Recognition of Female Partners of MSM as a High-Risk Group

Also by 2005, mounting evidence of a significant proportion of Chinese MSM being married, or otherwise engaging in vaginal sex with female partners, was causing concern for these interactions possibly "bridging" HIV infection into the heterosexual population. Thus, Wang Long-de publicly recognized that "Chinese MSM differ significantly from western MSM in important ways. Once western MSM identify as gay, they primarily practice homosexual behavior. Influenced by traditional culture and social norms, a significant proportion of Chinese MSM will finally get married and practice both homosexual and heterosexual behavior. As a result, HIV may spread more easily to outside of MSM sexual networks." He also pointed out that some men

sell sex to men, providing sexual services in gay gathering places, such as public toilets and gay bathhouses. This high-risk behavior places their female partners at risk of being infected with HIV through homosexual contact.

8.5.3.3 Recognition of the Need for MSM Involvement in HIV Prevention

Due to severe social discrimination against Chinese MSM, it is very hard to reach them. They may be hidden from all except those in their local MSM community, or even all except their smaller, close social circle. Therefore, the implementation of HIV interventions among MSM cannot depend solely on public health professionals from local CDC offices. Without participation of individuals in the MSM communities, HIV interventions cannot be successful. Fortunately, since the very beginning of the HIV epidemic among MSM in China, many individuals in the Chinese MSM community have taken the initiative and spontaneously set up grassroots organizations for HIV/AIDS intervention work. It has been widely recognized that the role of community-based organizations (CBOs) in HIV prevention and control was irreplaceable. Furthermore, the involvement of MSM NGOs in the HIV/AIDS response was officially endorsed by the new policy in 2006 (see Chaps. 18 and 22 for more information).

The Chinese government attaches great importance to the role of social organizations. The former Minister of Health, Chen Zhu, has stated that HIV/AIDS prevention and control is a systematic social project. The government cannot try to do everything by itself. He urged grassroots organizations to quickly mobilize to participate in this project. Chen called on administrative departments of health and the CDC at all levels to be more open-minded than before, provide social organizations with more support, and build a platform to strengthen communication and collaboration with MSM NGOs and CBOs.

8.5.4 Pilot Prevention Program: 2008–2010

Before 2008, there was a lack of information on the HIV epidemic among MSM at the national level. Data on HIV prevalence and risk behaviors was being gathered from the only a few surveillance sites at that time. These few sites alone were insufficient to assess the status of the national MSM HIV epidemic and monitor and evaluate MSM HIV prevention programs. More importantly, no HIV/AIDS prevention program targeting MSM had yet been broadly and effectively implemented. Furthermore, effective collaboration between the CDC and local and regional MSM NGOs needed to be established, and HIV testing needed to be promoted, case reporting strengthened, and medical follow-up improved for MSM.

The 61-City National HIV Comprehensive Prevention Pilot Program for MSM (pilot program) was designed and developed to address these issues. The primary objective of the program was to fully characterize the national HIV/AIDS epidemic among MSM and provide evidence for effective development of prevention and control policies, and the second objective was to enhance implementation of HIV

prevention programs (National Center for AIDS/STD Control and Prevention 2008). The study was conducted from 2008 to 2009 in 61 cities across the nation such that every province and autonomous region was represented and a total of 47,231 MSM participated. HIV prevalence among this large, nationwide cohort of MSM was found to be 4.9% overall. Although at the city level the median prevalence was 3.4%, individual city HIV prevalence figures ranged from approximately 1% to greater than 15%. Substantial syphilis infection and sexual risk behavior were also documented (Wu et al. 2013b).

The pilot program promoted participation of MSM NGOs and established an effective collaboration mechanism between the CDC and MSM NGOs both at the national level and at provincial and local levels. With the support of the CDC, MSM NGO capacity was increased through a series of program activities including HIV/AIDS prevention education, delivering condoms and lubricant, recruiting study participants, HIV/STD counseling, and emotional support for MSM living with HIV/AIDS.

The pilot program also promoted the nationwide implementation of HIV/AIDS programs targeting MSM. Through community mobilization, education, and research, the number of MSM receiving HIV testing increased gradually, and the reported number of MSM diagnosed with HIV infection substantially increased. The number of PLWH identified within MSM communities increased threefold from 2007 to 2008. The proportion of MSM diagnosed with HIV infection who received a CD4 test in the previous 12 months increased from 41% in 2007 to 79% in 2009 as a result of intensified case management efforts. However, while this prevention, testing, and linkage-to-care intervention was efficient, it was not effective due to low coverage, and these gains were not sustained (see Chaps. 12 and 26 for more information).

8.5.5 The China Global Fund AIDS Program: 2004–2015

The China Global Fund AIDS Program was an international collaboration characterized by extensive geographical coverage, a wide range of program activities, and the largest financial support package thus far received for combatting HIV/AIDS in China. The program included six subprojects, each with different objectives and project sites. These were named GF3 (for Global Fund Round 3), GF4, GF5, GF6, GF8, and RCC (for Rolling Continuation Channel). Among these subprojects, GF5, GF6, and RRC were identified as top priorities.

GF5 lasted for 5 years, from July 2006 to June 2011, with a total budget of USD 29 million and targeted seven provinces. The program was committed to creating a supportive social environment, conducting high-risk population interventions, increasing quality of STI treatment service, promoting participation of CBOs, and strengthening epidemic surveillance, data analysis, and dissemination to policymakers and stakeholders. GF6 was conducted from January 2008 to December 2012 and targeted 15 provinces. It aimed to further promote CBO participation in HIV/AIDS prevention and control efforts.

In 2010, the management mechanism of the China Global Fund AIDS Program fundamentally changed. The RCC program was launched following the principle of the "One Strategy Plan," where all HIV programs were coordinated under one strategy and were evaluated with one standard, thereby consolidating resources. The RCC program consolidated not only the current China Global Fund AIDS Program projects and grants but also all the resources on HIV/AIDS prevention and control in China, including centrally transferred funds; local funds from provincial, city, and county levels; and other international cooperation funds. The RCC program started in January 2010 and ended in December 2015. The program covered 31 provinces (including municipalities and autonomous regions), 303 cities, and 1283 counties and aimed to scale up HIV/AIDS prevention, treatment, and care to achieve universal access for high-risk groups and PLWH. One of the important components of the RCC program was the strengthening of CBO roles in prevention interventions among MSM through direct financial support of their services or open bidding on projects. A total of 280 MSM CBOs won bids to perform project activities. By the end of 2012, 250,000 MSM were reached through interventions each month.

The program encouraged the application of innovative approaches to prevention and control efforts targeting MSM, including Web-based interventions, MSM community-based HIV rapid testing, community mobilization and referral for HIV testing, development of MSM volunteer organizations, and psychological counseling/social support. This project also conducted an internship program for capacity building among MSM CBOs. Nationally, four mature MSM CBOs were selected to serve as practice sites, where participants from smaller CBOs received further training in these practice sites (see Chaps. 20 and 22 for more information).

8.5.6 China-Gates Foundation HIV Prevention Program: 2008–2013

The China-Gates Foundation HIV Prevention Program was the first large-scale public health partnership between the Bill and Melinda Gates Foundation and the Chinese government. The program lasted for 6 years (2008–2013) with a budget of USD 50 million. It aimed to scale up and increase access to HIV prevention program for MSM in urban areas.

The core of the program utilized the test-and-treat model to reduce HIV transmission in 14 Chinese cities and in Hainan province and was based on two strategies: case detection (i.e., prevention for high-risk groups) and case management (i.e., prevention of secondary transmission). The main project interventions included (1) HIV testing and counseling for MSM, (2) improving the linkage between HIV screening performed in hospitals and clinics to HIV confirmatory testing performed at local CDC offices, (3) improving linkage to HIV care and treatment for persons diagnosed with HIV infection, and (4) educating the general public and healthcare providers to reduce stigma and discrimination against PLWH.

The China-Gates HIV program has significantly strengthened the HIV prevention response for MSM in China. Over the six project years, more than 300,000 HIV

tests were conducted for MSM. A total of 12,322 new cases were identified. The number of CBOs participating in the program increased from 74 in 2008 to greater than 200 in 2012. Additionally, the roles of CBOs were expanded during this period with more and more CBOs not only mobilizing MSM for HIV testing but also themselves providing HIV testing and care and support services for PLWH.

Because of interventions associated with this program, the proportion of MSM diagnosed with HIV infection who received CD4 testing increased from 47% in 2008 to 84% in 2012. Furthermore, consistent condom use in the previous 3 months reported by MSM with HIV infection in program areas increased from 60% in 2008 to over 80% in 2012.

From a program management perspective, the China-Gates Foundation HIV Prevention Program introduced and developed a novel system of performance-based programming and financial incentives for project collaborators, in which the distribution of funds was tied to biannual performance, measured by key indicators for program activities (e.g., numbers of persons tested, numbers of HIV cases newly diagnosed, numbers of persons with HIV infection referred for treatment and care). More importantly, the China-Gates Foundation HIV Prevention Program served an advocacy role to help promote and develop productive collaborations between the Chinese government and NGOs to expand effective HIV prevention efforts in China (see Chaps. 20 and 23 for more information).

8.6 The MSM Community's Participation

8.6.1 Grassroots Organizations

In 1990s, some Chinese MSM community members realized that HIV would spread rapidly among MSM in China, just as it already had among MSM in western countries. Therefore, they began to organize a response and started to conduct AIDS prevention work in large cities such as Beijing. At the same time, they actively advocated and mobilized for more community, governmental, and international effort in the fight against HIV among MSM. After 2002, with more financial and technical support from government and international agencies, local volunteer-led working groups were established to provide community-based HIV/AIDS prevention and care services in more than 20 cities. These groups secured office space and long-term staff and provided multiple services for MSM, including AIDS prevention, psychological support, promotion of gay culture, legal assistance, and antidiscrimination advocacy. However, AIDS prevention was the main focus of many of these grassroots organizations. Following technical guidance from health agencies such as the China CDC, they conducted AIDS prevention work, including providing outreach services in MSM cruising areas, setting up a consultation hotline, and combining AIDS health promotion with activities tailored to the gay community.

Since 2007, the government has recognized that community organizations must play an important role in combating HIV/AIDS. As increased financial resources were mobilized for CBOs, the number of grassroots organizations gradually

increased. By the end of 2010, the number of MSM HIV CBOs reached 112 nationwide. However, in order to directly receive funding from national and international agencies as legal entities, eligible NGOs were required to register with the Ministry of Civil Affairs. The majority of these organizations had not met the criteria for registration and were therefore not recognized. This lack of recognition impeded the further development of these organizations. In 2013, with the end of several large international cooperation projects such as the China Global Fund AIDS Program and the China-Gates Foundation HIV Prevention Program, the Chinese government made a commitment to secure more funding to make up the financing gap. However, despite the increased funding, most of these organizations still lacked the capacity to effectively implement HIV prevention interventions (see Chap. 22 for more information).

8.6.2 MSM Community-Based Counseling and Testing

At the early stages of MSM CBO development, community-based interventions focused on health education in MSM venues, outreach, condom and lubricant distribution, peer education, and providing counseling and referrals to local CDC or health facilities for those who need HIV testing. Since 2008, needs for HIV testing among MSM increased rapidly, as new recommendations encouraged MSM get tested twice a year or even more frequently. However, many MSM do not like to go to government-run public health facilities for HIV testing because of concerns about privacy and confidentiality as well as stigma and discrimination.

As the experience and capacity of MSM CBOs increased, some organizations were able to independently provide HIV testing and counseling services using rapid testing technology. The CBO-based HIV testing service also provides persons who screen HIV-reactive with "one-stop shop" services including follow-up support, treatment education, and referral for STI/HIV treatment. Currently, HIV rapid test kits used by community-based organizations include finger blood test kits and oral fluid test kits. Most HIV counselors at these CBOs have received professional training in HIV/AIDS counseling and rapid testing.

Community-based HIV testing and counseling services are viewed as having many advantages: they provide an environment free of discrimination, in-depth counseling tailored to the needs of MSM, confidentiality, and continuous follow-up support for MSM who screen HIV-positive on a rapid test. These advantages have made this service popular among MSM. An evaluation conducted by the China Male Tongzhi Health Forum showed that CBO-based HIV testing services were often able to find HIV cases more efficiently than public health institutions. Twelve community organizations carried out more than 10,500 person-time tests in 6–18 months and found that 7.7% of MSM screened positive for HIV, which was higher than the 5% HIV prevalence among MSM reported in the large 61-cities study (Wu et al. 2013b). The evaluation indicated that CBOs could mobilize MSM subgroups that are at the highest risk, such as gay bathhouse attendees, to receive testing (Wu et al. 2013a). The service was not only able to identify more cases but

also link more clients to care through follow-up support. The proportion of MSM who screened HIV-reactive that received HIV confirmatory testing was 89%. Furthermore, 95% of those MSM who received confirmed diagnoses of HIV infection received a CD4 test (see Chap. 12 for more information).

8.7 Current Approaches

Since 2008, a comprehensive intervention strategy has been adopted to address the HIV epidemic among MSM. This strategy is comprised of the following approaches: public health campaigns, conducting health education and behavioral interventions at the individual and population level, delivering HIV VCT services at the individual level, referring STI patients to treatment, and providing ART for PLWH. Public health campaigns and education meant to improve HIV/AIDS awareness, and knowledge helps promote behavior change, testing uptake, and community mobilization. Behavioral interventions are conducted to promote condom use. STI treatment and ART for PLWH are important biomedical interventions. Treatment of existing STIs reduces HIV infection and transmission risk.

8.7.1 Health Education

Health education is carried out through mass media channels such as newspapers, television, and the Internet. It has been shown to effectively improve basic HIV/AIDS knowledge among MSM (Xing et al. 2007). In addition, information is tailored to meet specific needs of the MSM population. Targeted health campaigns and education aim to improve HIV/AIDS risk awareness and promote safe sex practices and frequent HIV testing. Community-based health education can be conducted in the following ways: peer education, MSM cultural activities, and posting information onto gay websites and online chat rooms for MSM. Peer educators were made up of MSM volunteers who had completed training and spread HIV/AIDS knowledge to their peers. HIV prevention efforts have also taken advantage of the various cultural activities specific to the MSM community, such as gay bar shows and self-organized sports activities. Integrating HIV/AIDS knowledge campaigns into these activities can help with promoting a healthier lifestyle within the MSM community. Many MSM are very frequent users of the Internet and various social networking applications (apps) on mobile devices. Gay websites and apps serve as an important platform to spread accurate HIV/AIDS information (see Chap. 11 for more information).

8.7.2 Outreach Services and Condom Promotion

Outreach activities are carried out by MSM CBOs or MSM volunteer groups. Outreach teams regularly go to MSM cruising areas such as parks, public toilets,

bars, bathhouses, and clubs to distribute condoms, lubricants, and health education materials, conduct on-site counseling, provide information about STI treatment and HIV testing, and pass out referral cards. Outreach provides an opportunity to contact large numbers of MSM, allowing volunteers to distribute condoms and provide information to the target population face to face. By conducting appropriate outreach activities, not only are individual needs on HIV/AIDS prevention met, but this approach may also help to build a supportive environment for behavior change at the community level. The purpose of condom promotion is to strengthen the awareness of safe sex and to improve condom accessibility. Condom promotion activities can be integrated into health education campaigns and outreach services. With the cooperation of owners and managers of gay bars, bathhouses, and clubs, free condoms can be distributed or condom vending machines can be installed within these places.

8.7.3 HIV Testing and Linkage to Care

There are various forms of HIV testing services available to MSM. Free voluntary counseling and testing (VCT) is mainly available at local and provincial CDC sites and in various healthcare settings (e.g., hospitals, clinics). However, some MSM CBOs also provide VCT services. Free provider-initiated testing and counseling (PITC) is also performed in healthcare settings across China, whereby individuals seeking care for other reasons are strongly encouraged, and in some cases required (e.g., surgical patients) by providers to accept HIV testing based upon their medical judgment. Many HIV infections are found via PITC, particularly in surgery, emergency room, and STI departments of hospitals. HIV self-testing is a relatively new format for conducting a screening test on oneself. While HIV self-testing kits are not free, they are readily available and help to overcome the many barriers to facility-based testing that many MSM face (e.g., concerns for confidentiality and privacy, fear of stigma and discrimination, ease and convenience). However, linkage to further diagnostic and treatment services is currently suboptimal—many who receive reactive, inconclusive, or unknown results on HIV self-tests do not seek further medical care (see Chap. 12 for more information).

8.7.4 Antiretroviral Therapy

Antiretroviral therapy (ART) is considered an important part of prevention whereby the rate of secondary HIV transmission is reduced if PLWH are properly treated and achieve viral suppression. To assess feasibility and effectiveness of universal testing and treatment among the Chinese MSM population, a “test-and-treat” pilot project was designed and launched in 2012 in eight cities across China. This project included two components: one was to work with MSM CBOs to launch an “HIV Testing Day” campaign among MSM and to mobilize the community on test days to increase HIV testing rate and HIV case finding among MSM. The second component was to start ART upon diagnosis regardless of CD4 count, including using

optimal treatment regimens with fewer side effects, such as tenofovir (TDF) instead of stavudine (D4T). This pilot project had two evaluation indicators: HIV incidence, using the BED method to monitor the trend of HIV incidence through cross-sectional surveys, and community viral load, using random sampling among HIV-infected MSM to understand the change in community-level infectivity.

The CD4-based ART eligibility criterion has since been eliminated in China, and all diagnosed PLWH, regardless of CD4 level, are encouraged to begin ART as soon as possible after diagnoses. Furthermore, a streamlined and accelerated procedure for diagnosing and treating PLWH has been tested and found to be effective in clinical trial and had since also been converted to national policy. It is expected that these two advancements will together have a profound impact on the MSM HIV epidemic in China (see Chap. 13 for more information).

Pre-exposure prophylaxis (PrEP; i.e., ART given to uninfected MSM at high risk of infection to prevent acquisition of HIV infection) has been piloted in China but thus far has not been considered for scale-up as a national strategy.

8.8 Achievements and Challenges

China has made great progress in implementing HIV/AIDS prevention interventions among MSM. Data from the National HIV Surveillance System has indicated that awareness among MSM of how to prevent HIV/AIDS has increased from 55% in 2008 to above 90% in 2010. Intervention coverage among MSM has increased from 38% in 2008 to 77% in 2011. The proportion of MSM using condoms during their most recent episode of male sexual contact increased from 64% to 74%. The proportion of MSM who have tested for HIV in the last year increased from 33% to 50% in the same period. Furthermore, the rate of clinical follow-up and uptake of ART for MSM with HIV infection improved significantly. The proportion of MSM who had HIV infection who received CD4 testing at least once a year increased from 54% to 71% during 2007 to 2011.

However, many challenges yet remain. Chinese MSM still face substantial societal stigma and discrimination, which becomes a barrier to HIV prevention, testing, treatment, and care. Despite substantial efforts in the area of awareness, education, outreach, counseling, and condom promotion, MSM still tend to engage in risky sexual behavior including having large numbers of partners, low rates of condom use, and concurrent drug use and risky sex. Low rates of lifetime testing and low frequency of testing among those who have tested are also a problem. As a result, both prevalence and incidence continue to climb among this vulnerable population.

The epidemic is still far from being contained among MSM in China. Effective national responses face many challenges. In order to combat these challenges, sustain the progress made, and begin to slow the growth and turn the tide of the MSM HIV epidemic in China, the Chinese Central Government must continue to prioritize HIV prevention, testing, treatment, and care efforts among MSM, as well as pursue meaningful partnerships with MSM NGOs, and explore novel strategies capable of making bigger impacts on the epidemic.

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The National Methadone Maintenance Treatment Program

9

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Abstract

Drug use reemerged in China after the 1978 introduction of sweeping economic change initiated by the "Opening Up and Reform" policy, and the high-risk behavior of drug users was the major driver of China's early HIV epidemic. To combat both the growing drug use and HIV epidemics, China's National Methadone Maintenance Treatment (MMT) Program was piloted in 2004 and scaled up starting in 2006. By the end of 2015, the program encompassed 785 full-service clinics, 29 mobile vans, and 325 satellite sites nationwide that were providing MMT services to more than 170,000 regular clients who were former heroin injectors. China's National MMT Program had become the largest opioid substitution therapy program in the world. This important harm reduction program has successfully reduced illicit drug use, HIV incidence, mortality, and criminal activity, as well as improved quality of life. However, there are still a wide range of challenges and gaps remaining, and further work to strengthen this program will be necessary for HIV to be eliminated in this important key population.

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9.1 The Evolution of China's Drug Use Epidemic

9.1.1 The Rise, Fall, and Reemergence of Opioid Drugs

After China was defeated by the British in the two Opium Wars (1839–1842 and 1856–1860), the production and use of opioid drugs increased dramatically nationwide (Jia et al. 2015; Lu and Wang 2008). By 1906, there were more than ten million opioid users in China, accounting for 27% of the adult male population, who had consumed around 39,000 tons of opium (Fang et al. 2006). This astounding prevalence of opioid use might have been the largest in the world history.

Once the People's Republic of China was founded in 1949, the government initiated a vigorous nationwide campaign against illicit opium cultivation and drug use. During this campaign, cultivation, trafficking, buying and selling, and possession and use of opioid drugs were made illegal and assigned penalties ranging from imprisonment to death. Largely due to the firm and severe actions taken by the Chinese government, one of the most acute drug use epidemics in Chinese and world history ended within 3 years, after which China experienced a relatively drug-free period between the mid-1950s and the mid-1970s (Lu and Wang 2008; McCoy et al. 2001).

However, since China implemented its historic economic reforms in the late 1970s and early 1980s, beginning with the "Opening Up and Reform" policy of 1978, trade of illicit goods, including opioids, reemerged. As neighbor to the world's largest heroin-producing regions, the "Golden Triangle" (i.e., Myanmar, Thailand, and the Lao People's Democratic Republic) and the "Golden Crescent" (i.e., Afghanistan and Pakistan), China has become integrated into the largest drug trafficking routes in the eastern hemisphere (Lu and Wang 2008). Very large amounts of opioids, mostly heroin, have since been smuggled into China, mainly from Myanmar into Yunnan province or from Vietnam into Guangxi Zhuang Autonomous Region (hereafter Guangxi).

Due to low prices, widespread availability, and lack knowledge of its deleterious consequences, opioid drug use became prevalent in these regions. Illicit drug use, particularly heroin use, then quickly spread to other neighboring provinces including Sichuan, Guangdong, Guizhou, Hunan, and Xinjiang Uyghur Autonomous Region (hereafter Xinjiang) via drug trafficking routes. As the world's largest opium-producing region since 2003, the Golden Crescent became a major drug supplier to Xinjiang and other provinces in the northwest region of China. According to data issued by the United Nations Office on Drugs and Crime (UNODC), Xinjiang drug control authorities solved ten Golden Crescent drug trafficking cases in 2004, four of which involved more than 1 kg of heroin. By contrast, more than 600 kg of heroin was captured in 2010 (United Nations Office on Drugs and Crime 2012).

Initially, illicit drug use was concentrated in ethnic minority populations, such as Dai, Jingpo, and Zhuang, living in border regions. More than 80% of people using heroin in Dehong prefecture, Yunnan province, the site of the first HIV outbreak identified among drug users, belonged to Dai and Jingpo ethnic groups. The opioid drug use epidemic in China rapidly worsened in the 1980s, 1990s, and early 2000s

(Jia et al. 2015; Liu et al. 2010), and the cumulative total number of registered illicit drug users in the country increased from approximately 70,000 in 1990 to over 1.1 million in 2004.

In 2005, President Hu Jintao called for a "People's War on Drugs" to address the nation's ballooning heroin use problem. Five campaigns were launched—drug abuse prevention education; drug addiction treatment and rehabilitation; drug supply reduction and control; antidrug law enforcement scale-up to facilitate a "crackdown" on drug possession, transport, buying, and selling; and control of chemicals used in drug production (Jia et al. 2015). A recent nationwide, retrospective study of nearly 1.2 million drug users that aimed to evaluate the effect of the war on China's drug use epidemic found that while some important indicators showed improvement between 2005 and 2010 (i.e., proportion of drug users who relapse, risk of relapse, proportion of new drug users who use heroin, and risk of occurrence of new heroin users), other indicators suggest that China's drug use epidemic was changing (Jia et al. 2015).

9.1.2 The Arrival of Synthetic Drugs

Traditionally, opioids, especially opium and heroin, have been the most commonly used drugs in China. However, rates of opioid use have plateaued, and drug use has shifted to new types of addictive drugs (Jia et al. 2015; Lu and Wang 2008; Lu et al. 2008). Since the first 3,4-methylenedioxy-*N*-methylamphetamine (MDMA; also known as "ecstasy") use case was reported in China in 1994, the use of new psychoactive substances (NPS; also called "synthetic drugs" or "club drugs") has spread throughout the country very quickly, with concentrations found in southeastern regions and business-centered cities. One study reported that 74% of heroin users had also used synthetic drugs, 14% of whom had switched to using synthetic drugs exclusively (Zhang 2006). Generally, users of synthetic drugs believed that they did not have addictive properties and had have fewer physical and mental health consequences compared to heroin or other opioid drugs (Joe Laidler 2005). Moreover, synthetic drugs are not illegal in China, so users do not risk arrest or incarceration, making them an even more attractive alternative to heroin.

Besides MDMA, other synthetic drugs commonly used in China include crystal methamphetamine (MA; a.k.a. "ice"), ketamine (a.k.a. "K Fen," "Special K"), "Magu" pills (capsules typically containing a mixture of MA and other drugs including caffeine), and alkyl nitrite inhalants (called "poppers"). Both the variety of synthetic drugs available and the numbers of synthetic drug users have been increasing rapidly since the beginning of the "People's War on Drugs." In one nationwide, retrospective study, researchers found a 920% increase in synthetic drug users among all drug users and an 861% increase among new drug users over an 8-year period from 2003 to 2010 (Jia et al. 2015). According to official statistics, the proportion of registered club drug users among all drug users increased from 9.5% in 2004 to 38% in 2012 (National Narcotics Control Commission 2005, 2013). For the first time in 2014, the prevalence of synthetic drug use among registered drug users in China exceeded the prevalence of opioid use (National Narcotics Control Commission 2015).

9.1.3 Early Responses to the Drug Use Epidemic

To combat the resurgence of drug use, the Chinese government first responded in the 1980s by mobilizing enormous resources to reduce the drug supply. However, this strategy failed because China's lengthy borders are difficult to monitor and there is a virtually free flow of trade and migration in and out of the country, especially along the southern borders adjoining the Golden Triangle.

In 1990, the Standing Committee of the National People's Congress issued the Regulation on Prohibition Against Narcotics, which specified three steps to end drug use. First, drug users, when detained by police for the first time, were to be fined and/or encouraged to receive treatment in hospital-based voluntary detoxification centers run by the Ministry of Health. Drug users typically stayed at these centers for 1–4 weeks. Second, relapsed drug users who have previously attended voluntary detoxification treatment, detained by police a second time, were to be sent to compulsory detoxification centers, which are managed by the Public Security Bureau. Drug users sent to compulsory detoxification typically spend at least 6 months undergoing a combination of detoxification therapy, physical exercise, and manual labor. Third, relapsed drug users who have previously been confined in compulsory detoxification centers, detained by police for the third time, were to be sentenced to 2–3 years in reeducation-through-labor camps, which are administered by the Ministry of Justice (Sullivan and Wu 2007).

In general, voluntary and compulsory detoxification treatment mainly serve to force drug users to quit drug use and prevent them from committing crimes associated with drug use, as well as demonstrate the government's commitment to addressing the drug problem. However, due to limited resources, many compulsory detoxification centers have become overcrowded, understaffed, and underfunded. Furthermore, drug users in these settings are provided very little psychosocial counseling and health education, and staff receive very little skills training and capacity building. Consequently, a significant body of research has found that it is difficult for drug users released from detoxification centers to successfully reintegrate into society and relapse rates exceed 90%. Clearly, this method of dealing with drug use is not effective (Liu et al. 2006). Furthermore, the broader international community has criticized compulsory detoxification treatment centers in China and elsewhere, noting a myriad of human rights violations and calling for their closure.

Nevertheless, drug use and addiction has traditionally been viewed by Chinese society as a moral failing of the individual and as a complex social problem that affects families, neighbors, and even entire communities. Therefore, it has been thought that the solution to China's drug use should consider the rights of community members whose lives are affected by drug users (Li et al. 2010). In this social and cultural context, it is not surprising that the initial response to drug use has been punitive, and hence, the Chinese government continued to scale up compulsory detoxification treatment centers. According to official statistics, nearly 700 centers were operating across China, covering more than 300,000 people, in 2012 (National Narcotics Control Commission 2013).

9.2 Public Health Implications of Drug Use

Studies indicate that people who use drugs often experience extremely stressful and chaotic lives, including dealing with unemployment, homelessness, family disruption, loss of economic productivity, and social instability (World Health Organization et al. 2004). Apart from social instability caused by drug use, drug users are more likely to engage in criminal behaviors. For example, according to data published by the National Narcotics Control Commission, 133,000 individuals committed drug-related crimes (e.g., theft, violence, drug trafficking, prostitution) in 2012 nationwide, an increase of 18% over the prior year (National Narcotics Control Commission 2013). In some areas of China, crimes associated with drug use accounted for about 70–80% of all criminal activity. In Lanzhou, a city in northwestern China, approximately 70% of drug users reported that they had committed crimes (Fang et al. 2006; Shi et al. 2007).

In addition to negative social consequences, drug use also has major health consequences. Previous studies conducted in various countries have consistently indicated that drug users have a much higher risk of death than non-drug users (Hulse et al. 1999; Morgan et al. 2006). It has been reported that leading causes of death among drug users are overdose, AIDS-related disease, and suicide (Brugal et al. 2005; Cao et al. 2013; Degenhardt et al. 2006; McCowan et al. 2009).

9.2.1 Opioids and Risk of Infectious Disease

Many drug users shift from smoking opioids to injecting them, typically heroin, soon after they realize that injecting is more cost-effective and has a stronger effect. Unfortunately, sharing of drug injecting equipment is a common practice among people who inject drugs (PWID) worldwide, which increases the risk of infection with HIV and other infectious diseases, such as hepatitis C virus (HCV). Behavioral surveillance data in China have shown that the prevalence of needle sharing among PWID has been quite high.

In addition to risky drug injecting behaviors, a majority of drug users tend to engage in risky sexual behaviors and are less likely to consistently use condoms compared to nonusers. This exposes not only injecting partners but also sexual partners to risk of HIV, HCV, and other infectious agents (Liu et al. 2010; Sullivan and Wu 2007). Although most drug users in China are male, female drug users may be at comparatively greater risk for HIV infection since they tend to have sexual partners that are drug users and are more likely to be involved in the sex industry (Sullivan and Wu 2007). Given that the sexual partners of drug users are a likely bridge to the general population, targeting this population for HIV prevention and intervention has been a top priority in China (State Council AIDS Working Committee Office and the United Nations Theme Group on HIV/AIDS in China 2004).

9.2.2 Synthetic Drugs and Risk of Infectious Disease

Synthetic drugs are generally taken by smoking, snorting, inhaling, or swallowing and less commonly by injecting. They are known for acting very quickly on the nervous system, giving the user an immediate "rush" of energy, confidence, and euphoria. Unlike opioids, where the primary risk of infectious disease comes with the sharing of injecting equipment, synthetic drugs bring risk of infectious disease through their very strong influence on sexual behavior. Synthetic drugs are known to increase sexual desire and suppress inhibitions, exaggerate sexual pleasure and prolong sexual episodes, and generally promote high-risk sexual behaviors such as having multiple sex partners, having sex without condoms, and engaging in "sexual marathons," group sex, or homosexual sex (Corsi and Booth 2008; Urbina and Jones 2004; Volkow et al. 2007). Synthetic drug users thereby expose themselves to risk of acquiring HIV and other sexually transmitted infections (STIs) via heterosexual or homosexual contact (see Chaps. 7 and 8 for more information). The remainder of this chapter will focus on PWID who use traditional opioid drugs (e.g., heroin) and address how opioid substitution therapy has been used as a harm reduction strategy among PWID to combat China's HIV epidemic.

9.3 HIV Among PWID

In 1989, the first outbreak of HIV was found among 146 PWID in remote, rural southwestern Yunnan province near the border of Myanmar (Ma et al. 1990; Shao et al. 1991; Zheng et al. 1994). Since then, the HIV epidemic has spread at an alarming rate from Yunnan to other neighboring provinces including Sichuan, Guangxi, Guangdong, and Xinjiang along drug trafficking routes (Sun et al. 2007). As of 2002, all 31 provinces in mainland China have reported cases of HIV infection associated with injecting drug use (State Council AIDS Working Committee Office and the United Nations Theme Group on HIV/AIDS in China 2004).

According to sentinel surveillance data collected annually from 1998 to 2004, HIV prevalence among PWID in China's five most affected provinces—Yunnan, Guangxi, Sichuan, Xinjiang, and Guangdong—ranged from 20% to 30%, while in all other provinces during the same period ranged from 2% to 5%. Overall, HIV prevalence among all PWID nationwide reached a peak of 11% in 2004 (Wang et al. 2015). By 2004, a cumulative total of approximately 100,000 HIV cases had been reported, 42% of which were among PWID (Chinese Center for Disease Control and Prevention 2004).

9.3.1 The Benefits and Barriers of Harm Reduction for PWID

Drug abuse poses serious problems for communities, families, and individuals. Solutions sometimes seem uncertain, difficult, and controversial. This was the case for opioid substitution therapy as a means of reducing the harms faced by PWID in China.

Since Dole and Nyswander introduced orally administered maintenance doses (80–120 mg) of methadone as a drug substitution treatment for opioid addiction in 1960s (Ausubel 1966), methadone maintenance treatment (MMT) quickly became the most common model of drug replacement therapy for opioid dependence in the world. MMT has helped millions of people in recovery from opioid addiction, allowing them to improve their health, resume their family and social lives, hold steady jobs, and generally become productive members of their communities.

Although the many benefits of MMT have been adequately documented (Fiellin et al. 2001; Langendam et al. 1999; Ward et al. 1999), there were several barriers associated with introducing MMT to China. Internationally, it is now widely accepted that drug addiction is essentially a chronic condition, which has physical, social, cultural, and legal consequences. However, traditionally, the notion that illicit drug use is a failure of willpower or a flaw of moral character rather than a chronic medical condition is deeply rooted in Chinese society. Opponents argued that MMT is unacceptable because it simply "replaces one drug of dependence with another" and insisted that abstinence is the only acceptable treatment goal. Some public officials, especially law enforcement officials, held the view that allowing the long-term medical use of methadone was condoning drug use. Consequently, law enforcement officials believed that tackling the drug use problem through punitive measures, such as incarceration and detoxification, was the only right course to take (see Chap. 19 for more information).

9.3.2 Toward a More Supportive Policy Environment

To convince government officials, and especially law enforcement officials, to be open to the idea of MMT as a harm reduction method for reducing HIV/AIDS and drug use-related crimes, public health experts from the National Center for AIDS/STD Prevention and Control (NCAIDS), Chinese Center for Disease Control and Prevention (China CDC), took the bold step of exploring the feasibility and effectiveness of initiating an MMT program in China. With support from international organizations including the World Health Organization (WHO), the United Nations (UN), and the World Bank, several workshops, conferences, and seminars were held to establish a platform for discussing the feasibility of MMT in the Chinese political and cultural context (Yin et al. 2010). Study tours for government officials from multiple sectors were organized in Australia, the Netherlands, the United Kingdom, and the United States to provide opportunities to see and hear from those involved in MMT programs in other settings. These tours improved key officials' perception of MMT and other harm reduction strategies (Wu et al. 2007; Yin et al. 2010).

By the late 1990s and early 2000s, senior-level officials within various arms of the Chinese Central Government were becoming more aware of the seriousness of the nation's HIV epidemic and of the urgent need for a more comprehensive response. Thus, a policy environment more supportive of innovative new strategies and alternative approaches, such as harm reduction strategies, was developing. Representatives from multiple sectors—the Ministries of Health, Finance, Public Security, and Justice, as well as the Development Commission—met to discuss the

idea of introducing harm reduction interventions including MMT, needle and syringe exchange, and condom use promotion. The group decided to take the next steps toward formulation of policies endorsing these measures and supporting the conduct of small pilot studies. Thus, harm reduction was included as an important component in China's First 5-Year Action Plan for the Containment and Control of HIV/AIDS (2001–2005; State Council 2001; Sun et al. 2010) (see Chap. 18 for more information).

9.4 MMT's Pilot Phase

In 2002, the National Working Group for Community-based Methadone Maintenance Treatment for Opioid Users (hereafter the National Working Group) was chartered and tasked with creating a plan for an MMT program in China as well as coordinating and overseeing execution of that plan and evaluating the resulting MMT program structure. It was composed of officials from the Ministry of Health, Ministry of Public Security, and State Food and Drug Administration (SFDA), as well as experts on opioid addiction and HIV. NCAIDS served as the secretariat for the National Working Group, carrying out the plan, providing technical support to MMT clinics, and conducting monitoring and evaluation activities. The resulting national MMT protocol was formalized in 2003, when the Ministry of Health, the Ministry of Public Security, and the SFDA jointly issued the Temporary Protocol for Community-Based Maintenance Treatment for Heroin Addicts (Ministry of Health et al. 2006; Yin et al. 2010).

The protocol detailed the purchase of raw materials and production, storage, transport, distribution, and security of methadone to ensure safety, quality, and security. The protocol outlined eligibility criteria for participation in MMT program (i.e., several failed attempts to stop the use of heroin, at least two terms in a compulsory detoxification center or one term in a reeducation-through-labor camp, at least 20 years of age, a local resident where the clinic was located, and capable of "complete civil liability," meaning having ability to take responsibility one's own actions). An exception to most of these criteria was made for drug users with HIV. The protocol also included operating guidelines and requirements for MMT clinics and stipulated that the daily cost per drug user client could not exceed 10 RMB (the equivalent at that time of 1.20 USD), irrespective of dose. Clients were permitted to miss a maximum of 15 days in a 3-month period. Failure to obey MMT program rules and failure to follow clinic doctors' directions, which included maintaining abstinence from opioid use while in treatment, resulted in expulsion from the program (Ministry of Health et al. 2006; Yin et al. 2010).

Under the governance of the Ministry of Health, the Ministry of Public Security, and the SFDA, eight pilot MMT clinics were opened in the five provinces with the high prevalence of drug use and HIV infection among drug users—two clinics were located in Sichuan, one in Yunnan, two in Guizhou, one in Guangxi, and two in Zhejiang. All became operational between March and June 2004 (Cao et al. 2013; Pang et al. 2007; Yin et al. 2010). A total of 1029 opioid users were enrolled in pilot

MMT clinics at the end of 2004. To monitor the work and assess the effectiveness of the pilot clinics, an information management system was developed by the NCAIDS. This system has since been integrated into China's National HIV/AIDS Comprehensive Response Information Management System (CRIMS), which has been instrumental in improving the quality and timeliness of data on the National MMT Program (as well as all other HIV response programs), facilitating program monitoring and evaluation as well as targeted improvements in services (Mao et al. 2010) (see Chap. 24 for more information).

At 1 month, 6 months, and 12 months after starting treatment, MMT clients at the eight pilot clinics were surveyed on changes in drug using behaviors, drug-related criminal activity, employment, and relationships with family members. Sociodemographic data were kept up-to-date and HIV serostatus was assessed as well. Through this evaluation, researchers found that MMT clients engaged in less injecting drug use and crime and experienced improved family relationships and individual social functioning after an adequate daily dose (usually 60–120 mg) was attained. Reduced rates of HIV were also observed. The pilot study had successfully demonstrated the feasibility, safety, and benefits of MMT in the China setting (Pang et al. 2007).

9.5 MMT Scale-Up

With the pilot deemed a success, China's first national MMT conference was convened in Sichuan in 2004 for the purpose of sharing experiences, troubleshooting problems, and advocating for rapid nationwide scale-up. Government officials from the three governing ministries (i.e., Health, Public Security, and SFDA), drug use and HIV experts, and key staff from each of the eight pilot clinics participated.

At the end of 2004, the support for MMT was further bolstered among policymakers when Vice-Premier Wu Yi recommended MMT be scaled up in regions with serious HIV epidemics in a speech at the State Council Special Assembly on HIV/AIDS Prevention and Control. Early in 2006, China's State Council issued the HIV/AIDS Prevention and Treatment Regulation, which specifically endorsed the use of MMT as an important harm reduction measure (State Council 2006a; Sun et al. 2010; Yin et al. 2010). In the same year, the Second 5-Year Action Plan for the Containment and Control HIV/AIDS (2006–2010) was issued, and specific targets for scaling up MMT were included (State Council 2006b; Sun et al. 2010; Yin et al. 2010).

The National Working Group and NCAIDS immediately got to work scaling up the MMT program nationwide—they were under enormous pressure to meet an ambitious target of opening 300 clinics by the end of 2006. The team successfully opened a total of 320 clinics, which, by the end of 2006, were serving 37,345 drug users. Based on lessons learned from the pilot phase, the National Working Group revised the temporary MMT protocol, and in mid-2006, China's National Protocol for Community-Based Methadone Maintenance Treatment for Opioid Addicts was issued. The new protocol featured several important changes that intended to expand

coverage and improve service quality. First, clients were no longer required to have failed attempts to quit using drugs and a history of detoxification. Second, clients were no longer required to have local registrations, and a transfer system was developed to manage clients who were relocating. Third, rules for clients in the program were made more tolerant and grounds for expulsion were limited. Fourth, a detailed clinical guideline for delivery of methadone treatment was added to support standardized clinical practice. Fifth, comprehensive interventions were added, including ancillary services such as counseling, psychosocial support; testing for HIV, syphilis, hepatitis C virus, and tuberculosis; and referrals to treatment, peer education, health education, group activities, social support, and skills training for employment. Finally, the fee for MMT services was not specified, so that in some areas, where heroin is easily obtained at low cost, the fee could be reduced or even waived (Yin et al. 2010).

In 2007, the Chinese Central Government again allocated funding to support further expansion of the MMT program, enabling areas with less than 500 registered drug users to establish MMT clinics. A target of 500 MMT clinics was set, and by the end of 2007, a total of 503 MMT clinics were operational in 23 provinces. A cumulative total of 97,554 clients had been served (Yin et al. 2010).

In 2008, the National People's Congress issued a revised Law on Drug Control, which integrated MMT into existing antidrug strategies, thereby requiring drug users to undergo community-based drug treatment, rather than closed-setting, compulsory detoxification (Standing Committee of the National People's Congress of China 2008). The revised law also stipulated that drug users in community-based treatment were to be provided with vocational training and employment assistance. Moreover, the law directed "the health sectors of provinces, autonomous regions and municipalities to cooperate with the Public Security Bureau and the Food and Drug Administration to implement community-based MMT." This important legislation was critical to the long-term sustainability of MMT in China (Yin et al. 2010).

Today, China's National MMT Programs is the single largest opioid substitution therapy program in the world. As of the end of 2015, a total of 785 full-service "bricks and mortar" clinics were operating across the country. These clinics further support 29 mobile vans and 325 satellite sites, which enable drug users in remote, rural areas and in smaller villages and towns to access methadone. Since 2011, this network has been providing methadone services to approximately 200,000 drug users each year. At the end of 2015, roughly 170,000 former PWID were regular clients of China's National MMT Program (Wu and Pisani 2017).

9.6 China's National MMT Program

9.6.1 Program-Level Organization and Management

The National MMT Program is managed at both the national and provincial level, with working groups established at each. The National Working Group consists of the National Health Commission (formerly the Ministry of Health), the Ministry of

Public Security, the SFDA, as well as relevant technical agencies. It is responsible for overall management of the program, oversight of the methadone supply chain, training of key staff at the provincial level, and monitoring and evaluation of the program at the national level. The National Working Group secretariat, NCAIDS, is responsible for the coordination and routine administration of the program. The Provincial Working Groups consist of the provincial-level officials affiliated with the agencies included in the National Working Group. Provincial Working Groups are responsible for organizing, administering, supervising, and providing MMT program services in their province. The secretariat of each Provincial Working Group is responsible for routine operation and monitoring.

9.6.2 Clinic-Level Organization and Management

Clinics can be affiliated with a local CDC site, community hospital, mental health center, community-based health center, voluntary detoxification center, or penal system-based hospital. Currently, a majority of clinics are affiliated with CDCs and hospitals. Each full-service "bricks and mortar" clinic includes several functional areas, such as a counseling room, HIV testing room, and waiting room, which are equipped with computers, telephones, Internet connections, and methadone dispensing equipment and supplies. Each clinic has at least eight trained staff members, including at least two doctors and two nurses. At least two staff members from each MMT clinic are required to participate in a 10-day training course held by the national MMT training center covering addiction theory, clinical practice, and administrative skills for delivery of MMT services prior to the opening of clinic.

Methadone is supplied to each clinic based on the clinic's actual demand as evaluated by the Provincial Working Group—clinics are prohibited from obtaining methadone from any other source. The Provincial Working Group must request quantities of methadone from the National Working Group. Clinics are responsible for managing their own methadone supplies under the strict oversight of both the Provincial Working Group and the National Working Group.

Although the ideal clinic size is approximately 300 clients, clinics vary considerably in size, from a few dozen to nearly 1500 clients (average is approximately 250 clients per clinic). The program follows an outpatient model—clients attend clinics daily to obtain their methadone dose, which is taken under the direct observation of clinic staff. There are no options for take-home doses nor any way to obtain methadone outside the clinics. The daily dose recommended by China's MMT protocol is 80–120 mg.

Clients are charged a maximum of 10 RMB (roughly 1.5 USD) per day for treatment received regardless of the dose. Although the National MMT Program is funded by the Chinese Central Government via the National Health Commission in collaboration with the Ministry of Public Security and the SFDA and provincial and local governments allocate funds for the establishment of clinics, these funders do not cover regular operating costs. Day-to-day operations are funded by client treatment fees.

MMT clinics are responsible not only for administering the program, supervising the routine treatment of clients, and reporting on operational progress in a timely manner but also for educating clients about risk reduction, providing psychological support, and providing disease prevention consultations, urine tests, and medical management.

9.6.3 Client Enrollment and Treatment

When an opioid user approaches an MMT clinic to seek treatment, they are informed of the treatment procedure and expectations of clients. If the prospective client chooses to enroll, then he or she is asked to provide written informed consent for treatment. Upon enrollment of a new client, the MMT clinic is obliged to notify the relevant narcotics control department of the local Public Security Bureau branch.

Before treatment starts, the new client is provided a standardized card identifying their participation in the MMT program and is entered into a baseline assessment. The baseline assessment consists of the collection of identification, contact, and sociodemographic information as well as information on historical and current drug use behavior, high-risk sexual behavior, and health and sexual health history. Then, clients provide a blood sample for HIV and HCV testing. The results of these tests become a part of the client's baseline data. All clients who are found to have HIV and/or HCV infection are referred to treatment.

Clinic doctors are responsible for the initiation of methadone treatment according to current clinical guidelines. The clinic doctor then may adjust the client's dose in accordance with their response to treatment, and an individualized methadone treatment protocol should be developed and adjusted until the correct maintenance dosage is determined. Once on a maintenance dose, daily doses may be administered by clinic nurses or pharmacists depending on the clinic.

Since MMT clients are prohibited from using opioids or any other kinds of illegal drugs while in MMT, clients receive urine drug-screening tests on a regular and irregular basis. Urine tests are administered and results recorded by clinic doctors. Other clinic staff are not permitted to administer urine drug tests.

Transfers between clinics are permitted and are facilitated by a proximity card system, which was introduced in 2008. This system enables clients to obtain methadone when they move or travel. MMT clients may choose to discontinue treatment via an application process. Discontinuation applications are approved by the local branch of the Public Security Bureau.

9.6.4 Data Management

Client information is confidential and is therefore securely stored. MMT clinics are strictly prohibited from releasing confidential client information to any institution or individual without the permission of the client, unless they are required to do so by law. To securely store and restrict access to client, clinic, and program information, China's MMT Data Management System was developed and launched

simultaneously with the opening of the first eight MMT clinics in 2004. The system has since been upgraded and integrated into CRIMS as of early 2008. Because Internet outages remain a challenge in some areas, the system was designed to allow for off-line data entry by MMT staff using client software. Data are then uploaded to CRIMS when the terminals are back online (Mao et al. 2010).

Each patient is given a unique treatment number upon entry into the MMT program and each clinic uploads its daily service records to the system in real time. Data collected include that generated from enrollment and the baseline assessment (e.g., identification, contact, and sociodemographic information) as well as treatment initiation and daily visits to obtain methadone doses. Daily methadone dose records, results of urine drug-screening tests, and results of HIV and HCV tests at entry, 6 months, 12 months, and then at 12-month intervals thereafter are entered into the system. In addition, if clients discontinued taking methadone for 30 consecutive days or died, reasons for dropout and causes of death were collected (see Chap. 24 for more information).

9.6.5 Staff Training and Capability Building

With approval by the National Working Group, the National MMT Training Center was set up at the Yunnan Institute of Drug Abuse in 2005. The mission of the National MMT Training Center was to offer providers in new MMT clinics basic support and clinical and operational training. At least two staff members from each MMT clinic were required to participate in a 10-day training course at the center covering addiction theory, clinical practice, and administrative skills for the delivery of MMT services prior to the opening of each clinic. To assist the staff of a newly opened clinic, the center provided onsite training for the first 7 days of operation to guide them in the practice of addiction treatment and data management (Li et al. 2013).

In 2008, the National MMT Training Center modified its capacity-building programs after performing a situational analysis and skills and capacity assessment of existing clinics (Li et al. 2013). The new technical training program for MMT service providers covers a broader range of topics and is meant to better strengthen their skills and ability to offer quality services. In addition, the center trains core MMT providers to themselves be trainers, so that they can provide training to staff at other clinics in their province and conduct week-long field visits to new clinics to provide on-site technical support and performance coaching to new service providers (see Chap. 27 for more information).

9.7 Evaluations of the National MMT Program

According to official government statistics, as of the end of 2014, a total of 767 MMT clinics were operating in 28 provincial-level administrative regions, treating 184,000 regular, active clients, and having a major impact on China's HIV epidemic (National Health and Family Planning Commission 2015). HIV incidence declined

by 80% among MMT clients from 2006 to 2013, suggesting an estimated 13,000 new HIV infections were averted by the program. Among all newly diagnosed HIV cases nationwide, the proportion attributed to injecting drug use fell from 44% in 2003 to under 8% in 2013. Furthermore, sentinel surveillance data indicate that HIV prevalence among drug users fell from 7.5% in 2005 to 3.6% in 2013 (World Health Organization China Office 2014).

Many observational studies have also been conducted to evaluate the performance of the National MMT Program and to investigate MMT client outcomes. This effort has been greatly facilitated in more recent years by CRIMS (Mao et al. 2010). The open cohort of MMT clients whose demographic, behavioral, health, and treatment data are contained within CRIMS is the largest in the world, making it a very powerful tool for examining a broad range of MMT-related questions. A selection of these observational studies are highlighted here. Overall, both government figures and results of observational studies alike point to benefits of MMT for opioid drug users across a broad range of outcomes.

9.7.1 Evaluation of the Pilot

To evaluate the MMT program while still in its pilot phase, Pang et al. conducted three successive cross-sectional studies at the eight pilot clinics (Pang et al. 2007). The first was in April to August 2004 among 585 clients who had been in MMT 1 month. The second was in December 2004 among 609 clients who had been in MMT at least 4 months. And the third, was in September to November 2005 among 468 clients who had been retained at least 12 months. Each study consisted of an interview and HIV testing was performed at 1 month and at 12 months.

Drug injecting in the past 1 month declined from nearly 70% to less than 10%, and among those who continued drug injection behavior, frequency of injecting declined from an average of 90 times per month to 2 times per month. Employment climbed from 23% to above 40%. Self-reported engagement in criminal activity fell from 21% to under 4%. Harmonious relationships with family members were reported by 66% after 12 months compared to 50% at 1 month. Although client satisfaction was also found to be above 95%, program dropout rate was nearly 52% at 12 months. Among clients who dropped out, 31% had been arrested and/or were incarcerated, 12% had moved away, and 12% had been disqualified. By the time of the third survey, a total of 3069 clients had cumulatively been tested for HIV. While 78% had been found to have HIV infection already upon enrollment, a seroconversion rate of only 0.7% in 12 months was found among those who entered MMT without HIV infection (Pang et al. 2007).

9.7.2 Evaluation of Client Characteristics

Sullivan et al. conducted a retrospective descriptive analysis of MMT client characteristics among all clients who enrolled in treatment in the 6-year period between

March 2004 and March 2010 (Sullivan et al. 2015). During this time, a total of 684 clinics were operating in 27 provinces. All routinely collected program data on the 251,974 clients ever enrolled during this time were examined. Overall, mean age of clients was 34 years, 84% were male, 70% were unemployed, 75% had a lifetime history of drug injecting, 17% had a lifetime history of needle sharing, and 7.4% had HIV infection. Over time, fewer clients were female, were unemployed, reported drug injecting, reported needle sharing, and had HIV infection. The 6-month dropout rate was roughly 50%, with median time to first treatment interruption of 162 days (Sullivan et al. 2015).

9.7.3 Evaluations of Retention

A systemic review and meta-analysis of 74 studies of MMT in China between January 2004 and April 2013 found that approximately one-third of clients drop out of treatment within the first 3 months after enrollment. Among those who dropped out, the most frequent reason was arrest or incarceration (22%). Among those who were retained, 25% had a positive urine drug-screening results, 9% still injected drugs, and 1% sold sex for drugs at 12 months (Zhang et al. 2013).

Cao et al. conducted a 6-year cohort study of 1511 MMT clients attending the first eight clinics in the program beginning in March 2004. Overall 6-year retention rate was 36%. Highest dropout rates were found within the first 12 months of enrollment and among those with the lowest methadone doses. Clients that had daily methadone doses above 30 mg or had relatives who were also in MMT had better odds of being retained and having a history of drug injecting or needle sharing behavior was also associated with improved retention (Cao et al. 2014).

To date, there are many smaller studies of MMT retention and although retention rates do vary considerably, the remain persistently low overall.

9.7.4 Evaluations of Comorbidities

A broad range of studies in the literature today examine various comorbidities including mental illnesses, blood-borne infections, and sexually transmitted infections as well as other harms. Overall, MMT has been shown to improve the health of drug users.

A cross-sectional study of 1301 MMT clients attending nine clinics across three provinces from 2008 to 2009 found that the prevalence of depression was 38% and the prevalence of anxiety was 18% with 14% of participants displaying symptoms of both depression and anxiety. Multilevel mixed modeling found a significant association between employment status and depression and between employment status and positive urine drug-screening results and anxiety (Yin et al. 2015).

A systemic review and meta-analysis of 90 studies (primarily in Chinese) published between 2004 and 2010 found that the overall national prevalence of HIV among MMT enrollees at baseline was 6%, prevalence of HCV was 60%, and HIV/

HCV coinfection was 5%. Although large geographic variation was noted, no significant difference in prevalence of HIV, HCV, or HIV/HCV coinfection was observed over time (Zhuang et al. 2012).

A nationwide study of 296,209 MMT clients who enrolled between March 2004 and December 2012 found an overall HCV prevalence of 55% at baseline and documented a notable decline in prevalence over the study period from 67% in 2005 to 46% in 2012. Those with a history of injecting drug use had an eight-fold greater risk of HCV infection and those with a 9-year or longer history of drug use had a two-fold greater risk of HCV. Substantial geographical heterogeneity was observed in HCV prevalence (Wang et al. 2016).

A systemic review and meta-analysis of 29 studies reporting syphilis infection among MMT clients in China documented a pooled syphilis prevalence of 7.8%. However, substantially greater prevalence of syphilis was found among women compared to men (Wang et al. 2014).

A 7-year retrospective cohort study (2006–2014) of 9240 clients attending 14 MMT clinics in Guangdong province found an overall HIV seroconversion rate of 0.2 per 100 person-years (PY), an HCV seroconversion rate of 20.5 per 100 PY, and a syphilis seroconversion rate of 0.8 per 100 PY. A significant 16% per year decline was observed in the HCV seroconversion rate during the study period. HIV seroconversion was associated with positive urine drug-screening results. Factors associated with HCV seroconversion were unmarried status, injection drug use in the past month, sex in the past 3 months, and higher methadone dose. Being female and having HCV infection at time of MMT enrollment were associated with syphilis seroconversion (Zou et al. 2015).

9.7.5 Evaluations of Mortality

Cao et al. conducted a 6-year cohort study (2004–2010) among 1511 enrollees in the first eight MMT clinics and found an all-cause mortality rate of 28.6 per 1000 PY (Cao et al. 2013). Most frequent causes of death were drug overdose (34%), HIV/AIDS-unrelated disease (21%), and HIV/AIDS (17%). Risk of death was five-fold greater for clients with HIV infection. Longer duration of retention in MMT was protective against death—clients retained 2–3 years experienced four-fold lesser risk of death and clients retained 4 or more years a ten-fold lesser risk. Furthermore, clients who had HIV infection and remained untreated had two times greater risk of death than those who were on treatment (Cao et al. 2013).

Zhao et al. investigated a nationwide cohort of 23,813 PLWH who reported having become infected via injecting drug use and who received ART between December 2002 and December 2011. The main finding was significantly lower mortality among those who were in MMT (66 per 1000 PY at 6 months, 37 per 1000 PY at 12 months) compared to those who were not in MMT (169 per 1000 PY at 6 months, 74 per 1000 at 12 months). Significant predictors of death were having never received MMT, having a low hemoglobin level, having a low CD4 count, and receiving treatment in settings other than infectious disease hospitals (Zhao et al. 2013).

Liu et al. extracted 306,786 MMT records of clients enrolled in MMT from 2004 to 2011 and found an overall mortality rate of 12 per 1000 PY but 57 per 1000 PY among those who had HIV infection. Methadone doses above 75 mg were associated with a 24% reduction in mortality, and this reduction in mortality was even greater among clients with HIV infection, nearly 50% (Liu et al. 2013).

Zhou et al. examined mortality among 1188 clients at a single clinic in Yunnan over 11 years of follow-up (2004–2015) and found an overall all-cause mortality rate of 34.2 per 1000 PY. Being married, being employed, and having longer MMT retention were all protective factors. HIV infection was a risk factor for death (43% increased risk of death), and the leading cause of death was HIV/AIDS-related causes (53%). Among those with HIV infection, being on treatment was a protective factor and was associated with a four-fold reduction in risk of death (Zhou et al. 2019).

9.7.6 Other Evaluations

A nationwide retrospective study of 19,026 MMT clients enrolled between April 2008 and March 2010 and retained at least 6 months found that self-reported rates of drug use and drug use-related high-risk behavior declined, and social functioning improved. Upon entry into MMT, 98% of clients had a positive urine drug-screening result, and nearly 100% self-reported drug use in the prior month. By contrast, at 6-month follow-up, 28% had a positive urine drug-screening result and 25% self-reported drug use in the prior month. Greater odds of continued drug use was found among those who had low attendance, reported often seeing drug-using friends, and reported having difficult family relationships. No association was found between continued drug use and methadone dose (Sullivan et al. 2014).

A systematic review and meta-analysis of 38 studies, primarily published in Chinese, found that a broad range of outcomes improved among MMT clients retained at least 6 months compared to baseline. For example, self-reported arrest rate declined from 13% to under 4% and drug-related crime from 10% to 3%. Selling drugs declined from 8% to 3% and selling sex for drugs declined from 5% to 1%. Employment rates rose from 26% to 40% at 6 months and to 60% at 12 months, and the proportion of clients reporting good relationships with family climbed from 40% to 60% at 6 months and to 75% at 12 months (Sun et al. 2015).

9.8 Challenges and Future Directions

The rapid scale-up of MMT programs in China has benefited hundreds of thousands of drug users, reducing drug use and criminality and improving health, quality of life, social functioning, and productivity. Nonetheless, there are still a wide range of challenges and gaps remaining, which need to be addressed if China is to further improve upon its already impressive National MMT Program.

9.8.1 Coverage

Despite China's National MMT Program being the largest in the world with 785 full-service clinics, 29 mobile vans, and 325 satellite sites serving roughly 200,000 clients each year as of the end of 2015 (Wu and Pisani 2017), coverage remains low. According to data released by China's National Narcotic Control Commission, there were more than 1.27 million registered opioid drug users in China as of the end of 2012 (National Narcotics Control Commission 2013). However, the true number of opioid users in China is known to be much larger and is thought to be still growing. China must again prioritize scale-up of MMT and find new, innovative ways to improve coverage. China must not allow the program to stagnate in the face of an ever-growing and ever-changing drug-using population.

9.8.2 Retention

Even during the pilot of the MMT program, client retention was a serious challenge (Pang et al. 2007), and it remains so today (Cao et al. 2014; Sullivan et al. 2015; Zhang et al. 2013). Barriers to retention have been well studied and include low methadone doses, clinic accessibility, treatment interruption caused by incarceration, lack of psychosocial support within clinics, concurrent drug use, and misconceptions of clients and providers about methadone treatment goals (Cao et al. 2014; Lin and Detels 2011; Liu et al. 2009; Zhang et al. 2013).

9.8.2.1 Methadone Dose and Retention

Internationally, a high daily methadone dose (80–120 mg) has been recognized as an important predictor of long-term retention. Many randomized controlled trials and observational studies have clearly demonstrated that higher dosages resulted in longer duration of treatment as well as less concurrent drug use and criminal activity (Kerr et al. 2005; Liu et al. 2006; Peles et al. 2006; Strain et al. 1999). While a majority of clients require at least 60 mg/day, a dose of 80–100 mg or greater is even more strongly correlated with positive outcomes (Joseph et al. 2000). Within China's National MMT Program, methadone dose is low overall and higher doses have been associated with better retention in care (Cao et al. 2014; Pang et al. 2007; Sullivan et al. 2015; Zhou and Zhuang 2014). Client retention is in urgent need of improvement and fulling understanding the reasons behind low doses, and addressing them is a critical part of solving the poor retention problem.

9.8.2.2 Police Action and Retention

The historically opposing missions of the public health and public security arms of the Chinese government—one tasked with treating substance use disorder, the other tasked with punishing drug users—have had a negative impact on many MMT clients since the start of the National MMT Program. Diversion of drug users to detention in compulsory detoxification centers or reeducation-through-labor camps rather than to MMT and failure to refer drug users released from these settings to MMT

result in considerable lost opportunities to treat underlying substance use disorder. Fear of incarceration discourages enrollment among those who are not yet the target of police action, and arrest and incarceration after MMT enrollment causes treatment interruption. Although cooperation between MMT clinics and local narcotics control and public security forces has improved over time in China, progress has been difficult and slow (Meng and Burris 2013). Improved awareness and knowledge of substance use disorder and MMT is urgently needed among law enforcement in China (see Chap. 19 for more information).

9.8.3 Service Quality

Wide variations in program effectiveness have been observed between different MMT clinics, which may be correlated with factors such as clinic location, clinic organizational structure, characteristics of clinic staff and their work environment, and the quality of services provided by clinic staff. Further research is needed to explore potential impact of program factors on effectiveness.

9.8.3.1 Provider Capacity

Although MMT service providers standardly receive related MMT training prior to and after the opening of the MMT clinics, their knowledge and skills in addiction treatment and clinic management may be inadequate. A range of studies have suggested that misunderstanding about the goals of MMT as well as confusion regarding treatment for clients concurrently on treatment for comorbid conditions such as HIV, HCV, tuberculosis, or mental illness may negatively impact methadone prescribing practices and, ultimately, retention. Studies have also documented job dissatisfaction among MMT providers and negative attitudes toward clients, both of which can cause service quality and client retention to suffer. Furthermore, providers have provided feedback on lack of sufficient training, understaffed clinics, high staff turnover rates, unmanageable workloads, lack of respect from fellow medical professionals in other specialties, and concerns for malpractice liability, personal safety, and burnout (Li et al. 2013; Lin et al. 2010).

Good client-provider relationships are known to be correlated with long-term retention and the positive outcomes. Unlike patients in hospitals or medical clinics, MMT clients come to clinics routinely, every day, for a short time to receive their methadone dose. Unless special counseling or consultation sessions are scheduled, providers normally interact only briefly with clients. Thus, the short, perfunctory nature of the typical client-provider interaction during MMT administration can become a barrier to effective development of rapport. One study in China has found that providers with strong negative attitudes were less likely to interact with their clients, suggesting that providers' general attitudes toward drug users could strongly influence client perceptions of service quality and thereby retention (Li et al. 2012).

Clearly, there is a need for building capacity among MMT service providers and for addressing issues related to job satisfaction in order to improve service quality (see Chap. 27 for more information).

9.8.3.2 Ancillary Integrated Services

An emerging body of research both internationally and in China has suggested that substance use treatment programs could be a platform for assisting drug users who have HIV infection with overcoming the many barriers they face with respect to linkage and retention in HIV care. Moreover, MMT clinic-based ART services may be an effective strategy to promote treatment adherence, encourage follow-up visit attendance, and achieve improved outcomes for this extremely vulnerable population. Because MMT clients are regularly in contact with the health system for daily administration of methadone and receive ongoing counseling on risk behavior reduction and the importance of treatment adherence, MMT clinics offer a unique opportunity for drug users to also receive HIV-related diagnostic, treatment, and follow-up services. A small, preliminary study suggests that MMT clients with HIV infection would accept integrated MMT/ART services but note concerns about privacy and confidentiality as well as service provider training and experience (Lin et al. 2017). More study will be required to develop a service model that makes sense and can be effective in China setting, and capacity building among staff will be crucial (see Chap. 13 for more information).

9.9 Conclusion

Since the reemergence of drug use and the identification of the initial outbreak of HIV among injecting drug users, China has taken an active, pragmatic approach in response, resulting in a substantial decline in HIV epidemic among this population. The rapid nationwide scale-up of MMT has been the cornerstone of the response to the epidemic among PWID. To maintain China's successes in controlling the epidemic among PWID, the National MMT Program must be strengthened to fill service gaps and meet the evolving needs of clients. Future efforts must address low program coverage, poor retention, and uneven service quality, and research is needed to inform the implementation of solutions to these problems as well as the addition of ancillary and integrated services such as ART.

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National Needle and Syringe Exchange Program

10

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Abstract

The development of needle and syringe exchange programs (NSPs) in China can be divided into two stages: the pilot (1997–2003) and the expansion (2003 to the present). During this time, the national approach to NSP transitioned from absolute prohibition to the publicly funded provision of these services for people who inject drugs (PWID) in areas without methadone maintenance treatment (MMT). While NSP has shown effectiveness at reducing HIV transmission and injection behaviors, there are implementation challenges to be addressed. Currently, there is limited coverage of ancillary services provided through NSP, insufficient provision of high-quality clean needles and syringes, lack of civil society involvement, discrimination, stigma against PWID, and difficulties in managing peer educators. Proposed recommendations include intensified advocacy for NSP targeted toward relevant government departments, merging of redundant NSP sites, strengthened quality control of NSP, increased provision of female-friendly services, and more rigorous evaluation of NSP effectiveness. The Chinese government has made significant progress in the evolution of NSP policy and has gained significant experience through research and practice. In conjunction with MMT services, NSP can contribute to the control of HIV transmission among PWID, and there is evidence in favor of further program expansion.

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10.1 Introduction

This chapter will provide an overview of needle and syringe exchange programs (NSPs) in China as for people who inject drugs (PWID). NSPs are defined as "a legal harm reduction strategy to promote and increase the… availability and accessibility of sterile needles and syringes, using peer influence or other types of information and education strategies to promote these items, and to discourage the practice of sharing used injecting equipment among [PWID]" (Yap et al. 2002).

10.1.1 Historical Overview of Drug Use and HIV/AIDS in China

10.1.1.1 The First (1839–1842) and Second (1856–1860) Opium Wars

The use of opium in China started as early as the seventh century for medicinal and recreational purposes, and in the seventeenth century, Europeans introduced the practice of mixing opium with tobacco for smoking (Ebrey 2010). In the eighteenth century, the strong demand for Chinese tea drove large trade imbalances which favored China over European nations, including Great Britain. The British had colonized India and controlled its poppy fields. With the rise of opium/tobacco smoking in China leading to an increased demand for opium, the British sold opium to Chinese drug smugglers, thus ameliorating its trade problems.

As an increasing proportion of China's population became dependent on opium, this sowed discord in China's civil society and economy. Chinese authorities counteracted these growing problems by issuing increasingly strict bans on opium imports. Following the first edicts of 1729 and 1799, the Chinese Emperor decreed even more stringent laws against the importation and sale of opium in 1814 and 1831 to little effect. Opium dependency was widespread and affected many of the country's high-ranking government leaders and military officers. Corruption became rampant during this period. With the growing number of citizens addicted to opium, the Daoguang Emperor took drastic steps to prohibit all opium trade in China. Court officials who advocated suppression superseded rival officials who supported legalization and taxation. In 1838, the Emperor sent Lin Zexu, a high-ranking scholar-official to Guangdong province, which was a major opium trading center. Upon his arrival, Lin arrested Chinese dealers and attempted to persuade foreign merchants to exchange their opium supplies for tea. When the foreign sellers did not comply, Lin forcefully seized and destroyed over 1.2 million kg (2.6 million lbs) of opium.

These actions prompted a series of events instigating the First Opium War, which lasted from September 1839 to August 1842. The war ended with a British victory and the signing of the Treaty of Nanking, the first in a series of "Unequal Treaties." The Treaty of Nanking committed the Chinese to permitting free trade in opium, opening five ports to foreign merchants, ceding Hong Kong, and paying reparations. China suffered humiliating defeats in the First Opium War (1839–1842) to Britain

and the Second Opium War (1856–1860) to Britain and France. By the end of the second war, having been occupied by foreign forces, China lifted the remaining restrictions on opium imports.

As a result of the treaties, China was forced to legalize of the opium trade. Opium dependence was widespread for most of the next century. In the early 1900s, scholars estimated that China was home to 21.5–25 million opium users, including nearly one in four men (Tibke 2017). For a more in-depth discussion of the history and aftermath of the opium wars, recommended books include "Imperial Twilight: The Opium War and the End of China's Last Golden Age" by Stephen R. Platt and "The Opium Wars: The Addiction of One Empire and the Corruption of Another" by Frank Sanello and William Travis Hanes.

10.1.1.2 Opium After the Founding of the People's Republic in 1949

Led by Mao Zedong, the People's Republic of China was established in 1949. At the time, there were more than one million hectares of opium poppy growing in China and approximately 20 million opium users, accounting for 4.4% of the population. This proportion was as high as 25% in Yunnan province and 22% in Guizhou province (Zhang et al. 2004). The central government detained millions of drug users, executed dealers, and replanted opium-growing areas with new crops. On February 24, 1950, Premier Zhou Enlai issued a decree on the "prohibition of opium production, trade and consumption." Opium control committees were established at multiple levels of government, starting at the county level. Four major national actions were implemented to achieve total prohibition of drug use: (1) registering opium users and seizing opium supplies, (2) setting up detoxification stations, (3) eliminating poppy cultivation, and (4) handing down draconian punishments for those convicted of trading drugs. Emphasis was placed on antidrug trafficking.

Additional efforts were developed and implemented in in southwest China, where opium use was higher. The "Regulation on Drug Control" was issued on May 1950 with the following targets:

1. Closure of all "opium dens," confiscation of the properties, smoking paraphernalia and drug supplies, and punishment of owners with severe sentences, including capital punishment.
2. Prohibition of drug transportation and selling.
3. Education and rehabilitation of opium users, both voluntary and coerced.
4. Policy of "relief by production" for poppy-growing regions, wherein local governments assisted farmers in growing alternative crops with the condition that the farmers would need to repay the government after the harvest.

Through these measures, poppy cultivation was nearly eliminated in southwest China by 1951. Many drug traffickers were sentenced to death in Xi'an, Chengdu, Chongqing, Kunming, and other major cities. Large quantities of opium were

burned in public. Through these measures, the newly established government sought to wipe out centuries of drug use in only 3 years. In 1953, China asserted that it had become a "drug-free nation" (Zhang and Chin 2015).

10.1.1.3 Opioid Trafficking and the Start of China's HIV/AIDS Epidemic

China implemented major economic reform through the open-door policy in late 1970s, which had profound consequences for illicit drug use. A more permissive flow of goods between China and neighboring countries allowed opioid trafficking routes to emerge. China borders two major heroin-producing regions: the Golden Triangle (Myanmar, Laos, and parts of Thailand) along the southwest border and the Golden Crescent (Afghanistan, Iran, Pakistan) along the western border.

The Golden Triangle, particularly Myanmar, has been a major center of opium poppy cultivation (Chalk 2000). By the mid- to late 1980s, principal drug trafficking routes crossed from Myanmar into Yunnan province and from Vietnam into Guangxi province. The drugs were transported over inland routes passing through Sichuan, Guizhou, Gansu, Guangdong, and, less commonly, Xinjiang (Qian et al. 2006). The final destinations were usually North America, Australasia, and Northeast Asia (Chalk 2000). While most was export to other countries, the domestic demand for opioids also grew. In 1991, the number of drug users registered with public security was 148,000, a figure which rose quickly to 520,000 by 1995 (Li and Li 2013).

As has been seen in other countries, the channels for moving opioids are physical determinants of the spread of the HIV/AIDS epidemic (Rhodes et al. 2005). Using molecular epidemiology, researchers were able to link HIV subtypes to specific trafficking routes and pinpoint the flow of drugs through southern China (Beyrer et al. 2000). The first HIV outbreak in China was identified in 1989 among PWID in the city of Ruili in Yunnan province, which lies along the border with Myanmar (Ma et al. 1990). Numerous studies from the early 1990s warned that high needle sharing among PWID was the source of rapid HIV transmission and suggested prevention efforts, such as encouraging PWID to sterilize needles by bleaching (Wu et al. 1996; Xia et al. 1994; Zheng et al. 1994; Zheng 1991).

By 1995, HIV prevalence among PWID in Yunnan had risen to over 20%, and 12 of the 17 prefectures reported at least one case of HIV infection (Chen et al. 1996; Lu et al. 2004; Xiao et al. 2007). Nationally, only one of eight national sentinel sites for PWID reported HIV cases in 1995, but this low prevalence did not hold. Two years later, three of 22 surveillance sites reported an average of 6.6% prevalence among PWID (Qian et al. 2006). From there, the HIV epidemic in China spread quickly over the next 5 years. By 2002, all 31 provinces, autonomous regions, and municipalities on mainland China reported HIV infections among PWID, and individual sites started to report alarmingly high HIV prevalence in this population, including 14% in Jiangxi, 16–20% in Sichuan, 17–19% in Guizhou, and 15–20% in Hunan (Qian et al. 2005). Throughout the 2000s, the national average HIV prevalence among PWID hovered around 10% (Zhang et al. 2013).

10.2 Overview of Needle and Syringe Exchange Programs

To address the dual epidemics of injection drug use and HIV/AIDS, China was pushed to adopt public health strategies. A number of countries had set up opioid substitution treatment programs as well as NSPs. The first NSP was started in Amsterdam, The Netherlands, in 1984 to control the spread of hepatitis B and was soon followed by initiatives in other countries (Heimer et al. 1998; Lurie et al. 1998; Strathdee et al. 1999). In the 1980s and early 1990s, the rise of the HIV epidemic among PWID motivated a more widespread adoption of harm reduction programs, including NSPs. Out of the urgent need to curb drug-related behavior and crime, China followed suit in establishing methadone maintenance treatment (MMT) clinics and NSPs (see Chap. 9 for more information). As of 2018, NSPs operate in 86 countries (Stone and Shirley-Beavan 2018).

NSP is a social service based on the pragmatic principle of harm reduction, which is aimed at minimizing negative consequences associated with drug use (Marlatt 1996). At NSP sites, PWID may obtain clean hypodermic needles and associated injection equipment for free or at a non-prohibitive cost. Many programs are called "exchanges" because some programs require exchanging used needles for an equal number of new needles in order to encourage the safe disposal of used equipment. Access to sterile needles and syringes are considered a standard component of a comprehensive HIV prevention program for PWID. The international acceptance of NSPs is indicative of a practical approach to HIV prevention and an endorsement of public health evidence, which is conclusive that NSPs do not encourage drug use and that needle exchanges can be effective in reducing HIV incidence (Fernandes et al. 2017; Smith et al. 2012).

NSP is strongly endorsed by the World Health Organization (WHO). There is well-established evidence that HIV transmission through blood may be effectively averted through needle exchanges as these programs empower PWID to protect themselves and others from HIV (Aspinall et al. 2014; Fernandes et al. 2017; UNAIDS 2010). NSP may also reduce hepatitis C infection, although the research on this is inconclusive (Fernandes et al. 2017; Platt et al. 2017). By offering an accessible alternative to needle sharing, HIV transmission within PWID communities can be brought under control. Other data show that NSPs help people stop drug use through referral to drug treatment programs (Lurie et al. 1993). With sufficient coverage, NSPs in low- and middle-income countries can reach similar effectiveness at reducing HIV transmission as NSPs in high-income countries (Des Jarlais et al. 2013).

There is also widespread research showing that NSPs are cost-effective (Lurie et al. 1998; Wodak and Cooney 2006; Zhang et al. 2011). Wilson et al. (2015) estimated that the operation of NSPs cost $23–71 per person per year. Compared to the costs of providing a lifetime of antiretroviral therapy (ART), NSP is an extremely inexpensive intervention, and this finding has been reaffirmed by studies in countries across a spectrum of financial and geographical settings. Each infection averted through NSP implementation can save significant public health resources.

10.3 History of Needle and Syringe Exchange Programs in China

10.3.1 Evolution of Policies

The Chinese government issues national statements to lay out its priorities and to establish multiyear action plans for HIV prevention and control. China's policies toward harm reduction—particularly NSPs—have evolved dramatically over the past two decades (Hammett et al. 2008). Recent national policies have specifically stated official support for the provision of NSPs (see Table 10.1). In the action plan for 2001–2005, NSPs were explicitly noted as implementation aims: "Needle and syringe social marketing will be actively conducted. Clean needle and syringe usage will be promoted" (The State Council 2001). This was followed by a speech

Table 10.1 Official policies or statements on NSP

Year of issue	Policy or statement	Main messages
2001	China HIV Prevention and Control Action Plan (2001–2005)	"Data show that the HIV epidemic in China is still very severe. The HIV and sexually transmitted infection pandemics progress rapidly…The trend of HIV transmission among people who inject drugs continues to rise…Needle and syringe social marketing will be actively conducted. Clean needle and syringe usage will be promoted. The harmful aspects of HIV transmission through sharing injecting equipment will be decreased"
2004	Wu Yi, vice-premier, speech on promoting HIV prevention and control	"Pilot needle and syringe exchange programs implemented in recent years has been proved to be effective. It should be unswervingly scaled up in the future to prevent further HIV transmission among injecting drug users"
2006	China's Action Plan for Reducing and Preventing the Spread of HIV (2006–2010)	"…[To] scale-up needle and syringe exchange programs to reduce HIV transmission among drug users…clean needles and syringes should be provided to no less than 50% of injecting drug users in areas with needle and syringe exchange programs by the end of 2010"
2006	Regulation for HIV Prevention and Treatment	"[Aim:] to carry out behavioral interventions for groups vulnerable to HIV infection through high-risk behaviors"
2010	Announcement of the State Council on Strengthening HIV Prevention and Control	"[Public health officials] should continuously implement needle and syringe exchange programs to reduce HIV transmission among injecting drug users"
2012	China's 12th Five Year Action Plan for HIV Prevention and Control	"Comprehensive intervention measures should be implemented among drug users…[including] continuously implementing needle and syringe exchange programs in areas without methadone maintenance treatment services"
2017	China's 13th Five-Year Action Plan for HIV Prevention and Control	"Continuing to reduce HIV transmission among people who use drugs… continuously implementing needle and syringe exchange programs in areas without methadone maintenance treatment services"

in 2004 by State Council Premier Wu Yi: "Pilot needle and syringe exchange programs implemented in recent years has been proved to be effective. It should be unswervingly scaled up in the future to prevent further HIV transmission among injecting drug users" (Wu 2004). The 2006–2010 action plan stated that it was necessary to "scale-up needle and syringe exchange programs to reduce HIV transmission among drug users" and that "clean needles and syringes should be provided to no less than 50% of injecting drug users in areas with needle and syringe exchange programs by the end of 2010" (The State Council 2006a). Further State Council documents that have explicitly supported NSPs as effective intervention measures have been published in 2006 and 2010 (The State Council 2006b, 2010). Similar recommendations of NSP also appeared in the latest action plans—notably, China's 12th and 13th Five-Year Action Plan for HIV Prevention and Control states that "comprehensive intervention measures should be implemented among drug users [and] continuously implement needle and syringe exchange program in areas without methadone maintenance treatment services" (The State Council 2012, 2017).

At the provincial level, Guangxi, Yunnan and Xinjiang have led the way in strengthening harm reduction interventions (Hammett et al. 2008). Despite the established science showing the effectiveness of NSP and other harm reduction services, China's support for NSP should not be taken for granted. China's embrace of a harm reduction strategy has required years of painstaking educational and collaborative efforts between multiple governmental agencies with competing priorities (Hammett et al. 2008). Significant investment of political capital is needed to successfully establish and scale up NSPs, often in an environment of public misunderstanding. Harm reduction in many other countries continue to face entrenched opposition (Stone and Shirley-Beavan 2018). In 2018, NSPs operate in only 86 countries, less than half of the 179 countries reporting injecting drug use (Stone and Shirley-Beavan 2018).

10.3.2 Pilot Programs and Initial National Expansion

The first NSP in China was started in 1998 as a pilot program in Longchuan county, Yunnan province (Li and Li 2013). The program provided approximately 300 clean needles and syringes to PWID. An initial evaluation on acceptability found that the program was received positively among PWID, which was an encouraging sign for further program development. A larger second acceptability and feasibility study was conducted a year later (Yang et al. 2003). From August 1999 to September 2001, researchers from the Yunnan Institute for Drug Abuse studied the acceptance and feasibility of NSPs at three clinics. Over the course of 2 years, clean needles and syringes were made available to PWID who visited the clinics. Focus group discussions and in-depth interviews revealed high acceptability by PWID and their relatives (Yang et al. 2003). However, some resistance from the clinic staff was noted. Clients were not followed through the study so changes in needle-sharing behavior could not be measured.

In 2000, the National Center for AIDS/STD Control and Prevention (NCAIDS), Chinese Center for Disease Control and Prevention (CDC), conducted a study in Guangxi province (Ming et al. 2005). Health workers and peer educators provided clean needles and syringes, collected used injection equipment, disseminated health education pamphlets, and provided face-to-face health counseling for 1 year. PWID completed questionnaires on HIV risk and injection practices behaviors before after the pilot intervention. In 1 year, the program was able to halve the number of PWID reporting needle sharing from 60.6% at baseline to 30.3% at the end.

To evaluate the effectiveness of NSP in China more rigorously, NCAIDS researchers launched a prospective community-randomized HIV prevention trial in 2001 (Wu et al. 2007). Four counties and townships in Guangxi and Guangdong provinces were selected with one randomized to intervention and the other to control in each province. An NSP program, including promotion of safe injection norms and increased access to clean needles over a 12-month period, was provided to PWID. Cross-sectional surveys at baseline and follow-up compared changes in drug-using behaviors and HIV and HCV incidence in the intervention and control communities. The results revealed that needle-sharing behaviors were similar in the two groups at baseline (68.4% vs. 67.8%), and dropped significantly to 35.3% in the intervention community and remained relatively stable in the control community (62.3%) after a 12-month intervention.

The first bilateral cross-border intervention to include Chinese PWID was supported by the US National Institutes of Health and the Ford Foundation and led by an international team of experienced researchers. The intervention used peer educator outreach to facilitate a large-scale distribution of sterile needles and syringes, ampoules of sterile water, and condoms (Des Jarlais et al. 2007; Hammett et al. 2012). Starting in 2002, implementation took place at five sites in Lang Son province, Vietnam, and four sites in Ning Ming County, Guangxi province, China, and in each country, an average of 10,000–15,000 needles and syringes were distributed per month. The intervention yielded drastic reductions in HIV prevalence as measured by serial cross-sectional surveys: compared to baseline, HIV prevalence and incidence fell by approximately half after 2 years and by three quarters at 3 years in both countries (Table 10.2).

These early pilot programs showed promise for the feasibility and acceptability of NSP in China (Lin et al. 2004; Yap et al. 2002). Program officials and local stakeholders gained valuable knowledge on the implementation of NSP. The Chinese central government has designated special annual funds for HIV prevention since the

Table 10.2 Pilot studies of NSPs in China

Author	Project area	Date
Wu ZY (Li 2006)	Longchuan, Yunnan	1998
Ming ZQ (Ming et al. 2005)	Tiandong, Guangxi	2000–2001
Yang F (Yang et al. 2003)	Kunming, Yunnan	1999–2001
Wu ZY (Wu et al. 2007)	Guangxi, Guangdong	2001–2003
Hammett TM (Des Jarlais et al. 2007; Hammett et al. 2012)	Ningming, Guangxi; Lang Son and Ha Giang, Vietnam	2002–2003

early 2000s. The Chinese Ministry of Health (which has been superseded by the National Health Commission) launched the China Comprehensive AIDS Response Program (China CARES) starting in 2003, covering a total of 127 counties (Han et al. 2010). Fifty-eight out of 127 counties named the prevention of HIV transmission among PWID as a core issue, signaling a prioritization of harm reduction measures. Officials established MMT programs in counties with more than 500 registered drug users and NSP services in counties with lower than 500 registered drug users. By the end of March 2008, over 250 NSP sites had been established across 50 counties and had served over 45,000 PWID (Wu 2008). Following the approach set by the UK project, NSP included fixed and mobile services. Furthermore, new models of NSP were adapted for local contexts, including services at health institutions at subcounty (i.e., village and township) administrative levels. These new delivery models allowed NSP to be more flexible, tailored, and accessible for local PWID populations (China Comprehensive AIDS Response Program office 2009).

10.3.3 International Cooperation

Through much of the 2000s, expansion of NSP access in China was facilitated through support from international programs (Wu et al. 2011). Several major programs are discussed below: World Bank Loan Health Nine Project-HIV/STD Prevention and Control, China-UK HIV Prevention and Care Project, China-Australian Agency for International Development HIV Asian Regional Program in Guangxi Autonomous Region and Yunnan Province, and the China-Australia HIV Prevention and Care Program in Xinjiang Uyguar Autonomous Region.

The World Bank Loan Health Nine Project-HIV/STD Prevention and Control was supported by the World Bank from July 1999 to June 2008. One of the primary goals of the project was to achieve improved prevention and control of HIV/AIDS, other sexually transmitted, and other blood-borne infections by "implementing comprehensive and multi-sectoral public health programs at the provincial level, and by building technical capacity at the central level" (World Bank 2009). The program sought to develop a series of innovative, replicable, and cost-effective measures for HIV/STD prevention and control at the national level as well as four provinces with high HIV burdens: Fujian, Guangxi, Shanxi, and Xinjiang.

With the support of the Health Nine Project, China made several substantial advancements in NSP scale-up. In 2004, experts developed a manual to standardize the implementation of NSP based on experiences from China's pilot programs. The manual was distributed to sites across China. The Health Nine Project also held workshops to put together different stakeholders and program officials to increase communication across sites. A harm reduction workshop among drug users was held in Sichuan province in 2003. A conference on harm reduction in Sichuan province in 2003 was the first professional workshop on interventions for PWID in China, and it was attended by delegates from six provinces, including Sichuan, Guangdong, Guangxi, and Xinjiang. A related workshop on HIV prevention services for PWID was held in Xinjiang in 2005. This brought together provincial

health officials sixteen provinces to share perspectives and evidence on best practices among drug users for scaling up programs, including NSP (Wang et al. 2008).

Other ongoing programs were supported through bilateral funding, most notably from the United Kingdom's Department for International Developent (DFID) and Australia's Agency for International Development (AusAID). The China-UK HIV/AIDS Prevention and Care Project ran from August 2000 to June 2006 in Yunnan and Sichuan provinces with the aim of building scalable treatment and care interventions and to increase technical capacity of HIV response infrastructure. A major component of the UK project was the training of peer educators to disseminate knowledge on HIV prevention among PWID (Project Office of China-UK HIV/AIDS Prevention and Care Project 2006). The first NSP supported by the UK project was initiated in March 2002; by the end of the project, NSP had been implemented in 17 counties in Sichuan and 19 counties in Yunnan. In urban areas, fixed-site NSPs were established at easily accessible sites, while mobile NSPs were created for rural areas. Staff assigned to mobile NSPs included peer educators who undertook fieldwork to identify PWID in need of services. The implementation of these two NSP models increased acceptability and further expanded coverage of NSP.

AusAID also sponsored key NSP projects. The China-AusAID HIV/AIDS Asian Regional Program ran from July 2002 to June 2012. An objective of the project was to reduce HIV transmission by providing a community-based comprehensive intervention among PWID in Guangxi and Yunnan, which had the most serious drug epidemic in China. NSP was implemented in all of the six project counties in Guangxi and 19 project counties in Yunnan. More than 20,000 PWID received clean needle and syringes from the project and about 16,000 PWID were referred to MMT, ART, or HIV testing (Project Office of China-Australian Agency for International Development HIV/AIDS Asian Regional Program 2012).

AusAID also supported a China-Australia HIV Prevention and Care Program in Xinjiang from March 2002 to February 2009 (Zeng 2006; Wu et al. 2011). The program was implemented in four counties in Xinjiang with the aim of reducing needle sharing. An estimated 4000 PWID were involved in the program. More than 2500 PWID were referred to either HIV testing, ART, or MMT. The final evaluation survey indicated that proportion of needle sharing was reduced to 12%. The NSP in Xinjiang has been lauded by the HIV special ambassador of the secretary-general of the United Nations and experts from the WHO (Xinjiang Autonomous Region Center for Disease Control and Prevention 2008).

The Global Fund AIDS Program Round Four was approved under these circumstances in 2005. The aim of the project was to reduce HIV transmission among PWID and FSW through intervention measures including health communication campaigns, voluntary counseling and testing, MMT, NSP, condom promotion, STI management, and ART. The target areas included 76 counties from seven provinces with high levels of drug use—Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Xinjiang, and Yunnan. More than 110 NSP sites were established supported by the project (Office for Global Fund AIDS Program Round Four 2010) (Tables 10.3 and 10.4).

Table 10.3 Internationally supported HIV response programs in China

Project name	Project area	Date
World Bank Loan Health Nine Project—HIV/STD Prevention and Control (World Bank 2009)	Guangxi, Xinjiang, Fujian, Shanxi	1999–2008
United Kingdom's Department for International Development (DFID) (Project Office of China-UK HIV/AIDS Prevention and Care Project 2006)	Yunnan, Sichuan	2000–2006
Australia's Agency for International Development (AusAID) (2006)	Xinjiang	2002–2009
China-AusAID HIV/AIDS Asian Regional Program (Project Office of China-Australian Agency for International Development HIV/AIDS Asian Regional Program 2012)	Yunnan, Guangxi	2002–2012
Global Fund AIDS Program Round Four (Office for Global Fund AIDS Program Round Four 2010)	Seven provinces: Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Xinjiang, and Yunnan	2005–2010

Table 10.4 Programs supported by the Chinese government

Project name	Project area	Date
China Comprehensive AIDS Response Program (China CARES) (Han et al. 2010)	28 provinces, 127 counties	2003–2008
Central government special funds	31 provinces in China	2004–2012

10.3.4 Current NSP Status

In China, the drug user population is approximately 2.5 million; among these individuals, around 40% use opiates (Degenhardt et al. 2017; National Narcotics Control Commission 2016). For centuries, the most widely used class of illicit drugs was opioids—specifically opium and heroin—but in the mid-2010s, synthetic drugs, such as crystal methamphetamine and ketamine, rose sharply in popularity (Zhang and Chin 2015). In China, at the latest count in 2017, 12 provinces had implemented NSP with a total of 741 sites. These sites distributed 11 million needles to over 56,000 PWID, making China one of the highest distributors of needles in Asia (National Health and Family Planning Commission 2015; Stone and Shirley-Beavan 2018). The number of approximately 200 needles and syringes per attendee per year has been consistent since 2008 (Stitzer 2006).

NSP is effective in achieving reductions in HIV transmission in China. Evidence indicates that both HIV and HCV incidence can decrease after the establishment of an NSP intervention in China (Wu et al. 2007). This finding is consistent with multiple subsequent reports that PWID who had ever used NSP services were significantly less likely to have HIV infection, compared with those who had never used NSP services (Luo et al. 2013; Wu et al. 2017). Overall, there is compelling evidence that NSP significantly reduces needle-sharing behavior among PWID in China (Bao et al. 2007; Chen et al. 2007; Ma 2004; Qu et al. 2006; Xia et al. 2009; Xue et al. 2011).

Table 10.5 Types of NSP sites in China

Mode	Service orientation	Staff
Center for Disease Control and Prevention (CDC)	Drop-in, outreach	CDC health worker, peer educator
Community health service center	Drop-in	Doctor, nurse
Township hospital	Drop-in	Doctor
Village clinic	Drop-in, outreach	Village doctor
Pharmacy	Drop-in	Pharmacy staff

There are several models of NSP service delivery adopted across China. Services may be managed and located at a range of venues: CDCs, community health service centers, township hospitals, village clinics and pharmacies. NSPs managed and staffed by the local CDC are the most common and are usually housed at the same physical site. In many counties, clean needles are also available at pharmacies for legal purchase. Clients can travel to an NSP service site to obtain clean needles. Alternatively, some NSPs have staffs, clinicians, or peer educators who make visits to homes and to areas where PWID tend to congregate (Table 10.5).

The most effective NSPs have several shared characteristics:

1. Establishing multi-sectoral cooperation across different governmental divisions: health department, public security bureaus, narcotics control divisions, and local community organizations.
2. Conducting a comprehensive needs assessment prior to program initiation to better understand the needs of the local PWID.
3. Providing a range of services to supplement needle and syringe exchange, such as counseling, condom distribution, and referrals to MMT.
4. Adapting NSP models based on the geographical distribution of the clients.
5. Engaging peer educators who are at the core of recruitment of PWID, distribution of clean needles and syringes, and collection of used needles and syringes.

10.3.5 Relationship Between MMT and NSP

NSP and MMT have both been effective intervention measures in reducing HIV prevalence and incidence in China (see Chap. 9 for information). However, these two services have been met with unequal public receptions. MMT has attracted more attention and is much more favorably received by the public compared to NSP. As a biomedical intervention, MMT is more easily understood by the public and allows people to better conceptualize drug dependence as a complex disease, rather than a moral failing. While MMT can directly facilitate the cessation of opioid use, clients who attend NSP still continue to actively use drugs, and this leads to a common misconception that providing free or subsidized injection equipment suggests tacit government consent toward drug use (Koo et al. 2015).

Both NSP and MMT are key components of a comprehensive harm reduction package for PWID. There is long-standing evidence that engagement in NSP can promote enrollment in MMT, which is a strong argument in favor of NSP implementation (Hagan et al. 2000; Strathdee et al. 1999; Wodak and Cooney 2006). The provision of NSP—both independently and in conjunction with MMT—has a critical role in HIV prevention. NSP can address several weaknesses of MMT. First, MMT clinics require a heavier investment of time, money, and workforce training. There are also legal restrictions on the locations of MMT clinics and the availability of methadone (Disease Control Bureau 2006). MMT clinics require highly trained staff members who are familiar with the clinical management of methadone dosage, including the relationship to overdose (Marienfeld et al. 2015). Particularly in rural areas, it may be difficult to accumulate enough financial and human resources support. Where MMT clinics cannot be feasibly established for logistical or cost-effectiveness reasons, NSP can fill a gap in HIV prevention services. Furthermore, MMT programs often struggle with high rates of active drug use during MMT as well as attrition from treatment. Current or previous MMT clients who continue to inject drugs can still utilize NSP to decrease the risk of HIV and HCV transmission. NSP can also maintain a degree of connection between clients and the harm reduction infrastructure. Finally, there are also some PWID who refuse MMT out of a fear of being identified by government officials. NSP may be an acceptable alternative to these clients because no real-name identification is required to obtain or exchange needles.

10.4 Challenges

A multifaceted range of challenges affect NSPs, and some are described below. While some are unique to China, others are universal barriers to NSP implementation.

10.4.1 Decreased Support from International and Local Nongovernmental Organizations (NGOs)

As described above, international cooperation has had an instrumental role in scaling-up of NSP in China by providing financial support, technical capacity, and training. Major funding has been provided by the World Bank, the UK's DFID, AusAID, and the Global Fund (Liu et al. 2007). In recent years, with China's increasing economic power, international organizations have withdrawn or successively decreased their HIV-related grants to China. Funding from DFID, World Bank, and AusAID ended in 2006, 2008, and 2012, respectively. Most notably, the Global Fund withdrew its aid to China at the end of 2012, which prompted a transition period for China's HIV funding strategy. NSP have a more uncertain future in China because of the loss of international funding; moreover, the loss of technical support has also posed a challenge to the sustainability of NSP. While the Chinese central government continues to fund NSP, the cumulative annual amount has dropped

markedly, which has been reflected in a reduction of NSP sites. The decentralization of the Chinese health system also means that support for NSP is highly variable across local governments, fluctuating based on the level of regional economic development and government officials' attitude toward NSPs. In addition, as sexual transmission has become the predominant HIV transmission mode in China, health officials and staff in some areas that formerly dealt with a dual epidemic of drug abuse and HIV have felt that China's HIV response should be reorienting priorities and shifting resources toward other key risk populations, particularly men who have sex with men.

Although roughly half of NSPs in China were funded by international organizations, the majority of NSPs are run or implemented primarily by the China government agencies and with little involvement from domestic NGOs. However, local NGOs have their own unique strengths that allow them to implement NSP effectively, which have not been sufficiently leveraged. NGOs work on the ground and have intimate links with drug users, instilling trust in their clients in this service. NGOs' active involvement in implementation should be increased to complement government-run NSP sites.

10.4.2 Conflicts with Public Security

Although support for harm reduction including NSPs has been written into national and provincial policies, there is resistance from some government divisions. A major barrier to NSP implementation is the lack of support from public security officials; in a national survey, two-thirds expressed negative attitudes toward NSP (NCAIDS 2011; Zhang et al. 2015). In a separate qualitative study, officers from the Narcotics Division of Public Security in Hunan province were interviewed (Koo et al. 2015). Although the Narcotics Division has joint responsibility (with the CDC and the health bureau) for coordinating NSPs, 24 of 32 questioned the legitimacy of NSPs, and 16 thought that NSPs encouraged ongoing drug use. This degree of hostility toward NSPs is a clear impediment to the stated public health aims.

Local public security staff are known to harass and arrest NSP attendees. Police in China are authorized to place drug users in involuntary detention for up to several months (Huang et al. 2011). Thus, as might be expected, most PWID are fearful of being arrested if police see them at an NSP site (Sullivan and Wu 2007). However, despite China's scaled-up network of compulsory detoxification centers, there is no compelling evidence that enforced rehabilitation yields positive health outcomes (Stone and Shirley-Beavan 2018; Sun et al. 2001; Werb et al. 2016). On the contrary, compulsory treatment centers may expose PWID to increased harm if access to HIV testing and treatment is not reliable (Tibke 2017). The current punitive legal framework and unsupportive social environment undermines the confidence of NSP staff and deters PWID from attending NSPs and MMT. Without improved coordination of public health and policing strategies, the full benefits of harm reduction cannot be delivered.

10.4.3 Low Service Coverage

NSPs in China lack adequate coverage to have a maximal impact on the HIV epidemic among PWID. Currently, NSP services are accessed by approximately 56,000 PWID, a figure that has decreased over recent years and represents a minority of Chinese PWID. Approximately 200 needles/syringes per PWID are distributed annually—a figure well short of what is required to curb HIV epidemic (Burrows 2006). In 2016, the WHO revised their recommendation for NSPs to provide 300 needles per PWID per year by 2030, and China will require substantial efforts to meet this target (Stone and Shirley-Beavan 2018).

Services provided at individual sites could also be subpar. Insufficient outreach, peer education, and lack of awareness of NSP may be dampening NSP access, which has been noted in qualitative studies (Philbin and Zhang 2014; Stone and Shirley-Beavan 2018). The majority of the NSPs in China run by local CDCs provide services during normal working hours (Wang et al. 2016). Other delivery services such as mobile vans, vending machines, and night services have demonstrated effectiveness in other countries (Miller et al. 2002; Wood et al. 2003). However, these service delivery strategies are rarely used in China.

The service levels and other components of NSPs vary across the country. The concentration of NSP sites differs greatly across the country, and NSP is completely unavailable in some provinces. Notably, 90% of NSP sites are located in the seven provinces with the highest levels of drug use. Sites are highly variable, which is seen in the number of PWID served and the number of clean needle and syringes distributed, which can range from dozens to thousands per year per person. Furthermore, there are disparities in comprehensiveness of services provided; some stations only provide clean needle and syringes, while others provide supplementary services, including referrals to MMT, ART, and employment opportunities.

10.4.4 Discrimination and Stigma

PWID face high levels of societal discrimination and stigma in their communities. Only one-third of respondents to a national survey had a positive attitude toward NSP (NCAIDS 2011). It was even reported that 30.9% of attendees of NSP reported experiencing discrimination and stigma from NSP site staff, who should be advocates for their clients (Sun et al. 2013). As mentioned above, local public security officers and neighborhood residents often think that NSPs encourage continued drug injection (Koo et al. 2015). Some communities and residents also worry that the establishment of an NSP site would cause PWID to gather and cause neighborhood crime to increase. Even if they tolerate the establishment of a nearby NSP, non-PWID community members rarely became involved in supporting the program. Stigma toward people living with HIV, including PWID, is directly linked to diminished access to HIV care, lower HIV medication adherence, and poorer mental health (Wolfe et al. 2010).

10.4.5 Ancillary Services Provided in NSP Need to Be Expanded

In order to effectively reduce HIV transmission, NSPs in China also should provide ancillary services such as HIV testing and counseling in addition to distributing clean needles and reclaiming used needles. However, despite the need for these additional services, their availability remains very limited. NSP sites should be an important platform for offering comprehensive services and interventions to PWID such as primary medical care, HIV testing and counseling, condom distribution, and overdose prevention. Comprehensive services not only promote the health of PWID but also attract more PWID to be engage with NSPs.

Services should also be adapted for gender sensitivity. The proportion of female PWIDs is much smaller than male PWIDs (15% vs. 85%) (NCAIDS 2011). However, there still needs to be a focus on female PWID needs as they are more vulnerable to acquiring HIV than male PWID due to biological and social vulnerability as well as a high possibility of involvement in sex work to maintain drug use (Hail-Jares et al. 2016; Tang et al. 2015). Furthermore, female PWID are rarely able to inject first when sharing drugs and needles. To date, there are very few harm reduction services that have been tailored specifically for the needs of female PWID.

10.4.6 Management of Peer Educators Needs to Be Strengthened

In China, more than half of NSP attendees received clean needles and syringes and related information through peer educators (Li et al. 2013). The capacity, motivation, input of both the time and energy of peer educators, and their performance have greatly influenced the quality of NSP service (Xia et al. 2009). Accordingly, the management of peer educators is quite important to implementing a successful NSP; however, it is difficult to reliably monitor and evaluate peer educators' performance. The current practice is to measure indicators such as the number of PWID recruited, the number of syringes distributed, the numbers of condoms and educational pamphlets distributed, and the number of referrals to HIV testing and counseling. However, the reliability of these numbers and service quality are hard to validate and properly evaluate.

10.4.7 Distributing Better Syringes

Syringes vary in design. Some are high dead-space syringes (HDSS) which retain substantially more blood—corresponding to a higher possibility of HIV exposure and transmission—than low dead-space syringes (LDSS). Therefore, NSPs should carefully select the type of syringes being distributed. HDSS usually have detachable needles, and fluid is retained in the needle, needle hub, and syringe tip; in contrast, LDSS have permanently attached needles that extend through the syringe tip to the base of the syringe barrel. LDSS only retain fluid in the needle itself. Studies have suggested that HIV transmission among PWID may not occur when

most PWID in an area are using LDSS (Bobashev and Zule 2010). Despite this clear potential reduction in HIV risk, syringes distributed by NSP or sold on the market are almost all HDSS, and LDSS are rarely seen or known. It is necessary to evaluate the potential improvement in effectiveness of replacing HDSS with LDSS at NSPs.

In addition, low-quality needles and syringes provided by NSP might not be used by PWID even if given for free. Currently, at most NSPs in China, syringes are purchased by the provincial health bureau, which often results in only one size and type of needles and syringes being given out. As a result, injecting needs of PWID are often not met, and they may not willing to use the needles and syringes provided, especially low-quality ones. Funding and planning for the purchasing of NSP-distributed injection equipment needs to be flexible and carefully considered with input from local PWID themselves.

10.5 Future Recommendations

First, more advocacy for NSP is needed for relevant government departments to decrease stigma and discrimination, to improve coordination between agencies with competing motives, and to obtain more government support. There needs to be continued support of policies that can create an environment conducive to harm reduction, strengthen government financial support, and develop closer participation by NGOs at NSPs. PWID advocates and policymakers both play important roles, not only for the sustainability and expansion of NSP services but also for capacity building to deliver such services with the ultimate goal of reducing HIV transmission.

Second, some NSP sites in China should be consolidated. The number of NSPs in different provinces varies from none to over a hundred. The number of PWID attending each NSP also varies greatly from a few to hundreds per month. If less-utilized and redundant NSP sites are merged according to the distribution and needs of PWID, the limited available financial and staff support will be more concentrated, and these services can be provided in a more cost-effective way. By pooling site resources, it may be possible to provide additional or improved ancillary services, including services targeted toward female PWID.

Third, the impact of NSP on HIV transmission should be evaluated by a cohort study or serial cross-sectional surveys of HIV prevalence and risk behaviors among PWID. NSP in China has been implemented for years, but rigorous evaluation of its impact on HIV incidence has been relatively limited. Though a number of studies have focused on reductions in needle sharing and increases in condom use and HIV awareness, few studies have examined reduction of HIV infection among NSP attendees (Bao et al. 2007; Chen et al. 2007; Luo et al. 2013; Ma 2004; Qu et al. 2006; Xia et al. 2009; Xue et al. 2011). The available research points to NSP effectiveness, but the lack of large-scale studies demonstrating the impact of NSPs on HIV transmission may have to do with continuing debates on NSP validity and a hostile environment. A rigorously designed study with high enrollment of PWID and/or covering a large geographic region should be planned and implemented to observe the effects of NSP over time. With reliable data, the impact of NSP on HIV

transmission could be evaluated to better align the goals of public health and public security and to create more political buy-in.

Finally, quality control for NSP needs to be strengthened. Local, rather than central, authorities are responsible for the running and managing the NSPs. While the decentralization of NSP has potential benefits (e.g., being more quickly responsive to the specific needs of local PWID), it has also resulted in considerable variability in the performance of sites depending on the level of local government support and staff capacity. As a guiding institution, NCAIDS could provide standardized management, such as developing implementation manuals, providing detailed guidelines, and strengthening supervision of local NSPs.

10.6 Conclusion

NSP is an important component of a comprehensive public health response to the HIV epidemic among PWID. Strong international evidence shows that NSPs are a highly cost-effective approach to significantly decrease HIV prevalence among this population. In China, NSPs have been operating for more than 15 years. The official Chinese government stance toward HIV prevention and harm reduction services, including NSP, have evolved significantly during this time. To its great credit, China's national government has listened to the scientific research community's recommendations and has prioritized the public health benefits of NSP, even when public security bureau and community opinions are wary or at worst, directly hostile. Experiences and lessons for operating successful NSPs have been earned through research and practice. Although many challenges still exist, there is no doubt that individuals have directly benefited from this service and will continue to do so. The goal of controlling HIV transmission among PWID can be achieved through NSP, especially in conjunction with MMT and HIV services. At a time when expansion of NSPs is urgently needed around the world, we hope that China's experience can offer valuable insight for other countries investing in NSP scale-up.

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HIV Education: Raising Awareness and Increasing Knowledge

11

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Abstract

HIV education has been a key component of China's national HIV/AIDS response since the early days of the epidemic. This chapter describes the context of health education campaigns in response to HIV and how these campaigns have targeted different groups, such as government officials, and different channels, such as mass media and public spaces. The use of goodwill ambassadors and events centered around World AIDS Day have been important means of raising awareness and ensuring celebrities and top government officials alike work to draw attention to the HIV response effort, raise awareness of HIV, and help to drive improvements in HIV knowledge so that a more supportive environment can grow and HIV-related stigma and discrimination can be eliminated. The chapter also focuses on HIV education campaigns targeting key affected populations, measurement of effectiveness of China's HIV educational efforts, and remaining challenges in the area of communications, raising awareness, and improving knowledge of HIV and its prevention and treatment.

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11.1 Context of Health Education Campaigns in Response to HIV

11.1.1 The Importance of Raising HIV Awareness

Generally, awareness around HIV in China remains low. Specifically, awareness of risks for HIV infection, prevention of HIV infection, and HIV testing and treatment are low, as well as awareness of the rights of people living with HIV (PLWH) and the importance of addressing stigma and discrimination.

Studies conducted among the general public, as well as among key affected populations (KAPs), demonstrate that perception of risk of infection and understanding of transmission routes remain low. Consequently, risk behaviors are persistently prevalent in many contexts, uptake of HIV voluntary counseling, testing (VCT) services is insufficient, and understanding of effective prevention methods is suboptimal. A survey of nearly 1300 rural migrants in central China found that despite a high prevalence of risk behaviors, less than 4% considered themselves at risk of HIV infection (Zhang et al. 2012). A study of nearly 900 men who have sex with men (MSM) in Beijing who had unknown or HIV-negative serostatus found that 65% described themselves at low or no risk for contracting HIV infection (Fan et al. 2014). A nationally representative survey on the sexual health of unmarried Chinese youth found that approximately 30% of respondents had not used a condom during their most recent sexual contact, and both HIV/AIDS knowledge and awareness and knowledge of contraceptives were low (Chen et al. 2012). A cross-sectional study of men who have sex with men and women (MSMW) in Chongqing found that while 73% reported having engaged in unprotected anal sex in the past 6 months, only 36% had ever tested for HIV in their lifetimes and only 13% had ever accessed VCT services (Chen et al. 2015).

Lack of awareness around HIV and misconceived fears of infection result in stigma, discrimination, and ostracism of PLWH (Cao et al. 2006). Discrimination is prevalent and manifests itself in various contexts, including institutional settings (Burki 2011; Su et al. 2013). And having negative impacts on the quality of life for PLWH, discrimination, and the fear of discrimination drive people away from services, hampering the effective implementation of HIV prevention, treatment, and care programs (Lieber et al. 2006).

Studies show that low levels of understanding around HIV are correlated with high levels of discrimination (Zhang et al. 2012). For example, a survey of the general public in an urban area in Guangxi Zhuang Autonomous Region (hereafter Guangxi) found that 18% of respondents thought PLWH should be punished and 40% thought they should be isolated. HIV knowledge was low among respondents, and having accurate knowledge about HIV was associated with reduced punishment and isolation stigma (Abler et al. 2014). Decreased stigma can be the start of a more supportive environment for PLWH. In a study of older adult PLWH in a rural high-prevalence area in south China, for instance, 18% reported experiencing external stigma and 64% reported feeling internal stigma, but having more support from family members was associated with reduced perception of external stigma (Zhang et al. 2015).

It therefore follows that improving awareness and knowledge of HIV can be effective in combating stigmatizing attitudes and discrimination. At the same time, research suggests that exposure to multiple sources of information is significantly related to improved knowledge around HIV and less discriminatory attitudes toward PLWH (Li et al. 2009). Hence, it is clear that there is a need to strengthen awareness and improve knowledge in order to drive changes to risk behaviors and address discrimination and that both generalized and targeted communication and education campaigns delivered through a variety of channels are necessary and therefore a key priority for China's response to HIV.

11.1.2 A Changing Approach

China's approach to raising awareness and increasing knowledge of HIV has undergone important changes since the early days of the epidemic. China's initial communications labeled HIV as a condition associated with "immoral" behaviors, decadence, and contact with the West. Famously, AIDS was ascribed the moniker "aizibing" or "love capitalism disease" (People's Daily Online 2009), reflecting these negative associations. Early communications on HIV/AIDS often promoted misconceptions, characterizing HIV as a "super cancer," which could be transmitted by sharing towels or other forms of casual contact (Jing and Worth 2010).

Increasing openness to discussing HIV was demonstrated in 2001 by a World AIDS Day report on HIV featuring stories and testimonials of people living with HIV that aired on television along with a drama about AIDS (People's Daily Online 2009). This shift in attitude became more clearly visible in 2003. Institutional and ideological shifts, often credited to the SARS (severe acute respiratory syndrome) epidemic, resulted in a substantial change in the tone and substance of public communications around HIV. Finally, in 2003, China's Minister of Health, Zhang Wenkang, publicly spoke of the response to HIV as a "long-term war" and requested a doubling of China's HIV/AIDS response budget (People's Daily Online 2009), an important official acknowledgment that was a sign of national ownership and commitment to the HIV/AIDS response.

On World AIDS Day 2003, Premier Wen Jiabao met and shook hands with people living with HIV (PLWH) in an important gesture of high-level leadership and stated, "You must have the confidence to overcome the disease, for you will have love and care from the entire society." This moment marked an important shift in the government's public stance and messaging around HIV, demonstrating a markedly more positive and inclusive approach, which was recognized by the Joint United Nations Program on HIV/AIDS (UNAIDS) Executive Director Peter Piot, who said, "I really feel that there is a change going on ... I know that for top state leaders in China today, AIDS is on the agenda" (People's Daily Online 2009).

As China has continued to manage its response, national leaders have regularly spoken in public of the need to support the response to HIV and provide support for those living with HIV. In 2009, President Hu Jintao took the opportunity, on World AIDS Day, to recognize the detrimental effects of HIV-related stigma and discrimination and to call upon China's citizens to take action to end it. This message has

been repeated by subsequent leaders, including Xi Jinping, who called upon the public to work together to eliminate HIV/AIDS-related discrimination in his 2013 World AIDS Day message (China Central Television 2013). Thus, official narratives and communications have shifted from the need to isolate PLWH to a more inclusive message that focuses on protections and treatment for PLWH and the creation of a safe and supportive environment.

11.1.3 Principles and Strategies

China's approach to HIV/AIDS-related communications and efforts to raise awareness has been primarily government-led, with key responsibilities delegated to various ministries and government offices with a focus on promoting participation from all sectors, including civil society. In general, these efforts have adhered to the principles of public welfare, integration of resources, improvement of health literacy, and promotion of a healthy lifestyle. Approaches have combined regular, routine initiatives with focused, time-limited campaigns, making use of a variety of media platforms as well as educational institutions to popularize messages around HIV and related policies.

In terms of objectives, government campaigns have sought to reinforce accurate factual knowledge, and create an enabling environment for addressing discrimination. Educational campaigns and initiatives have focused on a range of relevant topics including general HIV knowledge, awareness of the risks of drug use, basic sexual and reproductive health knowledge, the current status of China's HIV epidemic, laws and regulations guiding the response to HIV, HIV-related policies and response measures, sexually transmitted infections (STIs), hepatitis B, information on HIV/AIDS-related services, healthy lifestyles, and discrimination.

11.1.4 Policies

In addition to being a clinical diagnosis, HIV is a major public health concern and social issue. As such, a range of laws and policies were developed to govern the response to HIV from various sectors. First and foremost, the People's Republic of China's Infectious Disease Prevention and Control Law requires government authorities at all levels to develop policies to facilitate the participation of organizations and individuals in communications activities around infectious disease control. For example, media organizations are obligated to conduct pro bono communications campaigns to raise awareness among the public of infectious disease control and public health issues. Educational institutions, including secondary schools, vocational schools, and universities, are required to instruct students on infectious disease prevention. Medical schools are required to include content on preventive medicine in their curricula and to provide training to infectious disease control personnel. Finally, it became compulsory for disease control centers and medical treatment facilities to conduct regular infectious disease awareness trainings and to provide continuing education for employees.

Additionally, legislation on carrying out prevention work that addresses specific facets of the epidemic has also been passed. In response to high HIV prevalence among people who inject drugs (PWID) and the emerging HIV epidemic among users of club drugs (e.g., ketamine, amphetamines, and methamphetamine), the People's Republic of China issued its Drug Prevention Law, which stipulates that raising awareness of the risks of drug use should constitute a key element of the response to HIV. Similar laws have also been passed targeting other HIV transmission routes such as mother-to-child transmission and blood product donation.

Most importantly, the Regulations on HIV/AIDS Prevention and Control, which came into effect in 2006, contained specific language concerning communications aimed at raising awareness around HIV in China. The regulations stipulate that government institutions should conduct activities targeting the general population meant to raise HIV awareness, encourage for healthy lifestyles, promote healthy behaviors, and build a supportive environment for HIV response efforts. The 12 articles of the regulations define the government's responsibilities for educational campaigns in various settings including public spaces and public transportation, healthcare facilities, schools, family planning institutions, labor recruitment facilities, and border crossing points. Under these regulations, semigovernmental organizations such as the All-China Women's Federation and Chinese Red Cross Association are also encouraged to conduct HIV/AIDS educational campaigns and activities. The regulations also affirm the government's support and encouragement for the work of community-based organizations (CBOs) and individual volunteers in raising awareness of HIV among KAPs. Finally, regarding the media, the regulations require radio, television, newspaper, and Internet operators to support broad dissemination of messaging meant to raise awareness and increase knowledge of HIV prevention, testing, treatment, and care as well as stigma and discrimination. Government institutions, nongovernmental organizations (NGOs), companies, and small businesses are also instructed to provide training for staff members on HIV-related laws, regulations, and policies and to encourage staff members to participate in HIV-related awareness activities.

Recently, policies guiding the integration of HIV and sexually transmitted infection (STI) prevention in China have also been established. In 2012, the Ministry of Health released the Administrative Measures for the Prevention and Treatment of Sexually Transmitted Diseases, which calls for participation of civil society organizations in STI response efforts, including promotion of educational and behavioral interventions. It also requires medical schools, medical personnel training facilities, and medical examination institutions to include STI-related content in their curricula. Furthermore, it stipulates that HIV-related content should be delivered alongside STI-related content in an attempt to further integrate HIV and STI care and improving awareness among health workers of the importance of both.

11.1.5 Incorporating HIV/AIDS Education into Response Planning

As early as 1987, when HIV had only just been discovered in China, the Ministry of Health issued a National AIDS Prevention Plan (1988–1991), which aimed to

prevent the emergence and spread of HIV in China. Although this plan was ultimately unsuccessful (HIV did rapidly emerge and spread across China), this plan prioritized strengthening education and training on HIV. In response to changing trends in the HIV epidemic, China's State Council issued a number of strategic plans, including China's mid- to long-term plan for HIV prevention and control and several successive five-year action plans for HIV prevention and control (2001, 2006, 2012, and 2017). These plans each specify objectives, strategies, measures, and guarantees to ensure the sustainable implementation of the overall national HIV response. Consistently, communication and education for the purpose of raising awareness and increasing knowledge have been included as high priorities.

As China's response to HIV has continued to develop, approaches to communication and educational interventions has also evolved. For example, China's third five-year action plan for HIV prevention and control (2012) called for an increase in basic HIV knowledge and set out definitions and objectives on the topic. Basic HIV knowledge was defined as correctly answering at least six out of eight questions on HIV. Targets were set among urban residents to achieve greater than 85% in 2015, compared to 75% in 2005, and rural residence to achieve 80% in 2015, from a baseline of 45% in 2005. The list of target populations for HIV awareness campaigns has expanded and also become more specific over time from all residents, KAPs, and detained persons (2001) to persons entering or leaving China, migrant populations, and young people (2012). Areas of knowledge to be covered also expanded over time and focus has increasingly been placed on developing a supportive social environment.

11.1.6 Multi-sectoral Policies

Various ministries and sectors of the Chinese government have issued a range of HIV awareness policies, based on relevant HIV response-related laws, regulations, and policies. In 2002, the All-China Women's Federation and Ministry of Health issued a notification regarding the initiation of the "Prevent HIV, Build Healthy Families" initiative. This initiative called on the Women's Federation and China's health sector to increase efforts aimed at raising awareness to expand coverage of high HIV prevalence regions and households not yet reached by similar initiatives. The objective of these efforts was to improve prevention knowledge, increase awareness around HIV, reduce HIV-related discrimination, and reduce risks of HIV transmission. In 2004, the All-China Women's Federation and Ministry of Health issued the All-China Women's Federation and Ministry of Health First Comprehensive AIDS Response in China Care Zone 'Face-to-Face' Awareness-Raising Initiative for Women. In this initiative, awareness-raising teams went into the workplace, into homes, and into women's gathering places to provide HIV knowledge for women.

With a focus on young people, the Ministry of Health; the China Care for the Next Generation Working Committee; the Ministry of Education; State Administration of Film, Radio, and Television; and the Communist Youth League Central Committee issued the Notice Regarding Launch of National Youth Red

Ribbon Pledge Activity in 2002. This notice sought to raise awareness among youth, and over the following years, these efforts evolved into the "Youth Red Ribbon" HIV awareness platform. In 2004, the Communist Youth League Central Committee and Ministry of Health issued the Notice Regarding Implementing the "Youth Red Ribbon" Initiative to Promote Young People's Involvement in HIV Volunteering for the "Face-to-Face" Raising of HIV Awareness Initiative. In 127 CARES project zones, youth volunteers were recruited to carry out face-to-face awareness work in communities and rural areas. In 2006, the State Council AIDS Working Committee (SCAWCO), which coordinates multi-sectoral HIV prevention activities jointly issued the Notice Regarding Implementation of HIV Prevention Initiative for Chinese Children and Young People along with the Ministry of Health, Ministry of Education, Population Planning Commission, Communist Youth League Central Committee, All-China Women's Federation, and the China Care for the Next Generation Committee. The notice established a division of labor and clarified responsibilities of departments and ministries.

Targeting in-school youth, the Ministry of Education issued guidance regarding implementation of the State Council Notice on Strengthening HIV Response Work in 2004, requiring that class time be allocated for teaching HIV-related content in schools. The notice required 6 h of class time for elementary school students and 4 h for middle school students. In line with the curriculum on HIV prevention for middle school students, vocational middle schools are required to organize 4–6 h of class time focusing on HIV prevention. Higher education institutions are required to incorporate HIV-related content into health education classes, ensuring that no less than 1 h of class time is dedicated to HIV-related content per year.

For university students, SCAWCO, the Ministries of Health and Education and the Communist Youth League Central Committee issued the Action Plan for University Student HIV Prevention Awareness, which calls on universities to recruit HIV awareness volunteers and establish a long-term team of university student volunteers to conduct help organize communications and activities meant to raise HIV awareness on their campuses. The objective of this work is to strengthen reproductive health awareness among university students, strengthen HIV prevention knowledge and skills, and build a sense of social responsibility thereby promoting student health, responsible behavior, and supportive attitudes and driving progress toward an HIV-free society.

In terms of raising awareness among migrant workers, SCAWCO; the Communist Youth League's Central Communication Department; the Ministries of Labor and Social Security, Construction, Agriculture, and Health; the Communist Youth League Central Committee; and the All-China Women's Federation issued the Notice Regarding Implementation of the Migrant Worker HIV Prevention Awareness Project in 2005. This initiative set out objectives, delineated divisions of labor, and required all relevant sectors to promote HIV prevention and treatment among migrant workers.

Targeting employees in general, the All-China Federation of Trade Unions, Ministry of Labor and Social Security, Ministry of Health, and the China Enterprise Confederation/China Enterprise Directors' Association jointly issued a notice on

implementation of the "Employee Red Ribbon Health Initiative," promoting activities that raise awareness among employees through television, radio, newspapers, Internet, and other channels. This initiative encouraged the use of lectures and popular media channels as well as leisure facilities inside and outside of the workplace to popularize HIV-related information and strengthen prevention knowledge and skills. This initiative provided significant health promotion content, which improved health awareness among employees. It was also an effective measure for protecting the legal rights and interests of employed PLWH. Moreover, this initiative further strengthened the cooperation between the trade unions, labor and social security departments, health departments, and professional organizations at all levels.

In an effort to standardize media messaging around HIV, the Central Party Ministry of Publicity and Ministry of Health issued the Notice Regarding Issuing of the HIV Response Work Advocacy Framework in 2004, which clarifies key content areas for communication and education campaigns. This framework required all localities to recognize the significant efforts involved in HIV prevention and control. To prevent the further spread of HIV in China, the notice also required that all localities extensively and deeply carry out information dissemination and education, scale up interventions, competently conduct epidemic surveillance and case reporting, and effectively implement HIV/AIDS care and relief measures (see Chap. 18) for more information.

11.2 Targeting Different Groups

11.2.1 Starting at the Top: Government Officials

Given the lack of awareness and understanding of HIV, HIV-related discrimination, and other associated issues among government officials, there has been a need to strengthen efforts to raise awareness, particularly around the Regulations on HIV/AIDS Prevention and Control, and other HIV/AIDS response policies.

Hence, the Chinese government has taken action to strengthen awareness among government officials at all levels. In 2006, SCAWCO established the HIV Policy Information Team. This team consists of more than 20 officials and experts from the Ministries of Publicity, Education, Public Security, Finance, Health, Population and Family Planning Commission, State Council Law Office, and the Communist Youth League Central Committee. In June 2006, the HIV Policy Information Team launched its inaugural lecture at the Central Party School, at an event attended by all members of the Policy Information Team and government officials attending the Central Party School. Sub-events were held at the same time at each of the 2600 Central Party School remote education centers distributed across China. In line with the national plan, events at provincial-level and local-level Party Schools were attended by officials from their corresponding level of AIDS Working Committee member organizations. An estimated 100,000 party and government officials received HIV response and awareness training through this initiative. Following the launch of this initiative, the Policy Information Team conducted training sessions

across China. By 2013, officials from SCAWCO member bodies, relevant experts, and HIV prevention trainers had conducted trainings in 31 provinces. Ministries including the Ministry of Public Security, Ministry of Civil Affairs, and Ministry of Agriculture also made use of the remote learning system to conduct trainings. More than 300,000 trainings were carried out by national-level trainers with officials at various levels. According to incomplete statistics from September 2009, a total of 120,000 officials from provincial-level departments, 560,000 officials from city-level departments, and 760,000 officials from township-level departments received HIV policy training (Figs. 11.1 and 11.2).

Efforts have been made to incorporate HIV training into the curricula of Party Schools, where government and Party officials are required to engage in continuous education during the course of their careers. The Central Party School has organized multiple training classes and implemented training for Party School faculty. The Ministry of Human Resources and Social Security has incorporated HIV-related content into pre-recruitment training for senior civil servants. A majority of provincial-level Party Schools have also incorporated HIV response policies into training curricula, as have Ministry of Education National Educational Colleges and Party Schools of the Ministry of Health, Ministry of Transport, State Administration of Industry and Commerce, and the local governments of various municipalities and townships. These schools provide comprehensive training on HIV, effectively improving awareness around HIV

Fig. 11.1 Launch of HIV training within China's Central Party School

Fig. 11.2 Leveraging existing training systems for government officials to establish sustainable training mechanisms

prevention and control among government officials and promoting the implementation of relevant policies.

With the aim of supporting HIV-related training for party and government officials at local levels, particularly for newly elected officials, SCAWCO published the AIDS Response Official Handbook in 2008, which was updated in 2012. This handbook provides an overview of HIV, presents updated information on the epidemic, and gives details of relevant HIV response policies. The handbook also clarifies the responsibilities of party and government officials at different levels of government, with regard to HIV prevention, and provides guidelines for working approaches. This handbook has proven effective in strengthening awareness of the HIV epidemic and the importance of the HIV response.

11.2.2 Strengthening Awareness Through a Variety of Channels

11.2.2.1 Mass Media

Mass media constitutes a key tool for increasing the visibility and awareness of HIV and HIV-related policies among the general public. Government departments responsible for television, the press, culture, and information are required to broadcast HIV-related messaging and conduct HIV awareness activities in accordance with relevant national HIV response policies and plans. Radio and television stations are required to use news reports, special reporting, cultural programs, and other programing to broadcast informative, accurate, and appropriate messaging on

HIV. Major Web portals are required to include informational pages on HIV that can be easily accessed and that contain content that is updated regularly.

11.2.2.2 Public Facilities and Areas

HIV-related communications and awareness campaigns in public areas can both increase attention and coverage of awareness campaigns through reaching diverse audiences on a broad scale. Public facilities including hotels, guesthouses, cinemas, museums, Web cafes, and conference centers have also supported efforts to promote raising HIV awareness, by producing informational materials and placing them in prominent locations. Commercial advertising companies have utilized billboards and building-front advertising spaces to boldly display HIV messaging. Karaoke bars and other similar entertainment establishments where unprotected and/or commercial sexual contact is likely to take place are required to provide training to employees at the time of their hiring and at least annually on an ongoing basis, to sensitize staff members to HIV prevention measures.

As many PLWH attend healthcare settings, these have also become important locations for conducting HIV awareness and prevention work. Medical facilities are required to install permanent notice boards displaying HIV prevention, testing, and treatment information. Where feasible, facilities are also encouraged to hold educational events. Family planning clinics are required to install HIV information signs and boards, make HIV educational materials freely available, and organize regular HIV information activities.

Residents' committees and village residential committees are also required to incorporate HIV-related content into grassroots cultural activities for people residing within their zones of jurisdiction and to share information on HIV through notice boards, community billboards, posters, and kiosks containing informational materials. Village residential committees and cultural centers are required to make use of broadcast systems, notice boards, billboards, and other fixtures to publicize HIV-related information. They may also encourage residents to participate in cultural shows or performances, which can help to share information on HIV publicly during weekly markets or festivals.

Workplaces are also key sites for raising HIV awareness. Strengthening HIV prevention and treatment knowledge among employees is a key approach to improving worker health and safety. In 2004, the All-China Federation of Trade Unions, Ministry of Labor and Social Security, Ministry of Health, and the China Enterprise Confederation decided to conduct a joint "Worker Red Ribbon Forum Health Initiative." This initiative focused on providing health information to company employees and made use of a range of approaches to deliver key information on HIV. Under this initiative, content on HIV prevention and treatment was also incorporated into training for trade union officials and staff members.

11.2.2.3 Using New Media to Expand Coverage

The emergence of social and mobile media in China has opened new avenues for communications, educational initiatives, and awareness-raising activities. These platforms include Weibo (a Chinese microblogging platform), Renren (a social

network), and the mobile chat application WeChat, among others. While government institutions have not yet effectively leveraged social media and mobile platforms, many CBOs, NGOs, and UN agencies have taken advantage of the low barriers to entry and potentially enormous reach of new communications platforms to conduct awareness-raising campaigns. For example, a 2011 social media campaign led by activists from the NGO Justice for All mobilized over 12,000 people to share photos featuring antidiscrimination messages (Yu 2012).

11.2.2.4 Leveraging the Power of Goodwill Ambassadors

Prominent celebrities serving as goodwill ambassadors have been a key feature of China's efforts to raise awareness around HIV. The first officially appointed Chinese Goodwill Ambassador for HIV was the popular stage and screen actor Pu Cunxin (China Daily 2003). Appointed by China's Ministry of Health in 2000, Pu has appeared in countless public service announcements, posters, and awareness campaign materials and activities and regularly participates in HIV-related advocacy events, bringing important visibility to the issue. Pu Cunxin was the first Chinese celebrity to appear in an educational movie about HIV, "Jiaru You Mingtian" ("If There is Tomorrow"; Hood 2010).

Many other celebrities have taken an active role in HIV-related awareness-raising activities, either unofficially or officially as goodwill ambassadors appointed by China's National Health Commission (formerly Ministry of Health). Currently, the UNAIDS Goodwill Ambassador for China is James Chau, China Central Television (CCTV) news anchor and guest presenter for BBC World. Chau plays an important role in strengthening national coverage of HIV through his role as a CCTV news anchor and regularly moderates and participates in national and global HIV events.

Of particular significance was the appointment in 2011 of China's first lady, Madame Peng Liyuan, as the World Health Organization's Goodwill Ambassador for Tuberculosis and HIV/AIDS (WHO 2011). This appointment brought new visibility to HIV and constituted an important sign of recognition by the Chinese government of the importance of the HIV/AIDS response. On the whole, the use of goodwill ambassadors has proved to be an effective means of leveraging the influence and reach of celebrities to raise awareness around HIV. The association of popular, respected figures such as Pu Cunxin, Peng Liyuan, and others, with this widely stigmatized issue has without question served to improve awareness and perceptions around HIV and PLWH.

11.2.3 Focusing on Key Affected Populations

11.2.3.1 Migrant Workers

In 2005, China launched the 5-year National Migrant Worker HIV Prevention Awareness Program, which sought to improve HIV awareness among migrant workers and reduce sexual transmission of HIV. Relevant ministries and government departments incorporated migrant worker HIV prevention into their organizational HIV response plans. In 2006, the Communist Youth League launched a

"Youth Red Ribbon" initiative, focusing on working face-to-face among young people migrating into cities for work. This initiative leveraged schools and community centers, and other youth facilities set up by the Communist Youth League to conduct trainings and activities with celebrities, university volunteers, and other prominent figures. Every quarter, key activities focusing on youth migrating to cities to work are conducted under the "Five Ones" initiative: (1) organizing one staff training activity, (2) holding one expert seminar, (3) holding one HIV awareness competition, (4) organizing one event to distribute materials to raise awareness, and (5) broadcasting one HIV-related educational film. Under this plan, youth volunteers are also recruited by health authorities to provide HIV counseling and guidance to young people migrating into cities for work. Volunteers provide one-on-one support to migrating young people to resolve their problems and answer their questions. University students make use of their holidays and weekends to volunteer and participate in this work, which includes HIV awareness work. During Chinese Spring Festival and harvest times, when migrant workers return home, volunteers distribute informational materials to migrating young people.

At the end of 2010, SCAWCO, the Ministry of Health, the All-China Federation of Industry and Commerce, and the Beijing Municipal AIDS Working Committee jointly initiated a nationwide rural migrant worker HIV prevention awareness campaign, known as the "Into the Factories, Into the Construction Sites" (Fig. 11.3). This initiative

Fig. 11.3 The launch of the nationwide rural migrant worker HIV prevention campaign "Into the Factories, Into the Construction Sites"

aimed to strengthen awareness around HIV at the grassroots level, bringing prevention skills into the hands of rural migrant workers and improving coverage of HIV prevention and treatment services. In 2011, the All-China Federation of Industry and Commerce and SCAWCO jointly launched the "Red Ribbon Health Package" initiative, targeting companies. Between 2011 and 2012, three phases of HIV awareness-raising activities were carried out targeting rural migrant workers from across China. These included giving away Red Ribbon Health Packages, which included educational materials, condoms, playing cards with HIV prevention slogans on them, and protective equipment and hygiene items such as gloves and soap were distributed.

HIV-related awareness among migrant workers was also strengthened through targeted activities carried out in areas frequented by mobile populations and by incorporating HIV educational content into training provided to workers migrating from rural areas for work. Companies used skills and safety training sessions to conduct HIV training. Furthermore, HIV informational materials and condoms were provided to migrant workers returning to rural areas during Spring Festival holidays and during the two peak harvest periods. Agricultural media platforms were used, and a series of informational activities were organized in agricultural wholesale markets. Some promotional slogans and phrases from these activities have become widely recognized by the public, such as "Keep HIV prevention in mind when you go out to earn money" and "Safety helmets save lives, condoms save your health."

Provision of HIV information has also been strengthened for people entering and exiting China for work. The General Administration of Quality Supervision provides information in various forms to people entering and leaving China and foreign citizens, with support from border, customs, port, aviation, and railway personnel.

11.2.3.2 Students and Young People

Protecting the health of students and young people is critical for the future of the country and economy, and young people are therefore a key focus for HIV education. In China, middle schools are required to provide 6 h of class teaching on HIV, and in high school, 4 h of class time must be allocated. Higher education establishments and middle-level vocational schools are required to distribute materials containing information on HIV prevention to all new students and provide at least 1 h of class time on HIV-related information. Medical schools and teacher training institutions are also required to incorporate comprehensive HIV information into curricula. Schools use a variety of platforms to conduct regular awareness-raising activities, including student societies, the Internet, and student publications. University libraries are required to carry HIV informational publications, which students and staff can borrow and read. School notice boards must provide HIV-related information that is updated regularly. Campuses are required to install fixed HIV information booths, and student radio and TV stations are also required to regularly broadcast information on HIV. During World AIDS Day, universities often organize HIV awareness activities.

Civil society organizations, youth training centers for migrant youth, and urban youth clubs are key partners in strengthening awareness among out-of-school youth.

These institutions organize thematic lectures and distribute informational materials. In 2004, the Communist Youth League Central Committee and Ministry of Health launched an awareness activity targeting young people in the 127 China CARES regions, with the theme "Treasure Life. Keep Away from HIV. Eliminate Discrimination. Enjoy Health." Through recruiting youth volunteers, training youth trainers, and creating an advocacy team, one or two face-to-face awareness-raising activities focusing on ten key HIV prevention facts were conducted every year in rural and urban areas targeting young people.

11.2.3.3 Women

The proportion of PLWH who are women continues to rise. Because of physiological differences and gender inequalities, women are at higher risk of HIV infection. As such, women are a priority population for HIV education. In 2005, the Communist Party Ministry of Publicity, Ministry of Health, Population and Family Planning Committee, and the All-China Women's Federation launched an initiative focusing on HIV prevention among women. A number of sub-initiatives focused on building awareness among different populations, improving HIV awareness, and advocating healthy lifestyles. Activities are organized by township, with volunteers and personnel working face-to-face with women in village groups, communities, and in fields and homes. The All-China Women's Federation coordinates heads of women's committees and representatives to conduct HIV-related training for key personnel. Awareness-raising work carried out is integrated with the "Safe and Harmonious Family" initiative. The All-China Women's Federation has also established an HIV awareness team, which uses popular cultural formats including plays, singing, dancing, and other forms of entertainment to raise awareness in rural areas, communities, factories, markets, and other public areas where women tend to gather. In future, comprehensive programs are suggested to also consider health education activities provided for pregnant women and their families through maternal and child health system, i.e. in health facilities and through outreach activities, for examples, health education in pregnancy schools for pregnant women and their families; group training/discussion organized by village doctors for pregnant women and their families; local opera developed by community workers for HIV/AIDS related health education.

11.2.3.4 Rural Residents and Ethnic Minorities

Efforts to raise awareness around HIV have been incorporated into various rural support programs, including the New Socialist Countryside Construction Project, and cultural, sci-tech, and health-related rural support initiatives. Rural training institutions have incorporated HIV content into training curricula, providing HIV-related training to marginalized and poverty-stricken rural areas. In remote, poor areas inhabited by ethnic minorities, HIV awareness activities have made use of local traditions and customs to deliver information in minority languages. Trainers who are themselves of minority ethnicities have been recruited to conduct training sessions in remote villages and minority areas, and partnerships have been developed with local religious and cultural leaders to deliver information in an appropriate and relevant manner that is sensitive to local traditions.

11.2.3.5 Detained Persons

Detention centers of all types (e.g., compulsory detoxification centers, reeducation-through-labor camps) are required to incorporate HIV prevention and treatment information into training for persons entering and leaving custody. Detained persons are required to receive at least 5 h of education on HIV upon entering a facility, and at least 3 h before being released. During routine education, at least 10 h of training must be provided. In detention centers, HIV awareness information must be displayed in residential areas, medical departments, and classrooms, and detained persons should be provided with HIV informational materials. Custodial institutions are required to use internal TV systems, radio systems, newspapers, lectures, knowledge competitions, cultural performances, peer education, and life skills training to strengthen awareness among detained persons. Peer educators are also used to provide targeted education. On World AIDS Day and on International Day Against Drug Abuse and Illicit Trafficking, detention centers are required to conduct relevant HIV-related activities.

11.3 World AIDS Day Activities

In January 1988, the World Health Organization (WHO) designated December 1st as World AIDS Day, a global day to improve awareness around HIV. World AIDS Day constitutes a key opportunity for improving awareness around HIV, attracting public attention, and addressing discrimination, thereby building a social environment conducive to HIV response work. Each year, China organizes a series of HIV-related activities on and around World AIDS Day for the purpose of raising awareness.

11.3.1 Party and Government Leadership

The Chinese government has demonstrated strong commitment to HIV response work. Starting in 2003, party and government leaders have participated proactively in World AIDS Day activities. On the 17th World AIDS Day, in 2004, President Hu Jintao visited Beijing Youan Hospital together with then Vice-Premier Wu Yi, to meet with people receiving treatment for HIV and to commend the work of medical staff and volunteers. On the eve of World AIDS Day 2007, President Hu visited Beijing's Chaoyang District Center for Disease Control and Prevention (CDC) to inspect HIV-related projects. President Hu shook hands and spoke with PLWH. On World AIDS Day 2008, President Hu visited Beijing's Ditan Hospital with then Vice-Premier Li Keqiang, to inspect HIV response efforts. On the eve of the 22nd World AIDS Day in 2009, President Hu and Vice-Premier Li Keqiang visited the National Convention Center to participate in a volunteer activity and encouraged volunteers to actively participate in HIV-related activities and build a caring and tolerant society. In 2012, on the eve of the 25th World AIDS Day, President Xi Jinping visited the Puhuangyu Community Health Service Center in Beijing's Fengtai District to meet with PLWH receiving methadone maintenance treatment

(MMT) for opioid drug addiction, exchange views with volunteers, and deliver a speech. In 2013, on the eve of the 26th World AIDS Day, the Beijing municipal authorities presented a report on the progress of HIV response efforts to President Xi. President Xi commended them for their efforts and issued further guidance, stressing the importance of summarizing best practices and expanding efforts. This tradition of public, high-profile support for China's HIV/AIDS Response Program each year on World AIDS Day continues today.

Other important officials have also participated in these efforts. Starting in 2003, Premier Wen Jiabao participated in World AIDS Day activities on an annual basis. In 2003, Premier Wen visited Beijing's Ditan Hospital to meet with PLWH receiving treatment. In 2004, he met with Dr. Gui Xien, a doctor specializing in HIV treatment at Wuhan University's Zhongnan Hospital. In 2005, Premier Wen traveled to Shangcai in Henan province, one of the areas most affected by HIV, to spend Chinese New Year's Eve together with children orphaned by AIDS and old people who had lost family members to AIDS. In 2006, Premier Wen Jiabao invited children orphaned by AIDS and children living with HIV to the Chinese government headquarters at Zhongnanhai as guests. On the same day, Premier Wen attended a cultural gala organized by SCAWCO, the Ministry of Health, and 10 other ministries. In 2007, Premier Wen again went to Shangcai to visit local people including children living with HIV or orphaned by HIV. In 2008, Premier Wen visited Fuyang in Anhui province, visiting children orphaned by AIDS and medical workers operating in rural areas. On World AIDS Day 2009, Premier Wen Jiabao and Vice-Premier Li Keqiang visited Beijing's Ditan Hospital where they convened a discussion-style meeting and listened to recommendations from international experts, community representatives, and rural healthcare workers on priorities for the HIV response. In 2010, Premier Wen Jiabao visited Sichuan's Liangshanzhou Prefecture, one of the areas most seriously impacted by HIV, to observe HIV response efforts and meet with PLWH and children impacted by HIV. In 2011, Premier Wen visited the China CDC to inspect HIV response work and meet with PLWH, medical workers, researchers, volunteers, and representatives from international organizations. In 2012, Premier Wen Jiabao again met with PLWH, children orphaned by AIDS, petitioners, medical and research personnel, volunteers, and representatives from relevant international organizations, this time at Zhongnanhai.

In 2011, Vice-Premier Li Keqiang visited the Beijing CDC to inspect HIV response efforts and to meet with medical personnel and representatives from civil society organizations. In 2012, Vice-Premier Li met in Beijing for a discussion session with representatives from civil society and international organizations working on HIV prevention and control. Following this meeting, Vice-Premier Li convened the Fourth Plenary Working Meeting of the State Council AIDS Working Committee. In 2013, Premier Li Keqiang visited Beijing's Youan Hospital and commended the work of frontline medical personnel and civil society and volunteer representatives.

The ongoing and consistent visibility of party and government leaders actively involved in and supporting the HIV response demonstrates the high priority placed on this area of work by the Chinese government and sets an important example for officials at lower levels of government.

11.3.2 World AIDS Day Themes

Each World AIDS Day has a theme, bringing attention to particular aspects of the global response to HIV. UNAIDS, WHO, and UN member countries then carry out various advocacy activities, focusing on this theme. China designates a theme for World AIDS Day based on the global theme. For example, in 2010, the chosen theme was "Stop AIDS, Keep the Promise," and China created a subtheme, "Rights, Responsibilities, Action." From 2011 to 2013, the global theme was "Getting to Zero," for which China developed subthemes, "Comprehensive Prevention, Active Treatment, Eliminate Discrimination" (2011), "Full Participation, Full Investment, Full Prevention" (2012), and "Fight AIDS Together, Take Responsibility Together, Enjoy the Future Together" (2013). This practice of thematically approaching the HIV response each year continues today and reinvigorates and refocuses efforts.

11.3.3 Large-Scale Public Benefit Galas

On World AIDS Day 2001, the Ministries of Health, Publicity, and Culture and the State Administration of Radio, Film, and Television, with support from the United Nations International Children's Emergency Fund (UNICEF), held a gala in the Beijing China Theater to draw attention to the issue of HIV and to encourage an end to discrimination against PLWH. Among the guests at the gala were the Ministry of Health HIV Prevention Goodwill Ambassador Mr. Pu Cunxin as well as famous singers and actors from China and other countries. Surveys showed that 6.1% of Chinese television viewers watched the gala, or close to 70 million people. As such, the gala served as a powerful awareness-raising tool.

In following years, HIV awareness galas were jointly organized for World AIDS Day by the Ministry of Publicity, Ministry of Health, China Central Television, and other organizations. The number of organizations participating in the gala continued to increase over the years, and the gala's content became richer. On November 22, 2005, ahead of the 18th World AIDS Day, 12 bodies including SCAWCO; the Ministries of Publicity, Health, Education, Public Security, Civil Affairs, Justice, Commerce, and Culture; the State Administration of Radio, Film, and Television; the Communist Youth League Central Committee; and the All-China Women's Federation jointly organized the gala, which took place in Beijing's Great Hall of the People with the theme "The Warmth of China." Ahead of the 24th World AIDS Day in 2011, another large-scale HIV awareness gala with the theme "Loving China" was organized by the All-China Federation of Industry and Commerce and SCAWCO, with support from the China Glory Foundation and the China Red Ribbon Foundation.

11.3.4 Other Activities Across China

In alignment with the national strategy, provincial and municipal authorities and member organizations of the State Council AIDS Working Committee have

conducted various World AIDS Day activities. These have included galas, information sessions, medical consultations, exhibitions, and leaflet handouts. Given the large number and variety of these activities, only a selection is described below.

In 2009, a large-scale HIV awareness activity was held at the Beijing Bird's Nest Stadium. As part of this activity, huge red ribbon banners were hung from the Bird's Nest. The Ministry of Publicity and SCAWCO organized online chat activities through the Xinhua News website, around the themes of "Challenges of Population Movements for the Response to HIV" and "The HIV Epidemic and Related Policies." The Beijing municipal government also sent out SMS messages to city residents for the 25th World AIDS Day. People's Daily used its 1000 video screens to display HIV awareness posters. Yunnan province organized a speech competition on the theme "Lighting the Candle of Zero Discrimination" as well as a photography competition entitled "A Loving Perspective—Looking at Yunnan's Response to HIV" and an essay competition on the theme "Mutual Support and Love. Enjoy Life Together." In Henan province, an HIV awareness event on the theme "Taking Action. Getting to Zero" was held combined with a ceremony for the Henan Province Inaugural HIV Prevention Health Day. Wenzhou in Zhejiang province held a light show to raise awareness around HIV. Xiangtan in Hunan province displayed HIV-related messages on display boards fitted on the roofs of taxis.

On the eve of World AIDS Day 2011, the Xinjiang Uyghur Autonomous Region (hereafter Xinjiang) AIDS Working Committee, Party Publicity Department, Education Bureau, and Bureau of Radio, Film, and Television jointly organized a middle school HIV prevention speech competition and a middle school student HIV knowledge competition. These events were jointly held in the Xinjiang TV theater in three languages: Kazakh, Uyghur, and Mandarin Chinese.

For World AIDS Day 2012, Chongqing held a "Red Ribbon Cup" university student basketball match. The Yubei District CDC worked with community hospitals to conduct an HIV rapid saliva testing campaign and an awareness-raising initiative entitled "Care for Older People, Build Health Awareness in the Community." A total of 68 long-distance bus stations, 18 ports, and 33 motorway toll stations installed a total of 256 information banners, 103 information exhibitions, 1600 posters, and 103 information booths that contained over 90,000 informational leaflets.

11.4 Appraisal of China's Communication Efforts

11.4.1 Developing and Standardizing Indicators

In 2007, SCAWCO issued China's AIDS Response Monitoring and Evaluation Framework. This framework sought to standardize indicators for evaluating effectiveness of HIV-related communication and education campaigns. The framework also clarified the reasoning behind the creation of these indicators, their specific definitions, and how they should be measured. These indicators are then measured through dedicated surveys among different population groups. During these

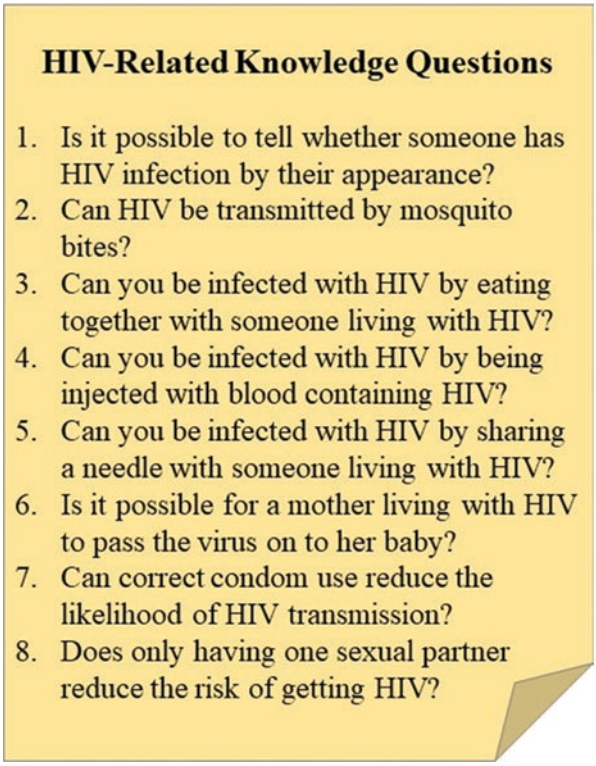

Fig. 11.4 Questions testing HIV-related knowledge

surveys, respondents are presented with the eight standard HIV-related knowledge questions (Fig. 11.4). Respondents giving correct answers for six or more questions are classified as "aware." In addition to the five questions used by UNAIDS to measure HIV knowledge, three questions relate directly to characteristics of China's epidemic (i.e., questions on blood transfusion, mother-to-child, and drug use transmission routes). In addition to measuring overall levels of knowledge, the proportions of respondents answering correctly are measured for each question and are disaggregated by KAP, age, gender, and household residence status. Following the launch of the framework, China's HIV Sentinel Surveillance Workplan was updated to ensure consistency. The methodology set out in the framework is also used during national and local evaluations of the effectiveness of HIV knowledge-raising activities.

11.4.2 Evaluations of Impact

In 2004, China's Ministry of Health commissioned the Beijing consulting firm HorizonKey to conduct a door-to-door survey. The objective was to improve understanding of HIV knowledge, attitudes, and behaviors, among people living in Chinese cities, towns, and rural areas, so that future approaches to HIV awareness initiatives

could be better informed and optimized. This survey was conducted in six cities (i.e., Beijing, Shanghai, Guangzhou, Chengdu, Taiyuan, and Changsha), six towns (i.e., Jinzhou of Liaoning province, Shijiazhuang of Hebei province, Xianyang of Shaanxi province, Yangjiang of Guangdong province, Xinyang of Henan province, and Zhaotong of Yunnan province), and six rural areas falling within the jurisdictions of the six towns. A total of 3247 permanent residents between the ages of 18 and 60 participated.

This study resulted in the 2004 China HIV Knowledge, Attitudes, and Behaviors Situation Survey Report. The main finding was that while an overwhelming majority of residents had heard of HIV (94%) and was aware that HIV was an infectious disease (90%), misconceptions and awareness of risk were low. Only 58% were aware that HIV could not be cured, and a number of misconceptions existed among urban and rural respondents concerning HIV transmission routes. The proportion of respondents correctly answering questions on whether HIV can be transmitted through coughing and sneezing and through mosquito bites were 70% and 33%, respectively. Furthermore, the proportions of respondents correctly identifying various forms of casual contact that cannot transmit HIV were also low—57% correctly identified sharing an office with someone living with HIV; 50% sharing food and utensils with someone living with HIV; 49% shaking hands, hugging, or kissing; and 30% identified using the same toilet, shower, or swimming pool. In terms of prevention knowledge, 54% correctly identified condoms as a means of reducing HIV risk, and 74% identified that blood should be screened for HIV prior to receiving it as a transfusion. Generally, greater than 80% of urban and rural residents considered themselves to be at no risk of HIV infection, and 14% believed their risk was quite low. Only 0.2% believed that they were at relatively high risk of HIV. These survey results provided an important reference for future HIV communication and education work aimed at improving awareness and accurate prevention, testing, and treatment knowledge, and informed selection of target populations, geographical regions, and methods and approaches.

In 2008, while conducting a review of the China HIV Prevention and Control Action Plan (2006–2010), SCAWCO organized 23 provincial AIDS Working Committee Offices from Beijing, Henan, Yunnan, and other provinces to conduct a survey evaluating basic HIV knowledge. Face-to-face interviews using structured questionnaires were conducted. A total of 210,000 urban and rural residents aged 15–49, in-school and out-of-school youth aged 15–24, and rural migrant workers were included. The results of these surveys showed that basic awareness rates were relatively high among urban residents (84%), rural residents (76%), in-school youth (85%), out-of-school youth (82%), and migrant workers (75%), meeting the mid-phase requirements set out in the Action Plan (Hu et al. 2010).

In November 2012, the Ministry of Health and the China CDC conducted a telephone survey in the 19 provinces that had launched the 12320 Health Hotline. By using stratified sampling, over 12,200 residents aged 15–60 years were surveyed by the standard questionnaire on HIV basic knowledge. Survey results showed improved awareness rates among urban residents (84%), rural residents (74%), and women of reproductive age (83%) (Zhang et al. 2013).

11.5 Challenges and Recommendations

Despite substantial investment of energy and resources in HIV/AIDS communication, awareness, and education campaigns, a number of obstacles continue to hinder work in this area. Awareness and knowledge around HIV remain low in China. This is the case both among the general public and also among KAPs, where low levels of awareness are accompanied by persistently high prevalence of risk behaviors. While China's strong emphasis on educational campaigns aimed at the general public has improved overall levels of awareness to some extent, this somewhat unfocused approach has had limited impact in generating positive behavioral changes among those most at risk. At the same time, discriminatory attitudes and behaviors persist, limiting demand for prevention, treatment, care, and support services from those most at risk. Strengthening communications and awareness-raising efforts in China will require a multipronged approach, which can draw on the advantages of all sectors of society including government, civil society, the private sector, and international development partners.

While CBOs and NGOs play an increasingly important role in efforts to raise awareness around HIV, their substantial potential has not been fully leveraged. Their inadequate inclusion in HIV prevention efforts is largely due to lack of access to sustainable funding and tenuous legal status. Given that CBOs are often most in tune with the needs of KAPs and their population-specific challenges and issues, these organizations have an important role to play in building awareness and promoting positive health-seeking behaviors among those most at risk of HIV. Marginalized populations, who are often at a greater risk of HIV, have in many cases been harder to reach with communications initiatives. Among populations which are criminalized, including sex workers and people who use drugs, conducting outreach and awareness-raising activities can be particularly challenging. In some cases, harm reduction and awareness programs for sex workers and people who use drugs have been hampered by prioritization of law enforcement over HIV prevention. In seeking to promote awareness and behavior change among KAPs, it will be important to better leverage the capacity of CBOs, capitalizing on their broad reach among affected communities and their grasp of the issues faced by the populations they represent.

Additionally, communication and education efforts need to be better targeted to KAPs, using language, messaging, and media platforms that are relevant and appropriate. This will require the greater involvement of KAPs and CBOs within communications planning processes and the strategic design of innovative, targeted communications initiatives. Existing formal and informal KAP networks can be leveraged to promote awareness and behavior change, together with peer-led interventions and outreach (Gao and Wang 2007; Tucker et al. 2011). Identifying and training key community leaders have also been shown to be effective in addressing discrimination (Rice et al. 2012) and should therefore comprise an important component of efforts to address discrimination.

The private sector, with its vast resources and capacity for innovation and execution, must also be at the forefront of the response to HIV. While corporate social

responsibility (CSR) remains in the early stages of development in China, reports suggest that Chinese companies are beginning to recognize the importance of CSR. A 2013 study by SynTao, a sustainability consultancy, reported that 1722 Chinese companies filed CSR reports in 2012, compared to just one in 2006. Other reports suggest that CSR efforts are being strengthened in response to pressure from government, civil society, and the public. The private sector can, of course, serve as an important source of funding, but it has much more to offer in terms of innovation and in-kind contribution of expertise. The rich experience of the private sector in communications and advertising constitutes a unique advantage in the response to HIV. In many cases, the most valuable contribution that private sector companies can make is their expertise. Bodies such as the China Red Ribbon Foundation, which bring together large numbers of private sector organizations, can serve as useful platforms for strengthening private sector collaboration.

Communications strategies need to make full use of the broad range of media and communications tools that now exist. Social and mobile media platforms present a tremendous opportunity for reaching huge numbers of people with customized messaging at comparatively low cost. In many countries, social media has been used effectively to promote testing, treatment adherence, and other positive health-seeking behaviors (Young and Rice 2011). Penetration of the Internet and mobile media is very high in China, including in rural areas. Among some vulnerable populations, such as migrant workers, mobile and social media use is very common, providing important opportunities for communication and education efforts (Farrar 2012). Another important advantage of social media is the opportunities it presents for demographically targeted messaging, based on user information collected by networks, allowing for improved cost efficiencies and more effective delivery of customized messages. A combined approach of this kind, making use of appropriate technologies and platforms, has the potential to generate substantial improvements in awareness, effectively combat discrimination, and reduce rates of HIV transmission.

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The Revolution of HIV Testing

12

Zunyou Wu and Jennifer M. McGoogan

Abstract

HIV testing is an important HIV control strategy—an opportunity to know one's status and the first step for diagnosed individuals to link to care and enter treatment. Here, we describe HIV testing before and after antiretroviral therapy (ART) became available in China. We focus particularly on China's innovations in promoting HIV testing, including active HIV testing campaigns and the debate that surrounded this controversial practice at that time. HIV testing has been viewed as a core component of HIV prevention efforts among key populations, such as men who have sex with men, female sex workers, and others, and has been used as an indicator to monitor the implementation of China's National HIV/AIDS Program. China's method of setting targets for numbers of diagnoses is very unique and has successfully facilitated increases in HIV diagnosis rates over the past decade. Chinese HIV/AIDS experts have also greatly influenced and contributed to the movement toward HIV testing as an important global control strategy in response to the HIV/AIDS epidemic. Nevertheless, China still has a long way to go to reach the UNAIDS 90-90-90 Targets and improving HIV testing strategies is an important next step toward reaching these goals.

12.1 Introduction

The role of HIV testing in the overall global response to the HIV/AIDS epidemic has changed significantly over the past three decades. It is now viewed as the "gateway" to HIV prevention, treatment, and care, and other support services. Internationally,

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HIV testing is now recognized as a critical HIV/AIDS control strategy. As an example, testing is listed first among the Joint United Nations Programme on HIV/AIDS (UNAIDS) 90-90-90 Targets—90% of people with HIV infection should know their status by 2020 (UNAIDS 2014, 2017). Although clearly it is impossible to control the HIV/AIDS epidemic without a successful HIV testing program, there are still many different strategies that separately provide HIV testing services in most settings, all of which have different advantages and disadvantages, as well as levels of effectiveness.

Anonymous HIV testing is a strategy in which a group of people are all tested anonymously, such that if any one test sample was found to be positive for HIV, the individual who provided the positive sample could not be identified. This strategy was used primarily for surveillance, to determine the magnitude of the HIV epidemic by estimating HIV prevalence, particularly before antiretroviral therapy (ART) was available (see Chap. 2 for more information).

Compulsory or mandatory HIV testing (MHT) strategies, where consent is neither sought nor required, is most commonly used in blood donation to protect the safety of potential recipients of blood products. It is also often used during recruitment for military service, and prior to surgical or other invasive procedures. In most Asian countries, drug users and detainees are also required to submit to MHT as one component of a comprehensive health exam package.

Voluntary counselling and testing (VCT) is one of the most popular strategies, and it has been used widely both internationally and in China. VCT is an "opt-in" strategy, meaning individuals voluntarily seek out and obtain HIV counselling, and then decide whether to have an HIV test. This strategy greatly emphasizes the rights of individuals, since the individual is ultimately the decision maker. VCT can be provided in fixed healthcare settings, by peer-run community organizations, or by outreach teams (Joint United Nations Programme on HIV/AIDS 2002).

Provider-initiated testing and counselling (PITC) is an "opt-out" strategy offered in clinical settings. In this case, a healthcare provider decides that an HIV test is warranted based on his or her medical judgement. Although consent for testing is required, generally the provider encourages testing. In contrast to VCT, where the emphasis is on counselling, in PITC, the emphasis is less on counselling and more on testing (World Health Organization and Joint United Nations Programme on HIV/AIDS 2007).

HIV self-testing (HST) is a recently developed strategy whereby individuals obtain an HIV self-testing kit and then perform HIV testing by themselves. Although this strategy only provides screening, it offers the user many advantages including maximal confidentiality and privacy, reducing the potential for HIV-related stigma and discrimination. It also has the maximum convenience since the user chooses the time and place to test and receives results immediately (World Health Organization 2016a, b).

The ultimate goal of HIV testing is the diagnosis of all individuals with HIV infection, as early as possible after they become infected. This is important for many reasons. Initiation of ART before substantial HIV disease progression has taken place (i.e., "early" ART), or as soon after diagnosis as possible (i.e., "immediate"

ART), provides invaluable benefits to the individual, including reduced morbidity and mortality, as well as to the community, in terms of reduced onward transmission (Borges et al. 2016; Cohen et al. 2011; Grinsztejn et al. 2014; INSIGHT START Study Group 2015; Lima et al. 2015; Martin et al. 2014; Rahman et al. 2016) (see Chap. 13). Furthermore, there is benefit to healthcare systems themselves—HIV disease causes considerable burden, and funding agencies, policymakers, and managers can better prepare and allocate resources when larger proportions of those infected are diagnosed more quickly.

12.2 HIV Testing Before the Advent of Antiretroviral Therapy (ART)

Early in the epidemic, HIV infection was deadly. Once an individual became infected, they were certain to eventually suffer from AIDS and die. On the one hand, with no treatment for HIV disease available, knowledge of one's infection status did not bring much individual benefit. However, on the other hand, HIV testing did have community-level benefit—evaluation of the prevalence of HIV in communities provided officials with critical information about the magnitude of the HIV epidemic, which became very important for health planning.

Shortly after the HIV/AIDS epidemic was first reported in the United States (US) by the US Centers for Disease Control and Prevention (CDC; United States Centers for Disease Control and Prevention 1982), Chinese scientists started to "search" for HIV infection in China. The first cases were reported among four individuals with hemophilia who had become infected after receiving contaminated Factor VIII serum imported from the US (Zeng et al. 1986). In response to this scare, import of foreign blood products was banned, and monitoring for HIV continued.

Then, in 1989, an epidemiologist working in rural Yunnan province investigating whether hepatitis C virus (HCV) was being spread among people who inject drugs (PWID) through the sharing of drug- injecting equipment, stumbled upon China's first major HIV outbreak. She not only found that 95% of her study subjects were infected with HCV but also that 40% tested positive for HIV. Upon more thorough investigation, a total of 146 HIV cases among PWID were found (Ma et al. 1990). These reports shocked government officials as well as health professionals. China's HIV epidemic had begun. As before, China responded by trying to eliminate the source of HIV and continuing to monitor. Hence, in the years following this outbreak, China focused heavily on cracking down on illicit drug use (see Chap. 1 for more information).

In early 1995, a tragic outbreak of HIV infection was discovered among former plasma donors (FPD) in rural, central China (Wu et al. 1995). After import of foreign blood products was banned in China, a huge new demand for domestically sourced blood products suddenly drove the development of a lucrative new market. Development of adequate regulations, controls, and inspections lagged, and concern for the safety of those who were selling their blood and those who would eventually receive blood products was eclipsed by concern for profits. Investigators found that

multiple instances of contamination had occurred during plasma collection and as a result, thousands upon thousands of FPD had become infected with HIV (Wu et al. 2017) (see Chap. 1 for more information).

At the time, the issue of how aggressively to scale up HIV testing for FPD was very sensitive and controversial. Epidemiologists, in support of increased HIV testing among FPD, argued that this further testing could provide more accurate information, not only for estimating the magnitude of the outbreak but also for better understanding the outbreak itself in terms of its other features, and that such information could be used for planning healthcare services. By contrast, many government officials argued against more HIV testing for FPD, since individuals benefitted little without treatment, and larger number of people diagnosed with HIV infection would only incite fear and worry in communities. Even at that time, there was concern for potential breeches of confidentiality, which could result in social stigma and discrimination for people infected and affected. In general, Chinese communities were not ready to accept that an HIV outbreak had occurred in their towns and villages (Wu et al. 2017).

Public health specialists realized the importance of having HIV testing services readily available for people in communities where HIV was already present. They knew it was very important to prevent secondary HIV transmission. However, the acceptability of HIV testing in these communities was still an issue. One study showed that even when HIV testing was offered for free, acceptability continued to be extremely low (Wu et al. 2005).

Although it was clear that thousands and thousands of FPD were infected with HIV, it became equally clear that VCT, and even free VCT, would be ineffective for case finding. No one came to test. Thus, the epidemic remained "silent" and the response remained "silent".

12.3 HIV Testing After ART Became Available

Although antiretroviral therapy (ART), which included a combination of antiretroviral drugs, initially became available in 1996, the high cost of ART at that time was prohibitive to patients with HIV infection in China. Many infected FPD had become critically ill by this time, and many were dying. By 2001 and 2002 in some of the villages, more than a dozen people died each week. Finally, in late 2003, the Chinese Government recognized the tragedy and issued its first major AIDS policy called "Four Frees and One Care." The new policy meant the Chinese Government would provide (1) free HIV screening tests for all those who wanted them; (2) free ART for all those diagnosed with HIV who lived in rural areas, or in urban areas but below the poverty line; (3) free prevention of mother-to-child transmission (PMTCT) services, which included free HIV testing for all pregnant women, ART for mother and child, and infant formula; (4) free education for children infected with HIV or affected by HIV (parent or caretaker infected); and finally (5) monetary support to families with members infected or affected by HIV. This landmark policy became the cornerstone of China's response to HIV/AIDS. It completely changed the landscape of China's National HIV/AIDS Program (see Chaps. 18 and 25 for more information).

The vast majority of HIV cases identified as of the end of 2003 had been reported anonymously. However, for free ART to be provided to the people who needed it, detailed personal information was required. Furthermore, for treatment and care services to be held accountable for appropriate spending of government funds and other resources related to ART delivery, the identities of individuals receiving services needed to be recorded. This issue is illustrated by a request made in early 2004 by the Health Department of Xinjiang Uyghur Autonomous Region for enough ART medicines to treat 100 individuals. At that time, the number of HIV infections reported to the central Chinese Government's notifiable disease system was over 10,000. Officials at the Xinjiang Health Department could not identify which 100 people among the more than 10,000 were planned to receive the free ART medicines, and therefore, their request could not be approved. The weaknesses of the anonymous HIV testing strategy immediately became major barriers to the provision of free ART to people diagnosed with HIV.

This realization meant the end of anonymous HIV testing. Public health specialists and government officials alike became convinced that anonymous testing should be stopped and replaced with confidential HIV testing where real identification and contact information were collected.

However, with free HIV testing, and now free ART as well, there were still very few people coming for HIV testing, particularly among those who were FPD. We knew that thousands and thousands of infected FPD were out there. But, where were they? Who were they? Why do they not come for an HIV test? One reason was likely that information about free testing and free treatment had not reached the individuals who needed it the most. Another reason was perhaps that those who had received the information still had not realized that they needed to have an HIV test. Whatever the reason, the feeling among public health specialists was that waiting for them to come was not a viable strategy. Consensus was building around the idea of actively approaching people directly to provide them with HIV counselling and testing.

12.4 The Revolution of HIV Testing

In early 2004, a massive HIV testing campaign among FPD was proposed. The scientific validity and implementation feasibility of the proposal was intensely discussed and debated. Furthermore, the ethical considerations of the proposed mass testing campaign were numerous and complex, and concerns were raised about how such a campaign would be viewed by international public health organizations and the West. Even among the Ministry of Health's AIDS Expert Committee, many were not supportive of the proposal.

Despite continued controversy and criticism from both domestic and international scientific communities, the massive HIV testing campaign was carried out with very strong government commitment and great determination to get a complete understanding of the magnitude of HIV epidemic and to provide appropriate healthcare services to all those diagnosed. The HIV testing campaign strategy was first tried among FPD in Henan province. From June to September 2004, millions of people were screened for

having a history of plasma donation around and before 1995. Among them, more than 280,000 admitted that they had donated plasma during this timeframe. All were offered free HIV testing, and more than 90% accepted. As a result of this massive testing drive, a total of 23,157 individuals were newly diagnosed with HIV infection, which was 9% of those tested. In three short months, the total number of infections identified in China increased six-fold over the cumulative total of the prior decade. Roughly 50% of these newly diagnosed individuals were currently in serodiscordant relationships, meaning their primary sexual partner was also tested and found to have an HIV-negative status. Condoms were distributed to these serodiscordant couples in an attempt to prevent secondary sexual transmission of HIV within the couples.

This first HIV testing campaign among FPD was a huge success, not only as measured by case finding but also as measured by the very positive feedback from newly diagnosed individuals on the solid healthcare services they were provided. Yunnan's Health Department subsequently decided to conduct a similar HIV testing campaign among several key populations, including people who inject drugs (PWID), female sex workers (FSW), sexually transmitted infection (STI) clinic attendees, men who have sex with men (MSM), individuals confined to detention centers and reeducaton-through-labor camps, and pregnant women. Yunnan's HIV testing campaign ran from September to December 2004. Nearly 425,000 individuals were offered testing, approximately 99% accepted, and nearly 13,500 were newly diagnosed with HIV infection, 3.2% of those who tested.

In less than 1 year, both Henan and Yunnan, two of the provinces hardest hit by HIV in China, had demonstrated that an active HIV testing campaign was a very effective and efficient way to identify HIV cases. In total, nearly 37,000 Chinese citizens were newly diagnosed with HIV infection because of active HIV testing campaigns in 2004. Yet, this approach remained extremely controversial.

Undeterred by the huge success of China's first two active HIV testing campaigns, opponents of this testing strategy continued to criticize and try to block future similar actions. In general, domestic experts had concerns that this new strategy had not been used in any other part of the world, and that it was not consistent with the principles of VCT endorsed by UNAIDS, or by the World Health Organization (WHO). Internationally, the strategy was criticized because of worry about violations of basic human rights protections (Wu et al. 2006).

The first open debate occurred at the second Conference of the China International AIDS Project, held in Kunming, Yunnan, in September 2005. Officials from international agencies challenged the new HIV testing program. They believed that actively approaching FPD and members of other key populations to have them tested for HIV violated their basic human rights. However, proponents of the active testing strategy, primarily Chinese epidemiologists, argued that actively approaching those who might already be infected and encouraging them to have an HIV test is actually protecting their individual human rights. First, people who are infected with HIV have the right to know they are infected. This right cannot be denied because of lack of sufficient knowledge (about HIV/AIDS and testing and treatment availability) to make an informed decision as to whether or not to have an HIV test. Second, those who are infected with HIV have the right to access critical, life-saving treatment that the government is providing for free. This right also cannot be denied

because of lack of sufficient knowledge (about one's infection status) to make an informed decision as to whether or not to access treatment. Third, those who are infected with HIV have the right to protect their partners, and their partners have a right to protect themselves, from becoming infected with HIV. Finally, actively approaching those who are likely to have been exposed to HIV to encourage them to test does not mean the HIV test offered is compulsory. HIV testing, even within the context of an active testing campaign, is still voluntary. Everyone approached has the right to decline. By this logic, Chinese epidemiologists argued that the active approach to HIV testing does not violate the basic human right of those being tested.

The debates continued after the conference, and in October 2005, a special meeting on HIV testing strategy was organized at Chinese Center for Diseases Control and Prevention (China CDC). Participants were technical officials from the UNAIDS China Office and the WHO China Office, technical officers from the US CDC Global AIDS Program (GAP) in China and the China CDC. Officials from UNAIDS and WHO China offices did not agree with the HIV testing campaign. The key point of their argument was that there was no need to know who is infected. It is only necessary to assess the proportion of people infected within a subgroup or a community. Such information is good enough. With only this information people in the community will take action to protect themselves.

However, epidemiologist from China CDC argued that HIV is an infectious disease, and that the universally accepted principles for controlling infectious disease epidemics are early diagnosis, early treatment, and early blockade of transmission routes. As an international public health community, we had over-emphasized the "specialness" of HIV/AIDS and forgotten its most basic and ordinary feature. For any infectious disease, diagnosis of the individual is the first step to controlling the epidemic at the community level, and it is also the first step to providing vital medical care and ongoing support to patients. This is particularly true when there are medicines available to slow down disease progression, like ART does for HIV disease. Epidemiologists from the China CDC used actual data from the Henan HIV testing campaign to illustrate its substantial individual benefits, including the fact that for all diagnosed HIV cases, contact information and basic demographic information had been collected, and that all had been provided free ART. They also showed actual data from Henan on the more than 10,000 serodiscordant couples identified, who were followed with HIV education and condom distribution interventions. Epidemiologists from US CDC supported China CDC epidemiologists, particularly emphasizing the importance of the attempt to block the sexual transmission route among this large number of serodicordant couples as a lifesaving strategy, as well as an epidemic control strategy.

No agreement was reached at the meeting. Nevertheless, public health officials were confident in the good they were doing for the Chinese people and the Ministry of Health agreed to continue to conduct active HIV testing campaigns. In 2005, a nationwide campaign among key populations began.

Epidemiologists continue to present HIV testing campaign results at international AIDS conferences, trying to convince international scientific communities that China's HIV testing strategy is scientifically sound, ethical, and effective and efficient in identifying individuals with HIV infection with the intent of getting them linked to prevention, treatment, and care services

12.5 Modernizing China's Comprehensive HIV Testing Program

Since 2004, China has prioritized HIV testing as one of its most important national HIV/AIDS control strategies, with the goal of diagnosing as many individuals infected with HIV as possible, and as early as possible, so that they may be rapidly and durably linked to prevention, treatment, and care services. Although HIV testing strategies have changed over time in China, with greater understanding the HIV epidemic and the significant role HIV testing plays, the overall direction has been to make HIV testing easier to obtain and more tightly linked to treatment and care services.

12.5.1 Target Setting for Promoting HIV Testing

Since HIV infection has a long, asymptomatic incubation period, PLWH can only be diagnosed if they elect to have an HIV test. In general, as the number of people being tested for HIV increases, the number of PLWH being diagnosed also increases, and conversely, the fewer people being tested, the fewer diagnosed. This means that the number and proportion of PLWH diagnosed greatly depends on HIV testing services and how people use these services.

How can the number of PLWH being diagnosed be maximized? Should everyone be encouraged to have an HIV test? Or, should testing instead be more targeted to those at highest risk? How can healthcare providers know exactly who is at risk? These are the kinds of questions that China's public health officials and policymakers grappled with after the conclusion of the active HIV testing campaigns. Decisions needed to be made about how to transition to a broader, larger, and more sustainable HIV testing program for the nation.

Focusing on what they knew (i.e., members of key populations were more likely to be infected), and using what data they had (i.e., number of tests given, and numbers of diagnoses made), China CDC epidemiologists came up with a way to set annual targets of the numbers of cases to be newly identified, and predict the numbers of tests that would have to be conducted to meet the targets. The basic idea comes from weather forecasting. Based on historical data and computing technology, humans can accurately predict the weather in the next few days, even 10 days or more. The thinking was that by using similar logic, we could predict the number of PLWH being diagnosed in a year. The rationale and scientific basis for such predictions are as follows. First, there is a gap between the number of PLWH already diagnosed and the estimated total number of PLWH (including both diagnosed and undiagnosed PLWH). Second, the number of HIV tests conducted and the number of PLWH newly diagnosed in previous years can be used to establish mathematical models that can make predictions. Third, the number of PLWH predicted to be diagnosed should be smaller than the difference between the number of PLWH diagnosed and the estimated total number of PLWH (diagnosed and undiagnosed).

Taking Guangxi Zhuang Autonomous Region (hereafter Guangxi) as an example, the number of newly diagnosed HIV cases where progression to AIDS had not yet occurred increased from 6427 in 2007 to 9116 in 2011, and the number of newly

Table 12.1 Forecasting the number of PLWH that would be diagnosed in Guangxi in 2012 based on historical data

Year	Number of cases newly-diagnosed with HIV infection			Cases of late diagnosis, %
	Not yet progressed to AIDS at diagnosis	Already progressed to AIDS at diagnosis	Total	
2007	6427	2610	9037	28.9
2008	7343	2592	9935	26.1
2009	7059	3590	10,649	33.7
2010	7383	4213	11,596	36.3
2011	9116	5071	14,187	35.7
Forecast for 2012			14,668[a]	
			13,375[b]	
			14,700[c]	

[a]Prediction for 2012 calculated using a linear model developed based on 2007–2011 data
[b]Prediction for 2012 calculated using a log-linear model developed based on 2007–2011 data
[c]Prediction for 2012 calculated using 2012 predictions based on both linear and log-linear models and adjusted for the historical proportion of cases of late diagnosis. This was the value used for target setting for 2012

diagnosed HIV cases where progression to AIDS had already taken place increased from 2610 cases in 2007 to 5071 cases in 2011 (Table 12.1). Therefore, the proportion of cases diagnosed late (i.e., AIDS is already present, CD4 count is <200 cells/mm^3 at first CD4 test after diagnosis) increased from 28.9% in 2007 to 35.7% in 2011. The higher the proportion of cases characterized by late diagnosis, the larger the number of PLWH who remain undiagnosed.

Based on these data, we established a linear model, using the formula:

$$y = 1196x + 7492.5$$

Where y is the number of PLWH expected to be diagnosed in 2012, and x is the number of years between initial year of the dataset (i.e., 2007) and the year that is being predicted (i.e., 2012). Therefore, using this linear model, we predicted that 14,668 PLWH would be newly diagnosed with HIV infection in 2012.

Similarly, based the 2007–2011 data, we developed a log-linear model, using the formula:

$$y = 2751.4 \ln(x) + 8446.3$$

where again, y is the number of PLWH expected to be diagnosed in 2012, and x is the number of years between initial year of the dataset (i.e., 2007) and the year that is being predicted (i.e., 2012). Therefore, using this log-linear model, we predicted that 13,375 PLWH would be newly diagnosed with HIV infection in 2012.

However, it was clear that the proportion of individuals who were being diagnosed late remained high between 2007 and 2011, which suggested that perhaps our linear and log-linear model estimates should be increased. Therefore, after this upward adjustment, the number of PLWH predicted to be diagnosed in 2012 in Guangxi is 14,700.

This method was used for each province to generate an aggregated national target of 77,500 PLWH to be diagnosed nationwide in 2012. This annual target number

of HIV diagnoses was used to drive the scale up of HIV testing programs by then predicting the numbers of HIV tests that needed to be performed across the country in order to find these 77,500 PLWH.

Actual achievement in 2012 surpassed expectations. A total of 82,434 PLWH were diagnosed with HIV infection in 2012, 105.2% of the target. This practice helped keep a strong focus on HIV testing as an important HIV prevention and control strategy in China, and this approach was appreciated by officials who sought to understand the reasoning behind the rate of scale up in HIV testing. The resulting strong support by the Chinese central and local governments for HIV testing programs has been an important key to its success. The number of HIV tests provided increased year over year from 84.2 million in 2011 to 169 million in 2016, and the number of PLWH newly diagnosed also increased year over year from 74,517 in 2011 to 124,555 in 2016.

12.5.2 Voluntary Counselling and Testing (VCT)

HIV VCT has been dramatically scaled up since the large active screening campaigns of 2005 concluded. In 2007, fewer than 3700 testing sites were operating in all of China, most of which provided VCT services funded by international aid organizations. By 2015, this number had skyrocketed to more than 24,700 sites, only one-third of which provided VCT services and nearly all domestically funded. Nearly 2.5 million HIV tests were conducted in 2015 among VCT attendees. Although this represents less than 2% of all tests conducted in China in that year, nearly 30% of the 115,465 newly diagnosed HIV infections found that year were among VCT attendees, for a detection rate 17 times greater than that of all testing settings combined (Pisani and Wu 2017).

Not only is VCT in China today an efficient way to find new HIV cases but a few studies have recently found that VCT was superior to other testing settings (e.g., PITC and MHT) at diagnosing individuals early (Cheng et al. 2016; Meng et al. 2018), before CD4 counts had declined below the 350 cells/mm^3 level, which is important for reaping the individual and public health benefits of early ART initiation (World Health Organization 2016a, b).

Nevertheless, the HIV VCT approach has many challenges that China's National HIV Testing Program has yet to overcome. Because VCT rightly remains an "opt-in" approach, meaning that citizens must seek out and obtain counselling at a VCT location and then choose to have blood taken for testing, VCT attendees must first have some HIV/AIDS knowledge, perceive themselves to be at some risk of acquiring HIV infection, and place value on knowing their HIV status. However, sexual health education remains inadequate and severe stigma and discrimination persist causing low uptake of VCT among many of China's most vulnerable—migrant workers, FSW, MSM, PWID, and others. Although VCT knowledge, acceptability, uptake, and repeated uptake have been well studied among key populations in China (Du et al. 2012; Lau et al. 2015; Meng et al. 2018; Wang et al. 2010; Zhang et al. 2012, 2013; Zou et al. 2013), it remains a difficult task to encourage individuals to attend VCT.

Even more challenging will be the task of encouraging the general public to understand and consider their risk of HIV and seek out and attend VCT. China's HIV epidemic has evolved over the past several years. The main routes of transmission in 2008 and prior, including most importantly injecting drug use, have been overtaken by sexual transmission. Beginning in 2014, sexual transmission was responsible for more than 90% of newly diagnosed HIV cases each year (Pisani and Wu 2017). China must do more to ensure that focus on prevention, testing, and linkage to care interventions for key populations are adapted and expanded to those at risk for infection via heterosexual contact.

Lastly, although not unique to VCT, failure to receive HIV test results remains a persistent problem. Because testing is often still slow, and results notification is even slower, many who receive testing never receive their results (Ma et al. 2013). A recent meta-analysis of rapid VCT (i.e., an alternative VCT model in which rapid screening tests are used to obtain same-day results) found that compared to standard VCT, odds of successful receipt of test results improved by 74% (Wang et al. 2015). Since knowledge of HIV status is important for subsequent linkage to HIV care, China should consider this model for a future upgrade of its VCT services.

12.5.3 Provider-Initiated Testing and Counselling (PITC)

HIV PITC has also been rapidly scaled up since 2007. In 2015, roughly 84.5 million HIV screening tests were conducted in the context of PITC, and a total of 58,592 newly diagnosed HIV cases were found using this method in 2015, slightly more than 50% of all new cases identified that year (Pisani and Wu 2017).

In contrast to VCT, PITC is an "opt-out" strategy whereby patients, generally visiting health facilities for other reasons (pregnancy excluded), are informed by their provider that they will be tested for HIV and are encouraged to accept it but are allowed to decline it. Also, unlike VCT where emphasis is on counseling, PITC places emphasis on testing. Since the principles behind PITC are consistent with the Chinese philosophy of good medical practice, it was immediately accepted and adopted by providers. Among patients, acceptability of this testing strategy is also high, particularly since PITC is generally covered by health insurance or rural health care cooperation programs, meaning most patients only pay 10% of the cost of this service, and many pay nothing.

However, PITC is not provided universally to all patients seeking care at health facilities. Instead, it relies heavily on written or unwritten policies of individual health care institutions and on individual providers' knowledge, training, and experience as well as attitudes and biases. Many health facilities in China now require HIV testing prior to surgical procedures or blood transfusions, largely to limit their own liability should a patient later be diagnosed with HIV infection. Beyond situations when HIV testing is warranted based on, for example, hospital policy, health providers make assessments of their patients' risks of HIV infection and symptoms present and decide whether or not HIV testing is needed.

Although this means that only a very small proportion of patients who visit health facilities each year are indeed screened for HIV via PITC, it remains a controversial

strategy. Some believe it to be a large waste of already-limited resources when considering that the prevalence of HIV at a national level is very low among patients attending health facilities. Furthermore, it is often true that individuals who access health facilities may access them with high frequency, and therefore, could be repeatedly tested for HIV in the same year, particularly if they access different facilities each time.

Nevertheless, PITC is an important strategy for identifying HIV cases among those who do not seek testing on their own through other means (e.g., VCT). Lack of appropriate assessment of risk and failure to seek out testing among PLWH diagnosed in PITC settings is evidenced by their high rates of late presentation (i.e., CD4 count <350 cells/mm^3 at diagnosis or AIDS-defining event at first follow-up) and late presentation with advanced HIV disease (i.e., CD4 count <200 cells/mm^3 and AIDS-defining illness at diagnosis event at first follow-up; Cheng et al. 2016).

Thus, it becomes critically important to ensure that PITC is efficiently applied to the very large population of patients attending health facilities each year in China. One recent study in a large general hospital in Beijing found that 1.4% of patients who sought care between 2011 and 2016 were screened for HIV, and the detection rate during this 6-year period was just under six newly diagnosed infections per 10,000 screened. However, although 70% of those screened were inpatients, nearly 50% of those diagnosed with HIV infection were outpatients. Moreover, screening rates were highest in internal medicine (36%) and surgery (33%) departments, yet detection rates were highest in the STI (153 per 10,000) and emergency (24 per 10,000) departments. It is clear from these data and the above-described national-level data that PITC services need to be better targeted in China's health facilities, with improved focus on outpatients, especially outpatients seeking diagnosis and treatment for STIs (Li et al. 2018).

12.5.4 HIV Testing in Other Settings

Approximately 8.2 million HIV tests were conducted among paid plasma/blood donors and 11.9 million among voluntary donors in China in 2015. Although only approximately 500 new infections were found (Pisani and Wu 2017), the diligent testing of blood product donors is a testament to lessons learned from the tragic outbreak in the mid-1990s that lead to countless deaths and sparked the rapid expansion of China's HIV epidemic. Ensuring the safety of the nation's blood supply remains a top priority for health officials, which means full-coverage testing of donors.

Mandatory HIV testing (MHT) continues to be an important strategy in closed settings in China, such as compulsory detoxification centers, reeducation-through-labor camps, and reform-through-labor prisons. Approximately 1.75 million HIV screening tests were performed among detainees in 2015—19% were administered to drug users, while less than 1% to female sex workers (Pisani and Wu 2017). MHT detection rates among detainees are typically quite high. However, little data exists on HIV testing rates, HIV prevalence, and rates of results notification and successful linkage to treatment and care (Yap et al. 2015; Zhang et al. 2015).

Improved HIV testing coverage for pregnant women has successfully reduced mother-to-child transmission at a national level from 33% in 2003 to 6% in 2014 (Peng et al. 2017). In 2015, nearly 19 million HIV screening tests were provided to women in antenatal care and only 1665 new cases of HIV infection were found for a detection rate of less than 1 per 10,000 (Pisani and Wu 2017). This is a major achievement that has been attributed to excellent support and multi-sector coordination by the Chinese Government with programmatic emphasis placed on acceptability and accessibility of prevention of mother-to-child transmission (PMTCT) services nationwide (Peng et al. 2017).

HIV testing is also offered in the context of pre-marital counselling and for the spouses of PLWH. Uptake of pre-marital testing in 2015 reached 6.5 million tests, among which 2640 newly diagnosed infections were found. By contrast, although uptake of discordant couple testing was much lower, at 45,000 tests in 2015, nearly 10% were newly diagnosed, the highest detection rate among all testing settings, 843 per 10,000 (Pisani and Wu 2017).

Intervention for key populations (e.g., MSM, PWID, FSW, migrants) plays a significant role in controlling the spread of HIV and the expansion of the national epidemic. Overall, more than eight million HIV screening tests were provided in 2015, a large proportion of which were intended to improve testing coverage for key populations including testing in entertainment places and for special surveys (Pisani and Wu 2017). Since 2008, the number of individuals in key population being tested for HIV was tabulated nationwide and used as a core indicator to monitor implementation of interventions for key populations (Table 12.2).

12.5.5 HIV Self-Testing

Despite the more than 30 years that have elapsed since the beginning of the global HIV epidemic and all the knowledge and understanding about this disease we have accumulated, HIV infection still carries with it profound stigma. Fear of stigma and discrimination, and in some cases violence, remains a huge barrier to HIV testing, even among those who suspect they might be infected. Many in China do not want to be seen entering a VCT clinic or do not want their true identifying information

Table 12.2 The number of HIV tests and HIV diagnoses among two key populations in China, 2011–2016

Year	Number of HIV tests provided to MSM	Number of MSM who tested HIV-positive	Number of HIV tests provided to FSW	Number of FSW who tested HIV-positive
2011	168,000	6794	660,000	1016
2012	342,000	10,740	1,088,000	1130
2013	392,000	10,933	1,094,000	1127
2014	406,000	13,770	950,000	722
2015	469,000	16,458	972,000	789
2016	512,000	17,937	986,000	867

MSM men who have sex with men, *FSW* female sex workers

recorded. They prefer their infection status remain uncertain or unconfirmed, rather than risk exposure as having accessed testing, or even worse, risk exposure as having HIV infection. Mistrust of privacy and confidentiality assurances by testing venues is high and worry over one's HIV-positive serostatus being revealed to others is constant.

HIV self-testing may be an important new option for those who do not choose to access conventional facility-based testing services such as VCT or PITC or do not access them with enough frequency (Estem et al. 2016; World Health Organization 2016b; Xu et al. 2013; Xun et al. 2013). For example, among MSM in China, HIV prevalence is rapidly rising and national guidelines recommend testing every six months yet testing rates among this population have historically remained low (National Health and Family Planning Commission 2015; Tang et al. 2016; Zou et al. 2012). Many barriers to HIV testing have been well-documented among Chinese MSM. These include fear of stigma and discrimination both socially and by medical personnel at testing facilities, concerns over confidentiality and privacy, inconvenience in testing facility locations or hours, poor service quality, and long waiting times to obtain the results (Liu et al. 2015; Tang et al. 2016; Tao et al. 2014; Wei et al. 2014).

In China, a wide range of HIV self-testing kit products are available for purchase online and at HIV/AIDS clinics, hospitals, pharmacies, and China CDC offices. These products are not regulated by the State Food and Drug Administration (SFDA) and, officially, they are neither promoted nor restricted (Han et al. 2014, 2016; Tang et al. 2016). Two types of HIV self-testing kits are most common—one using fingertip blood, and the other using salvia. The cost per kit ranges from CNY 30 to 50 (approximately USD 5–8), including delivery fees.

A series of recent studies on HIV self-testing among MSM in Beijing has found a nearly 40% rate of uptake of HIV self-testing and over 92% reported willingness to use this testing method in the future. However, the low rate of HIV care-seeking after HIV self-testing—just 16% overall, and only 11% among those who reported having reactive, uncertain, or unknown results—is very worrisome (Ren et al. 2017a, b).

HIV self-testing has the potential to improve testing rates in China, particularly among vulnerable and hidden populations like MSM. However, major improvements in linkage to further HIV testing and care for people who choose HIV self-testing methods is urgently needed. Furthermore, HIV self-testing kit manufacturers should simplify testing procedures and instructions for use and Chinese authorities should begin to regulate HIV self-testing kits so that consumers can have more confidence in product quality and reliability.

12.6 Challenges

Although China has made significant progress in terms of promoting of HIV testing, many challenges remain. First, there is still a considerable gap between the number of people being infected with HIV and the number of people being diagnosed with

HIV. At the end of 2015, an estimated 276,000 PLWH remained undiagnosed, which translates to approximately one-third of the total estimated number of PLWH in China (Ma et al. 2018). Since 2014, the majority of undiagnosed PLWH is becoming infected through sexual contact. All other transmission routes have been reduced to a very small minority of new infections. Most of these are likely transmissions via sharing of drug-injecting equipment among people who inject drugs (PWID); since universal screening of pregnant women for HIV, HBV, and syphilis has been implemented nationwide, nucleic acid testing of donated blood has been implemented nationwide, and all infected FPD have already been diagnosed and/or died (National Health and Family Planning Commission 2015; Pisani and Wu 2017). China needs to improve sexual health education and encourage development of social norms related to self-care that are encouraging of regular HIV testing uptake, especially among MSM (see Chaps. 7 and 8).

Second, a substantial proportion of PLWH are diagnosed at a late stage. A recent nationwide retrospective study of all adults (≥15 years of age) diagnosed with HIV infection in China between 2006 and 2014 found that 34% received late diagnoses, indicating already long duration of infection (Tang et al. 2018). Importantly, the consequences of late diagnosis are serious—morbidity and mortality are elevated, and risk of onward transmission remains high. For example, improved timeliness of diagnosis was estimated to result in a 54% increased survival rate in a large nationwide cohort (Tang et al. 2018). China must work to ensure that HIV testing becomes a normal, accepted part of regular self-care so that HIV infection may be diagnosed sooner, and infected individuals may be initiated on treatment earlier.

Third, despite its many advantages, HIV self-testing still faces barriers to scale-up. Because successful performance of HIV self-testing depends upon the user's ability to read and interpret self-test kit instructions, properly perform the test, and read and interpret the results, this test strategy will continue to limit uptake to more educated individuals. Furthermore, since HIV screening is still considered a "medical procedure," HIV self-testing kits are largely only available online. This further limits HIV self-testing uptake for younger individuals. Finally, HIV self-testing is officially neither encouraged nor discouraged, despite considerable evidence internationally that this testing strategy is important for hard-to-reach populations. A more supportive policy environment is needed so that this testing strategy can be scaled up and actively promoted, the quality of kits can be regulated, instructions can be improved, and access can be expanded.

12.7 Conclusions

Over the past three decades, China has completely shifted its attitude toward HIV testing from denial to reluctance to acceptance, and finally to pioneering, taking a bold and controversial new path toward active testing. HIV testing has since been recognized as a core intervention for key populations, and China's use of forecasting and target setting to drive the expansion of HIV testing coverage and promote HIV testing among key populations has resulted in improved rates of diagnosis as

well as improved timeliness of diagnosis. Today, China's HIV testing program is remarkable, yet many people remained undiagnosed and challenges persist. China still has a long way to go to reach the 90-90-90 Targets, but renewed effort toward improving testing strategies can be an important next step toward reaching these goals.

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Part III

Treatment

Strategy to Achieve Full Coverage in the National Free Antiretroviral Therapy Program

13

Fujie Zhang, Ye Ma, Yan Zhao, and Willa Dong

Abstract

The mode of HIV treatment in China is distinctive compared to the rest of the world—the Government of China is responsible for providing financial support to test and treat people living with HIV and lead the development of strategies to prevent and control the spread of HIV. Early in the epidemic, most people living with HIV were poor and could not afford treatment. In addition, the lack of physicians with experience in antiretroviral therapy (ART) was also a huge challenge before 2000. Numerous HIV infections were reported among former plasma donors infected at blood collection centers in the mid-1990s. Ten years since becoming infected, most people living with HIV developed AIDS and died in 2001–2002 due to lack of timely treatment. In response, the Chinese government piloted an emergency response program in high prevalence villages in Henan to provide free ART beginning in 2002. In 2003, Premier Wen Jiabao announced the "Four Frees and One Care" policy. In 2004, the Department of Treatment and Care at the National Center for AIDS/STD Control and Prevention (NCAIDS) commenced the development of an information system to track ART patients. China's National Free ART Program (NFATP) has since been quickly scaled up. The eligibility criteria for initiating ART have been adjusted from CD4 cell count less than 200–350 cells/mm^3 in 2008, then 500 cells/mm^3 in 2014, and finally for all people living with HIV, regardless their CD4 cell count, in 2016. By the end of 2017, the NFATP had enrolled and provided ART for 609,829 people living with HIV (including 5669 pediatric patients), with a coverage of 80.4%. Overall mortality decreased from 18.4% in 2005 to 4.2% in 2015. China has had remarkable success in implementing HIV treatment, but there is still a long way to go to continue improve coverage and effectiveness of treatment.

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13.1 Background

The evolution of the HIV/AIDS epidemic in China can be divided into three phases, i.e., initial phase (1985–1988), disseminating phase (1989–1994), and growth phase (1995–present) (Wang and Wang 2010; Sun et al. 2007). Since 1999, the number of reported HIV/AIDS cases has increased by 30% every year. The HIV/AIDS epidemic has been reported in all 31 provinces/autonomous regions/municipalities in China. The annual number of newly identified HIV/AIDS cases increased by more than 58%, from 5201 in 2000 to 8219 in 2001. In 2003 and 2004, because of the massive HIV screening campaign among former plasma donors in Henan Province, the national number of newly reported cases in these 2 years increased by more than 100%. After that, the number of newly reported HIV cases increased from 56,362 in 2008 to 134,512 in 2017. By the end of 2017, a cumulative total of 758,610 cases had been identified in China (National Center for AIDS/STD Control and Prevention and Chinese Center for Disease Control and Prevention 2018).

AIDS patients have an average lifespan of 12–18 months after a diagnosis of AIDS if no antiretroviral therapy (ART) is available. The deaths of many AIDS patients have not only had a serious impact on individuals and families but have also affected social stability and development. The development and improvement of antiretroviral drugs (ARVs) have brought new hope to people living with HIV (PLWH). In developed countries, ART has significantly prolonged life and improved the quality of life since 1996. Due to the successful application of ART, AIDS is not the "plague" we feared it was any more, but rather a treatable chronic disease. However, during the second decade following the discovery of HIV, the treatment situation is less optimistic. Since most PLWH (95%) were living in developing countries where limited medical resources could not meet actual needs, only 8% of the nearly six million eligible AIDS patients worldwide had access to ART (UNAIDS 2003). Thanks largely to funding from the United States President's Emergency Plan for AIDS Relief (PEPFAR) and The Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund), the accessibility of ART has increased substantially. As of December 2012, an estimated 9.7 million people in developing countries were receiving ART, an increase of 1.6 million over 2011 (UNAIDS 2013).

ART can also prevent secondary transmission of HIV, and this prevention strategy is widely known as "Treatment as Prevention" (Cohen et al. 2011, 2013). Although there is some disagreement about the large-scale application of ART in resource-limited settings, particularly concerns about the rising development of drug resistance (DR), such disputes have gradually been addressed and consensus has been reached after weighing risks against benefits. The World Health Organization (WHO) has launched a series of initiatives such as "Universal Access" and "Treatment 2.0," to promote the scaleup of ART in all countries. In cooperation with international organizations, the Government of China has initiated an active response.

13.2 History of ART Development in China

The care and treatment of HIV/AIDS is complicated—any failure in a single component will affect the quality of ART effectiveness. Therefore, stringent requirements were imposed on medical staff involved in the delivery of ART. ARVs were first marketed in China in 1999. At that time, hospitals in some large cities had access to ARVs through clinical trials, and some domestic clinical experts became familiar with ART. At the very beginning of the epidemic, AIDS patients had to pay for ART and associated services just like for many other diseases. However, the cost of ART was very high, and most AIDS patients were living in rural areas with poor medical conditions and their families were unable to afford ART. This was a huge challenge both in China and globally.

In the early stage of the HIV/AIDS epidemic, numerous HIV infections were reported among former plasma donors infected at blood collection centers in the mid-1990s (Wu et al. 1995; Dou et al. 2010a). Ten years after infection, most had developed AIDS and died in 2001–2002 due to a lack of timely treatment. In response to this serious situation, the Government of China started a pilot program in high prevalence villages and actively provided free ART in an attempt to save lives.

From October 2002 to April 2003, China conducted a pilot project for the implementation of free ART. During the pilot period, AIDS patients were treated in areas with high HIV prevalence and valuable experiences were gained that were then applied to the future national roll-out of ART on a broader scale. The first pilot site for free ART was launched in Shangcai County, Henan. Short-term intensive training was provided to local medical staff and free ARVs were offered to 100 AIDS patients in line with the international standard regimen—zidovudine (AZT, Northeast General Pharmaceutical Factory) + didanosine (ddI, Bristol Myers Squibb) + efavirenz stocrin (EFZ, Merck). At that time, AZT was the only domestically manufactured generic ARV in China. This successful pilot saved the lives of many persons with AIDS. In February 2003, the Chinese Ministry of Health decided to scale up free ART in central China through the Centers for Disease Control and Prevention (CDC) system based on the results of the pilot. The Chinese Ministry of Health promised to provide project areas with free ARVs for 5000 persons. Four China-made generic nucleoside reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs) were developed to help with this effort. These ARVs were procured from Northeast General Pharmaceutical Factory and Shanghai DESANO Pharmaceuticals Limited. Specifically, 80% of AIDS patients received the regimen of AZT/ddI/NVP and 20% received the regimen of stavudine (d4T)/ddI/NVP.

In 2005, the Chinese Government began producing lamivudine (3TC) after several years of negotiation with GlaxoSmithKline (GSK) and was then able to offer the regimens recommended by WHO for resource-limited settings. The new regimens improved efficacy and reduced side effects and toxicity. Also, the government started to provide free CD4 testing for AIDS patients, laying a solid foundation

to increase enrollment of eligible AIDS patients in the ART program and provide indirect evidence for effectiveness evaluation of ART. However, implementation for CD4 and viral load testing still are challenges even in today's NFATP. In 2005, the National ART Information System was officially implemented to collect key data on AIDS patients in order to document the dynamics of ART service delivery, to monitor and evaluate the effectiveness of the ART program, and to identify and address problems in a timely fashion. This system may be one of the most comprehensive ART databases in the world (see Chap. 24 for more information).

In July 2005, China launched the pediatric ART program. The Clinton Foundation donated pediatric ARVs for the pilot work of free pediatric ART in six provinces heavily affected by the HIV/AIDS epidemic in cooperation with the NCAIDS Treatment and Care Division. Treatment regimens, eligibility criteria, and performance indicators were developed for the pilot work, and a pediatric ART information system was created. In 2006, the pediatric ART program was expanded to the whole country. In 2007, pediatric ARVs were procured by the government for free distribution (Zhao et al. 2013b) (see Chap. 14 for more information).

Nevertheless, some AIDS patients receiving first-line regimens suffered from treatment failure and were in urgent need of second-line ARVs. In 2007, pilot work on second-line ART was launched in Henan, Anhui, and Hubei provinces in central China. The regimen of tenofovir (TDF)/3TC/lopinavir (LPV)/ritonavir (RTV) was used and achieved a treatment success rate of over 70%. In 2008, China increased funding support for the provision of free viral load testing in a bid to facilitate direct effectiveness evaluation, identify treatment failure in a timely fashion, and keep up with international standards. In 2009, the "National Protocol for Management of Second-Line HAART" was published to provide guidelines for providing second-line ART to AIDS patients failing first-line regimens or suffering from intolerable to side effects or toxicity. With the support of The Global Fund, drug resistance testing was performed for eligible patients in 2010. Since then, almost all key tests have become available in China. In 2010, the ART information system was upgraded to an online system. By 2012, a total of 10 free ARVs and 30 formulations were being used in China, meeting the basic needs of most AIDS patients. Treatment coverage had reached 63.4% across 2513 sites within 7 years (Zhang et al. 2011). With the scaleup of treatment, the mortality of AIDS patients receiving ART also decreased. Although mortality was observed to reach a peak during the first three months of treatment (22.6/100 person-years), it declined to a steady rate of 4–5/100 person-years after 6 months of treatment and maintained a steady level after that (Zhang et al. 2009). Also, more patients achieved virological suppression. A study showed that 82% of the patients receiving ART for 6–11 months experienced viral suppression (Ma et al. 2010).

13.3 Growing Recognition of Treatment Needs in China

Confronted with the rapid increase in HIV, the Chinese Government took emergency response measures and issued a series of policies to prevent the continuous spread of HIV. In 2001, the "China HIV/AIDS Prevention and Control Five-Year

Action Plan (2001–2005)" established several goals with regards to treatment and care. These goals included a target of 70% of medical institutions above the county level (including general hospitals, infectious disease hospitals, and traditional Chinese medicine hospitals) should be able to provide standard diagnosis, treatment, counseling, and preventive health services for people with HIV (to rise to 90% by 2005) and a target of increasing accessibility to community-based and home-based medical and social care for at least 50% of PLWH by 2005.

At the end of 2002, the Government of China issued a series of policies and made adequate preparations for the forthcoming pilot work and possible subsequent promotion of treatment, in order to increase the accessibility of domestic ARVs. For example, tariff and value-added tax were exempted for imported ARVs. The China Food and Drug Administration allowed fast-tracked importation of ARVs, negotiated price reductions with foreign manufacturers (e.g., Bristol-Meyers Squibb and Merck), assisted four domestic manufacturers in the production and registration of four generic ARVs (i.e., AZT, ddI, d4T, and NVP). These efforts helped to address the issues of high cost and shortages of supply, and laid a solid foundation for the promotion of free ART.

Initially, there were no policies on HIV/AIDS treatment at the national level. Consequently, it was very difficult to implement oversight and management of the free ART program.

In September 2003, Gao Qiang (Vice Minister of the Chinese Ministry of Health) attended a high-level HIV/AIDS meeting of the United Nations (UN) General Assembly and promised to strengthen the construction of the medical assistance system for PLWH and to provide free ARVs for poor AIDS patients on behalf of the Government of China. This was the first national-level political commitment made by China in terms of HIV treatment and care.

On December 1, 2003, Premier Wen Jiabao and Vice Premier Wu Yi of the State Council visited Beijing Ditan Hospital, and talked and shook hands with AIDS patients, and announced the "Four Frees and One Care Policy" for HIV/AIDS treatment (i.e., free ARV drugs to AIDS patients who are rural residents or who are urban residents with financial difficulties; free voluntary counseling and testing (VCT); free treatment for pregnant women with HIV infection to prevent mother-to-child transmission and free HIV testing for newborn babies; free schooling for children orphaned by AIDS; and care and economic assistance to the households of PLWH) (Liu et al. 2010). Additionally, the dissemination of knowledge about HIV/AIDS was strengthened, in an attempt to eliminate discrimination against PLWH (see Chap. 18 for more information).

On March 16, 2004, the Notice of the State Council on Strengthening HIV/AIDS Response stipulated clear requirements for "implementing treatment policies and enhancing the ARV supply" and "providing care and support and strengthening patient management." On November 30 (prior to World AIDS Day), President Hu Jintao visited AIDS patients and medical staff at Beijing You'an Hospital. Before the Spring Festival of 2005, Premier Wen Jiabao visited Shangcai County of Henan Province to talk with people with AIDS, review the HIV/AIDS response, observe medical care for AIDS patients, and spend the Spring Festival with these patients.

To further increase the accessibility of ARVs, the central government recognized ARVs as essential drugs. On May 31, 2004, the Chinese Ministry of Labor and Social Security listed the six free ARVs provided by the state in the Catalogue of Drugs for Basic National Medical Insurance. The new edition of the Catalogue of Drugs for Basic National Medical Insurance and Work Injury Insurance issued on September 13, 2004 then increased the number of ARVs to seven categories and 11 formulations. In June 2005, the Chinese Ministry of Health and Chinese Ministry of Finance jointly issued an official document to include efavirenz (EFV) in the catalogue of free drugs. The increasing inclusion of free ARVs in the catalogue enabled the provision of effective first-line regimens recommended by the WHO.

The 2006–2010, China Action Plan to Prevent and Control HIV/AIDS increased the target ART coverage to over 80% from the previous plan and also included a target of over 90% of eligible PLWH receiving treatment for opportunistic infections (OI) by 2010. The plan also required ART to be standardized and more accessible. Additionally, it emphasized the importance of increasing laboratory capacity for HIV-related testing, strengthening the prevention and treatment of OIs, and addressing HIV and tuberculosis (TB) co-infection.

With growing recognition of treatment needs and great support from the Government of China, the number of PLWH receiving ART has continued to increase. The annual number of new people receiving treatment was 10,000 people per year in 2004–2006, 10,000–30,000 per year in 2007–2010, and a sharp rise to 50,000 per year in 2011–2013, to 107,703 people in 2015, and 131,593 in 2017. Correspondingly, ART clinics increased from 236 in 2003 to nearly 4200 in 2017.

13.4 Management of ART

To fulfill the commitment to free ART provision, the Chinese Ministry of Health, Chinese Ministry of Finance, and State Administration of Traditional Chinese Medicine issued the “Measures for Management of Drug Treatment of HIV/AIDS and Common OIs at No/Reduced Charge (Trial)” (aka “The Measures” WeiJiKongFa [2004] No. 107) and the “Opinions Concerning the Management of HIV Antiviral Treatment” (aka “The Opinions” WeiYiFa [2004] No. 106). These policies defined clear requirements for the organization, implementation, management, and monitoring of ART and the division of responsibilities among different departments. The Measures clearly defined the leading role and primary responsibility of hospitals and clinicians in the delivery of ART and also the responsibility of central and local government departments in financing of ART. The Measures also defined the procurement, distribution, and demand reporting for ARVs, and contained a list of free ARVs and a list of common treatments for OIs. The Opinions defined the management of ART including the responsibilities of health authorities and CDCs at various levels, establishment and responsibility of ART clinical expert panels at various levels, selection and responsibility of designated hospitals, guidelines for treatment and management of seriously ill patients, and management of patients receiving ART at home and referral between hospitalization and home-based treatment. These

two policies marked the transition of free ART in China from an emergency response to scientifically based management program that was focused on standardization and quality control.

Accordingly, both local and national government units took responsibility for managing the free ART program. Policies were made, funds were provided, and a special unit was authorized to provide technical guidance on ART.

The National Health Commission (NHC, formerly the Ministry of Health) and Ministry of Finance distribute an annual transfer payment with a detailed budget for the NFATP at both national and provincial levels. The funds are distributed to the city level and county level after that. The funds cover the cost of drugs, CD4 and viral load testing, and patients' transportation and work expenditures.

At the national level, authorized by NHC, the National Center for AIDS/STD Control and Prevention (NCAIDS) at the Chinese Center for Disease Control and Prevention (China CDC) is responsible for general management, technical support for ART, and ARV procurement and distribution. Correspondingly, health departments at each level have authorized a special unit to be responsible for local management and implementation of ART.

Designated ART clinics are responsible for all components of HIV treatment and care, including pre-ART counseling and health evaluations, ART initiation, patient management follow-up, dispensing ART medications, and coordinating-associated testing (Fig. 13.1). ART provision has transitioned from an emergency response on an ad hoc basis via ART clinics managed solely by local CDCs to a standardized,

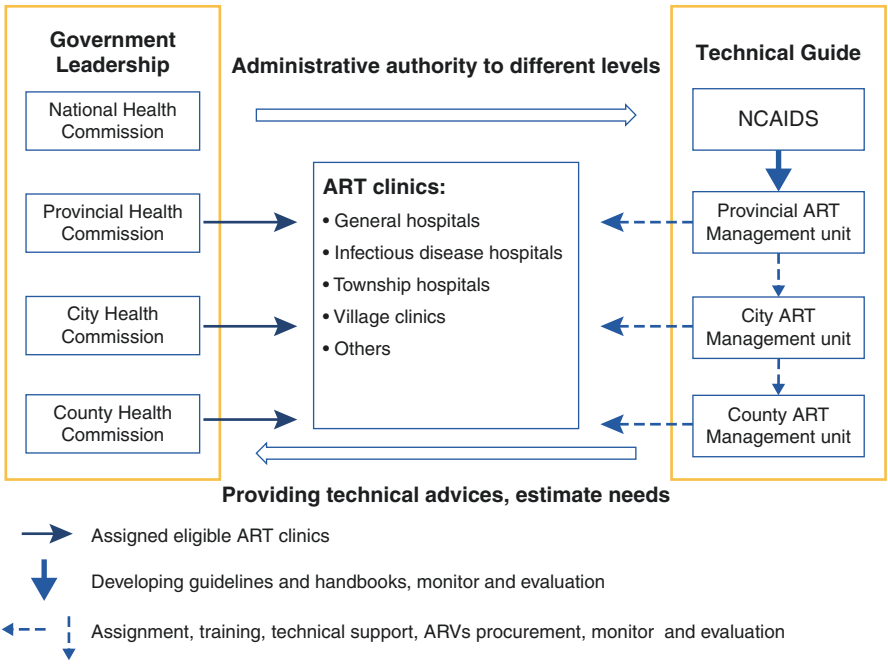


Fig. 13.1 Management of the China ART program

high-quality treatment program delivered through medical institutions. As of 2013, a total of 1968 medical institutions (including township hospitals and village clinics) have provided antiretroviral therapy, which accounted for 76.1% of the total patients receiving ART.

13.5 Chinese ART Database

13.5.1 Evolution of the ART Information System

By the end of 2003, more than 7000 AIDS patients in nine provinces were receiving free ART (Zhang et al. 2005). At this stage, data on free ART were reported to NCAIDS by the provincial level via statistical forms, primarily including the number of AIDS patients receiving free ART, main ART regimens, and the number of AIDS patients enrolled in each regimen.

In order to understand the progress of the National Free ART Program, the number of patients on ART, number of deaths, and those lost-to-follow-up or who had stopped medication, the NCAIDS Division of Care and Treatment commenced the development of the adult ART information system and started to collect data on adults receiving ART. ART providers completed standardized case record forms with the relevant data on each patient follow-up visit, and the paper forms were sent to the NCAIDS server via DataFax (Clinical DataFax Systems Inc., Hamilton, ON, Canada) (Zhang et al. 2007). In 2006, a pediatric ART information system was established along with the development of free pediatric ART. The design of the system took into account the fact that in 2002–2004, the free ART in China was mainly provided by township hospitals or village clinics, and the health workers at these facilities generally had limited skills and experience in providing ART and using computers and the Internet.

To address these issues, the system had the following features:

- *Standardized case record*: Standardized case records were used to help local doctors better understand the diagnosis and treatment workflows, key considerations for the initiation of ART for AIDS patients and for follow-up of ART patients, and the importance of collecting data during the diagnosis and treatment process. In addition to basic demographic data, data on the case record included the date of HIV confirmation, disease progression and laboratory test results before and during ART (e.g., CD4, viral load test (added after 2007), routine blood tests and liver/renal function tests), ART regimen, self-reported medication adherence, side effects, toxicity, and current treatment status.
- *Patient coding system*: A unique code was assigned to each AIDS patient upon the initiation of ART. The code consists of a four-digit code for the county/district where the health facility is located and a 4-digit serial number for the patient.
- *Data collection*: Data were reported via fax, because this was the fastest way possible based on the infrastructure and capabilities of local health facilities in China.

- *Automatic generation of statistical forms*: Based on the ART database, the system could generate various statistical forms automatically, including the cumulative number of AIDS patients receiving ART, current number of AIDS patients on ART, number of deaths, main ART regimens and number of AIDS patients receiving each regimen, and treatment quality supervision indicators recommended in the WHO Patient Monitoring Guidelines.
- *Data accessibility and security*: Data reported to NCAIDS were regularly imported into the China CDC's HIV special reporting system. Authorized administrators at the national, provincial, city, and county levels could conduct online queries and export and analyze ART data and statistical forms.
- *Quality control of data*: Any logic errors in the data were identified manually on a daily basis and fed back to the data reporting facilities. Since 2006, national data quality self-assessment and field sampling surveys were conducted every year.

By the end of 2009, ART had been launched in 1821 counties in 31 provinces, covering a cumulative total of over 80,000 PLWH. The original ART information system was overburdened due to limited human resources, system resources, and fax lines; however, the technical conditions and staff capacities had been remarkably enhanced compared to 2004. The ART information system underwent a major upgrade and renovation in 2008 (Zhao et al. 2013a), with the following improvements:

- *Information collection*: The fax system was replaced with a web-based structure. A data collection software package was installed in each ART facility. The data are entered via the software and directly uploaded to the central server via the Internet, which simplifies and accelerates the information transmission procedure.
- *Data quality control function*: An automatic internal logic check in the database is enabled in the software, while the server enables the detection of duplicate entries of personal identification information of ART patients across China, which enhances the data quality controls.
- *Enhanced data utilization*: The software provides reminders for patient follow-up dates, evaluation of individual patient treatment outcomes, and automatic generation of requests for second-line therapy.

Since drug resistance laboratories in China are mainly located in large cities, it took a long time for drug resistance reports to be fed back to ART providers. The improved ART information system added a drug resistance data collection module. Laboratory reports are directly submitted via the Internet. Thus, ART providers can review drug resistance test reports on a real-time basis. As a result, timely ARV replacement can be facilitated for AIDS patients in need.

13.5.2 Integration into CRIMS

In 2008, the ART information systems were integrated with the case report database within China's new HIV/AIDS Comprehensive Response Information Management

System (CRIMS). Information on patients with the same ID card numbers are linked between treatment and case report records. The linkage makes it possible to track the information on every patient from case identification, to linkage to medical care, to pre-ART follow-up, ART initiation, and ART follow-up and outcomes including treatment failure and death.

13.5.3 Role of ART Information Database

13.5.3.1 Monitoring the Progress of ART

By the end of 2017, nearly 4200 ART providers in 2400 counties/districts in all 31 provinces, autonomous regions, and municipalities had submitted data via the ART information system. Existing data indicate an increasing number of PLWH receiving ART each year (Fig. 13.2) and the proportion of patients on ART receiving viral load testing during the year is also increasing (Fig. 13.3).

13.5.3.2 Evaluating the Effectiveness of the National Free ART Program

Along with the continuous improvement of the national ART database and its integration with CRIMS, the effectiveness of ART can be evaluated in terms of AIDS mortality, immunological effects, and virological effects.

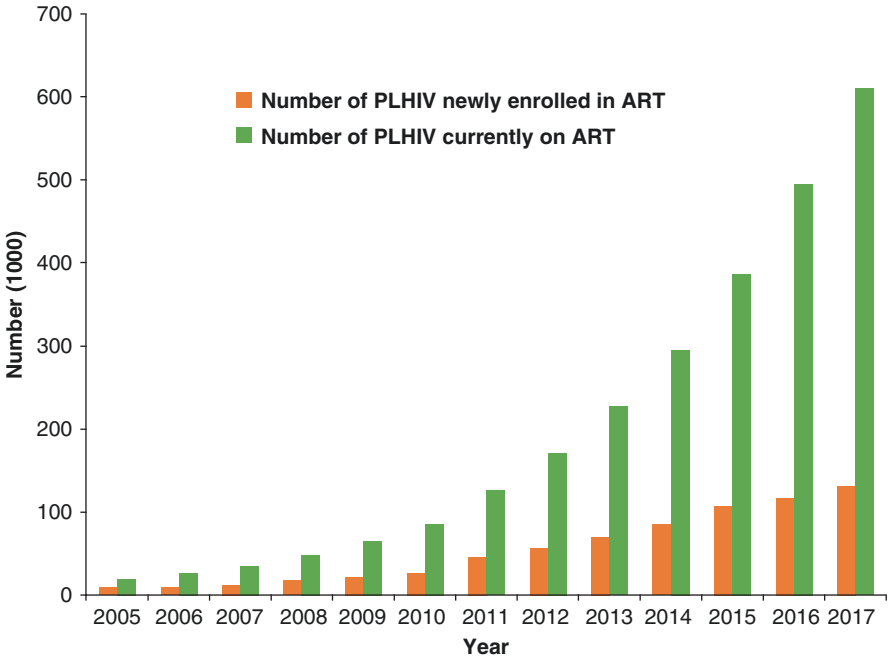


Fig. 13.2 Trend in number of AIDS patients newly enrolled and currently on in ART annually

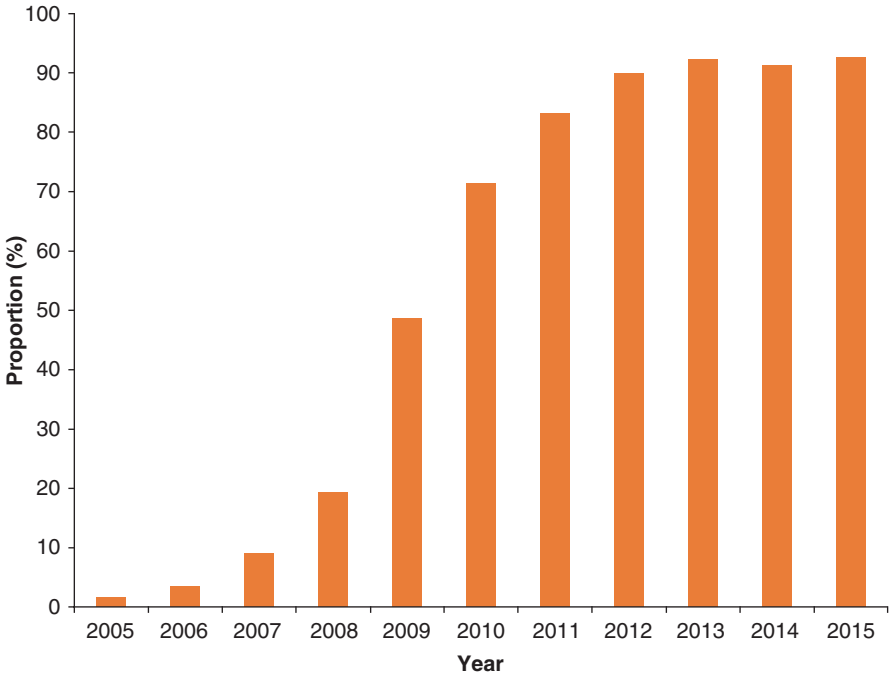


Fig. 13.3 Proportion of patients receiving viral load testing

13.5.3.3 Forecasting the Need for ART

Analyses of CD4 results and treatment outcomes were adopted to estimate and forecast national- and provincial-level numbers of PLWH in need of ART, so as to provide evidence for planning the demand for ARVs (Xia Liu et al. 2011). Since 2011, target numbers of newly treated PLWH have been projected based on the data in CRIMS. This method of target setting has accelerated the expansion of ART. In the 2017, 131,593 PLWH initiated ART in the NFATP (Fig. 13.2).

13.6 Prevention and Treatment of Common OIs/Co-infections

Tuberculosis (TB) is the most common complication observed among PLWH. In China, TB and HIV/AIDS are managed by two independent systems, without effective communication. Over time, increasing attention has been paid to TB/HIV co-infection. In March 2005, the Chinese Ministry of Health issued a notice requiring TB screening among PLWH and TB treatment for PLWH who were also diagnosed with TB. Also in 2005, China won the support of China Global Fund TB Program Round 5 to implement TB/HIV collaborative activities in program areas of the China Global Fund AIDS Program Round 4. The implementation of collaborative activities improved the timing and regimen design for the initiation of TB and HIV treatment in TB/HIV co-infected patients as clearly required by the third edition

of the China Free ART Manual and the National TB Control Program. In 2011, the National Center for TB Control and Prevention (NCTB) organized experts to compile technical guidelines for TB screening and management among PLWH. A meta-analysis found the prevalence of TB among PLWH to be 7.2% (4.2–12.3%) (Gao et al. 2010) (see Chap. 4 for more information).

Compared with ART, which is relatively complex and expensive to administer, the treatment and prevention of many OIs require simple screening and follow-up and relatively cheap drugs. One example is the prevention of *Pneumocystis carinii* pneumonia (PCP) with cotrimoxazole (CTX). WHO and the Joint United Nations Programme on HIV/AIDS (UNAIDS) have recommended CTX as a component of the standard medical service package for PLWH as it significantly reduces mortality in AIDS patients (Badri et al. 2001). Moreover, CTX is effective in the prevention and treatment of many other OIs in addition to PCP. China has developed a technical protocol for the prevention of HIV-related OIs with CTX, which is included in the China Free ART Manual.

Hepatitis co-infection is another concern for treatment among PLWH. Because of shared transmission routes, many PLWH are also infected with hepatitis B virus (HBV) and/or hepatitis C virus (HCV), particularly among key populations in both developing and developed countries (Kim et al. 2008). As ART had decreased AIDS-related deaths substantially and extended the average life expectancies of PLWH, chronic hepatitis-related liver diseases have become a growing concern (Thio et al. 2002; Weber et al. 2006). Therefore, more attention should be directed to the case management and treatment needs of PLWH with hepatitis (see Chap. 4 for more information).

With the spread of the HIV epidemic, *Penicillium marneffei* has emerged as an important fungal pathogen among people with AIDS, and the presence of *P. marneffei* infection is considered as an AIDS-defining disease. Numerous *P. marneffei* infections have been reported in the southern part of China including Guangxi Zhuang Autonomous Region, Yunnan Province, Guangdong Province, and Hong Kong (Hung et al. 1998; Ranjana et al. 2002). Therefore, it is critical for policy makers to take actions to prevent the spread *P. marneffei* among PLWH.

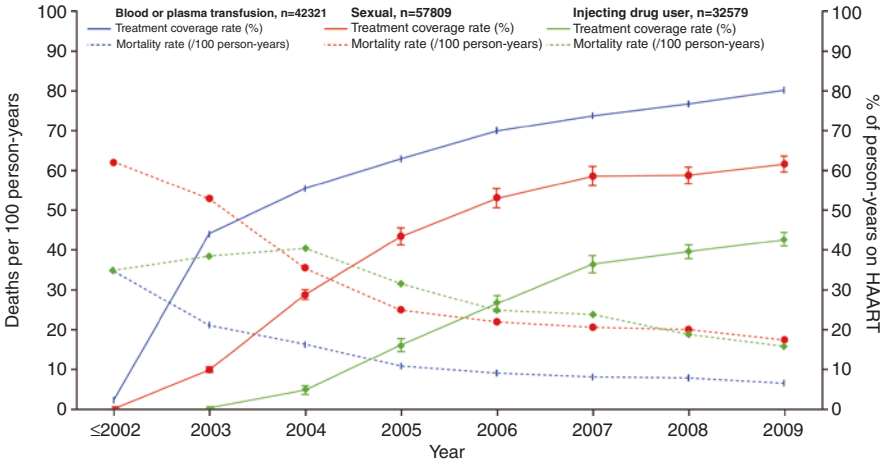
13.7 Effectiveness of Chinese ART

To evaluate the rapidly expanding NFATP more effectively, NCAIDS established a nationwide observational cohort in September 2004. Standardized case report forms (CRFs) were completed at each patient visit and faxed to NCAIDS via DataFax (Clinical DataFax Systems Inc., Hamilton, ON, Canada) prior to 2010. After 2010, data entry was changed to an Internet-based, electronic ART database system (Ma et al. 2009; Zhao et al. 2013a). Every clinic that provided free ART services in China was requested to provide data to the national database. Pediatric data were integrated to the national database in 2006 and added to a special module of drug resistance in 2010. Follow-up visits were scheduled at 0.5, 1, 2, 3 months, and once every three months thereafter. Additional follow-up visits were scheduled as needed.

During each visit, patient information collected included ART regimen, side effects, laboratory testing (i.e., CD4 count and viral load), and self-reported adherence. Laboratories uploaded drug resistance reports to the Internet where they were linked to patient records. The National HIV Reference Laboratory at NCAIDS provided quality assurance and quality control support to all laboratories that conducted HIV screening, Western blot confirmatory testing, CD4 count testing, viral load testing, and drug resistance assessments.

By the end of 2017, the NFATP had enrolled and provided ART for over 756,600 PLHIV, among whom 609,829 (80.6%) were currently still on ART (including 5669 pediatric patients). The cohort database has become an essential monitoring and evaluation tool for the NFATP and an important data repository to support research on ART. This research has focused on, for example, virologic outcomes, immune response, patient attrition, and mortality within the ART program (Dou et al. 2010a, b; Ma et al. 2010; Wen et al. 2011; Zhang et al. 2009, 2011, 2012; Zhu et al. 2012, 2013). Analysis of treatment outcomes informed modifications and improvements made to the NFATP. Results were analyzed in previous years to evaluate the effectiveness of the Chinese ART, with several trends emerging:

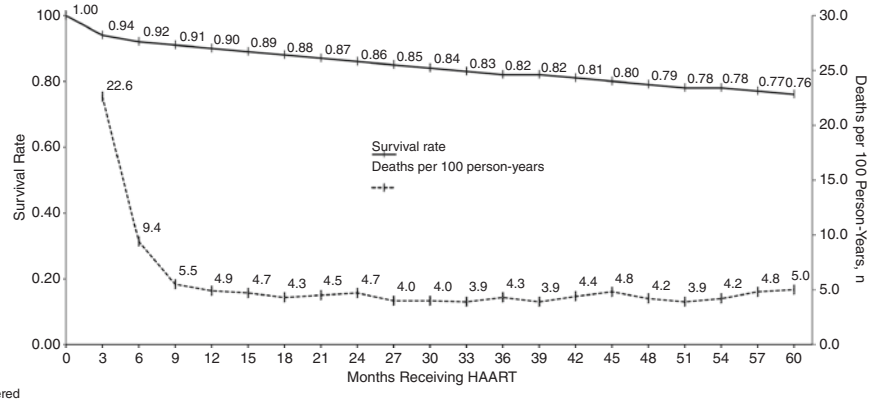
- Characteristics of PLWH receiving ART has changed. Since PLWH who were former plasma donors (FPD) were prioritized in the early days of China's HIV/AIDS response and were the first to receive ART, it was not surprising to find that according to data extracted from the national ART information system, 100% of ART recipients in 2002 were FPD. However, by 2009, the proportion of all ART patients who were FPD had fallen dramatically and a majority (59%) of all ART patients had been infected through sexual transmission routes (Dou et al. 2010a, b).
- As ART coverage increased, mortality rates among PLWH decreased. Zhang and colleagues found that the overall mortality among more than 320,000 PLWH in China as of the end of 2009 had fallen from 39 per 100 person-years (PY) in 2002 to 14 per 100 PY in 2009. Notably, ART coverage had risen from 0% to 63% during this 2002 to 2009 period (Zhang et al. 2011) (Fig. 13.4).
- Mortality rates decline again after PLWH are on ART 6 months. Another study found that although mortality among PLWH on ART reached a peak during the first three months of treatment (23 per 100 per year), it declined to a stable rate of 4–5 per 100 per year after 6 months on ART (Zhang et al. 2009) (Fig. 13.5).
- Increase in CD4 count at ART initiation over time. It has been well-known for some time that patients with lower initial CD4 counts had a higher risk of death. With the increase of ART coverage and effective implementation of treatment policies, the initial CD4 count among PLWH in China starting ART has gradually increased over time. One study found that from 2006 to 2009, CD4 count at baseline increased each year (Wen et al. 2011).
- Increasing success with respect to virological suppression rates. Although annual free viral load (VL) testing was made available to all ART patients beginning in 2007, capacity for conducting VL testing was limited since it required skilled laboratory personnel and well-equipped laboratory space. As a result, a large



Total number of newly diagnosed patients who are treatment eligible, by route of HIV infection

Blood or plasma transfusion	2378	6999	14614	5195	3953	3228	3563	2391
Sexual	642	428	1542	2988	5096	8953	16955	21205
Injecting drug use	1408	375	1125	3062	3499	5461	9382	8267

Fig. 13.4 Mortality and midpoint treatment coverage rates over time stratified by route of HIV infection



Entered interval, n	48785	39403	35378	32227	29175	26278	23891	21805	19802	17789	16136	14351	12693	10810	9294	7263	5394	4119	3020	2178
Censored during interval, n	6887	3150	2684	2677	2570	2118	1832	1760	1824	1483	1635	1513	1768	1406	1932	1803	1229	1062	811	957
Deaths during interval, n	2495	875	467	375	327	269	254	243	189	170	150	145	115	110	99	66	46	37	31	21

Fig. 13.5 Overall change over time by mortality and life table survival rate in the National Free Antiretroviral Treatment Program, China, 2002–2008

proportion of VL-testing eligible ART patients did not receive VL testing, thereby missing out on the opportunity to benefit this crucial monitoring of treatment effectiveness. Lack of VL results in patient records also prevented measurement of programmatic effectiveness on arguably the most critical of all treatment out-

comes. Fortunately, over time, VL testing coverage has improved. The first major study to examine the viral suppression outcome among NFATP patients was published in 2010 (Ma et al. 2010). The study showed that the virologic outcomes for patients on ART in China were similar to other countries, but these results also serve as a reminder to further develop the drug supply and improve training and supervision, especially in rural ART clinics. After this study, NCAIDS directed more attention toward VL testing as a monitoring tool and promoted the scale up of VL testing coverage.

- Retention of PLWH in ART continues to be a concern. Zhu et al. conducted a nationwide cohort study among all PLWH in China who initiated ART at any time between 2003 and 2010. The cumulative probability of dropping out of ART was 9% at 1 year, 16% at 2 years, and 24% at 5 years. Factors associated with dropping out of ART included being younger, male, and single or divorced, and having higher baseline CD4 counts (Zhu et al. 2012).

13.8 Challenges

Although many lessons have already been learned during the process of scaling up ART, several challenges remain. Further plans for the NFATP are rapidly moving forward to face these challenges.

ART coverage among special populations needs to be further expanded. Although ART coverage was significantly increased during the 11th Five-Year Plan, more attention needs to be paid to special populations including PWID and migrants. For example, ART coverage was only 52% among drug users in 2015 (Ma et al. 2018).

Late diagnosis is still a serious issue among PLWH. Analysis of annual mortality found that nearly 80% of HIV/AIDS-related deaths occur before the initiation of ART. The average duration from diagnosis to death was 7 months. The result of the first CD4 test was 91 cells/μL (23–240), of which 37.8% had a CD4 <50 cells/μL. From 2007 to 2010, the average baseline CD4 count of AIDS patients receiving ART was about 140 cells/μL, of which 37–40% had a CD4 < 100 cells/μL (Dou et al. 2010b). Therefore, it is still a challenge to identify HIV early, particularly for patients with low CD4 (National Center for AIDS/STD Control and Prevention and Chinese Center for Disease Control and Prevention 2018).

The number of ARV formulations available in China is limited. To date, China has not adopted the first-line regimens recommended by WHO in its ART manual in 2009. In China, current first-line regimens include TDF/AZT + 3TC + EFV/NVP. During drug resistance testing in 2010, 17% of AIDS patients with virological failure (viral load >1000 copies per mL) were found to have resistance to TDF and 3TC. Although drug resistance transmission in China is below the warning level defined by the WHO, it remains a problem in certain areas. Combating drug resistance transmission must be a focus in future treatment policies (Sohn et al. 2013).

The capacity of local medical staff needs to be strengthened. According to the evaluation findings, the virological success rate at ART facilities that are at prefecture level or provincial level is significantly lower than that at ART facilities at the county level or township levels.

Special attention needs to be paid to viral and bacterial co-infection. China is heavily burdened with high TB and hepatitis prevalence, resulting in high HIV/TB or HIV/viral hepatitis co-infection rates. As indicated by a meta-analysis, the surface antigen positive rate of hepatitis B virus was about 12% among PLWH, and HIV/hepatitis C co-infected patients accounted for about 60% of all PLWH in Africa (Barth et al. 2010). Mortality of co-infected patients is very high, and interactions between anti-TB drugs and ARVs increase the difficulty in treating such patients. Co-infection leads to accelerated disease progression in PLWH and changes in the patterns of complications (Thio et al. 2002; Weber et al. 2006). Meanwhile, PLWH co-infected with viral hepatitis face a higher risk of adverse events related to liver toxicity due to ART (Nunez 2010; Labarga et al. 2007). Therefore, it is an urgent priority to explore improved diagnostics and treatment protocols for co-infected patients.

Although ART is becoming widely accessible in China, maintenance (i.e., adherence and persistence) while in treatment remains a substantial challenge (Shiu et al. 2013). Reasons for missing doses include being away from home, and forgetting (Wang et al. 2008). Poor communication between physicians and patients may also impede adherence (Chen et al. 2007). Moreover, treatment dropout and cessation have been serious problems within China's NFATP since its inception. Therefore, local health workers are encouraged to identify the barriers to adherence and persistence to maximize the effectiveness of ART.

PLWH and their families in China still face serious stigma and discrimination (Zhang et al. 2014) and it persistently impacts the effectiveness of intervention strategies designed to reduce transmission, improve prevention, testing, and treatment uptake (Jia et al. 2013; Cohen et al. 2012), and encourage engagement in harm reduction programs such as needle exchange (Philbin and Zhang 2010) and methadone maintenance treatment.

13.9 Conclusion

In resource-limited settings, such large-scale development of ART inevitably poses serious challenges to both China and the world, because treatment goes beyond a simple medical issue. Successful treatment requires the support of the government, society, and families. China has had remarkable success in implementing HIV treatment. By the end of 2017, there were nearly 4200 ART sites in 2400 counties/districts in all 31 provinces. The NFATP enrolled and provided ART for over 756,600 PLWH, 609,829 (80.8%) of whom were currently still on ART (including 5669 pediatric patients), for a coverage level of 80.4%. Overall mortality decreased from 18.4% in 2005 to 4.2% in 2015. However, there are still challenges that must be overcome. There is still a long way to go to reach full coverage and effectiveness of HIV treatment.

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Treatment of Children Living with HIV in China

14

Yan Zhao, Willa Dong, and Zhongfu Liu

Abstract

Since the discovery of the first pediatric case of HIV in Mainland China in 1985, significant progress has been made in treating children and adolescents through the "Four Frees and One Care" policy. Additionally, since 2004, rapid improvements in access to, and quality of, care have been made through the development of a national treatment program, capacity building, and in-country manufacturing of various pediatric antiretroviral regimens. Overall, the early epidemic continues to be concentrated in central China, but has begun to mirror the distribution of the heterosexual epidemic among adults. Most cases are detected among the very youngest children, aged 0–3 years. Among adolescents, heterosexual transmission for girls and same-sex transmission among males are rapidly increasing. Despite the significant progress made, several challenges remain in treating and preventing HIV among children and adolescents, including rural–urban health disparities, understanding the mental health needs of this group, and weak sex education in schools.

14.1 Introduction

HIV/AIDS treatment and prevention has been particularly challenging among the youngest in China. This chapter begins with the historical, social, and epidemiological context of China's HIV infection among children, continues to a description of China's National Pediatric Antiretroviral Treatment (ART) Program, and concludes with a discussion on some of the unique issues faced by children living with HIV/AIDS in China.

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14.1.1 Historical and Social Context

The pediatric HIV epidemic in China has its origins in the social, political, and economic changes that brought the epidemic to large numbers of women. Most relevant changes that made women at increased risk of HIV infection included resurgence of drug use, resurgence of commercial sex, domestic migration, which resulted in gender imbalance in both rural areas where people move out and in urban areas where people move in, and unsafe donation of blood products in rural areas. The first pediatric case of HIV infection where transmission was traced to receipt of contaminated blood products was observed in a 10-year-old boy in Zhejiang who had hemophilia in 1985. During the 1990s, some women became infected due to partnering with men who injected drugs or through injecting drugs themselves. In the 1990s, the era of unsafe commercial plasma donation in China, some women were also infected through contaminated blood products. With the reintroduction of a market economy, liberalizing sexual attitudes, and relaxation of controls on internal migration, sexual transmission of HIV became a prominent route of infection. Some women began practicing risky behaviors or worked in high-risk environments, including as sex workers or having a HIV positive partner.

14.1.2 Epidemiological Context

14.1.2.1 Mother-to-Child Transmission

Many children were infected with HIV via their mothers who were sex workers, who partnered with men who injected drugs, or who were infected via unsafe blood donation. The increased numbers of women at risk for HIV infection placed their children at risk as well, and many children were infected through mother-to-child transmission (MTCT) of HIV. In 1995, the first case of HIV mother-to-child transmission (MTCT) was documented in Yunnan, when a 3-year-old girl was found to be infected with the virus. Initially, most cases were detected in older children, as younger children most likely died before being diagnosed. In 2004, when mass screening campaigns were conducted, a spike in the number of pediatric cases occurred across all age groups. In subsequent years, especially with the advent of early infant diagnosis (EID), the proportion of cases discovered in younger children has increased. Prior to 2006, children older than 18 months received a confirmatory diagnosis via western blot (WB). It was mandatory for infants and children less than 18 months born from HIV-infected pregnant women to wait 18 months to receive a diagnosis. In 2006, EID was piloted in Yunnan and other provinces, supported by the Clinton Foundation. After 2010 as a result of the national maternal and child health program, early infant diagnosis became common. However, many children are still diagnosed at older ages or have developed AIDS when they receive a confirmatory diagnosis (Fig. 14.1). Since 2009, the number of adolescents under age 18 infected through non-MTCT routes has grown annually.

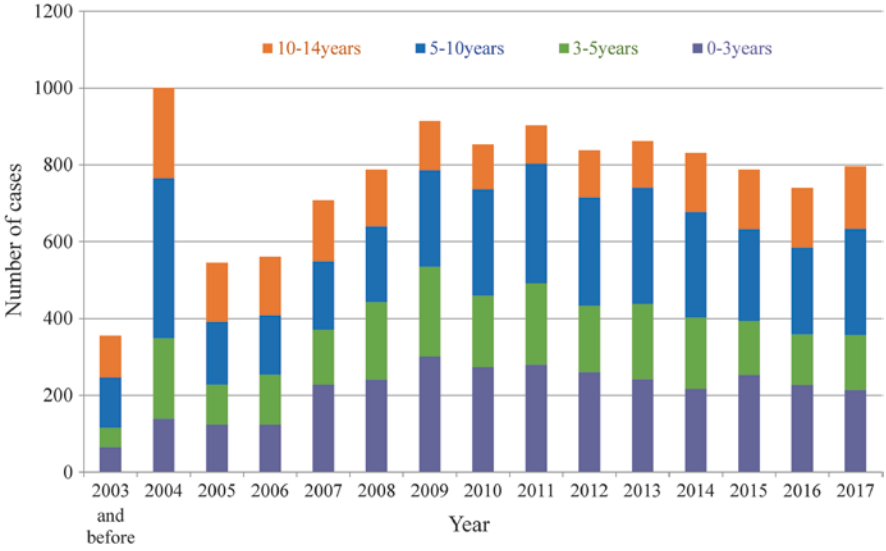

Fig. 14.1 Number of annual diagnosed pediatric HIV cases by age groups in China, 2003–2017

14.1.2.2 Unsafe Blood Donation Practices

In the 1990s, some children were infected through blood and blood product transfusions. In 2004, with the initiation of the HIV screening campaign for former plasma donors (FPD) and their families, pediatric cases began to be discovered. These earliest cases were discovered in central China as a result of transmission from female FPD to their children.

Before 2006, geographically, the pediatric epidemic had been concentrated in Henan and surrounding provinces in central China. Approximately 20% of cases among children were found in central China. However, the epidemic has since expanded to other areas including Guangdong and Guangxi in southern China, Sichuan and Yunnan in southwestern China, and Xinjiang in western China, mirroring the geographic distribution of the adult heterosexual and injection drug use epidemics (Zhao et al. 2006).

14.1.2.3 Sexual Transmission and Sharing Drug Injecting Equipment

Transmission via male–male sexual contact has become the fastest growing route of HIV infection for boys under the age of 18 (Fig. 14.2). Girls becoming infected through heterosexual transmission also represent a rapidly growing group. It is likely that some of these girls are adolescent sex workers, as many are rural-to-urban migrants who report working in the service industry, according to case reporting data (NCAIDS, unpublished data). Similarly, the number of cases of boys becoming infected through heterosexual transmission has been increasing steadily.

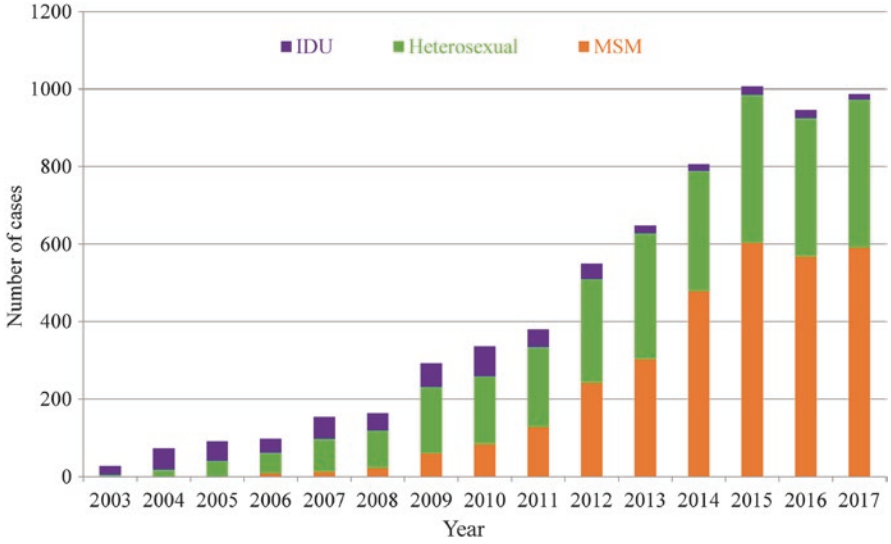

Fig. 14.2 The number of annual reported adolescent HIV cases aged 15–18 years old by transmission mode in China, 2003–2017

However, among those under 18, infection through injecting drug use has been fairly low, and decreasing slightly since 2010.

14.2 The National Pediatric Free Antiretroviral Therapy Program

Although ART had been proven to significantly reduce mortality among adults with HIV/AIDS, pediatric treatment for children with HIV/AIDS was not introduced in China until 2003. The first 288 pediatric HIV/AIDS patients were originally treated with adult antiretroviral (ARV) formulations due to the lack of pediatric ART medicine.

A national pediatric HIV/AIDS treatment program was piloted beginning in July 2005 in provinces with high pediatric HIV prevalence provinces including Henan, Anhui, Hubei, Yunnan, Shanxi, and Guangxi. By the end of 2006, pediatric treatment criteria and regimens as well as monitoring and follow-up guidelines were finalized, and the program expanded nationally. This program, called the National Pediatric Free ART Program (NPTP), is managed by the National Center for AIDS/STD Control and Prevention (NCAIDS), Chinese Center for Disease Control and Prevention (China CDC) under the National Health Commission (formerly the Ministry of Health). Within NCAIDS, the Division of Treatment and Care (DTC) manages the operational and strategic planning of the program. In addition to facilitating the implementation of pediatric treatment services throughout China, the

DTC also provides technical support to hospitals specializing in HIV care and supervises physician training, manages the drug supply, and collects and analyzes data (Zhao et al. 2010).

14.2.1 Building Treatment Capacity

Although China has become increasingly independent in its management of the NPTP over time, its development, piloting, and expansion required significant capacity building which involved assistance from international partners.

14.2.1.1 International Partners

China has collaborated with several international partners to combat pediatric HIV and AIDS since the start of the epidemic. These organizations have assisted with drug procurement and donation, program development, capacity building, and on-site technical assistance.

Médecins San Frontières (MSF), was one of the earliest organizations that provided treatment for children living with HIV in China. In May 2003, MSF opened its first free HIV treatment clinic in Xiangfan, Hubei Province, central China, providing free ART services for poor, marginalized groups, and children. In cooperation with the Guangxi Department of Health and Guangxi Regional CDC, another free clinic was opened in Nanning, Guangxi Zhuang Autonomous Region, southwestern China (Médecins Sans Frontières 2003). These clinics treated a substantial number of patients from Henan, the epicenter of the epidemic among FPDs. By August 2004, nine children were receiving ARV from the Xiangfan clinic. In addition to providing treatment, MSF also advocated for access to essential medicines prior to the availability of many ARVs in China (Médecins Sans Frontières 2004).

UNICEF was also an early partner in treating children infected with HIV in China in early 2000s. This organization unveiled community-based programs that administered directly observed treatment (i.e., daily taking ARV medicines under supervision of a health professional or trained peer) and provided funding for village health workers to make home visits to rural patients. Additionally, UNICEF established programs that provided psychosocial support to PLWH and provided support for treating infants. The initial community-based treatment program in Henan—the first 6 months of these programs—had positive outcomes.

From 2005 to 2011, the Clinton Foundation played an instrumental role in advancing pediatric HIV/AIDS treatment in China through donating pediatric ARV drugs, providing technical expertise, and creating a training curriculum for building healthcare worker capacity for treating pediatric HIV/AIDS patients. Table 14.1 summarizes the number of ARV medicines donated by the Clinton Foundation in 2005–2011. Their work was especially important in early infant diagnosis and improving infant outcomes as much of their technical assistance was provided at the local level as treating infants requires pediatricians. Additionally, the Clinton Foundation donated ten million dollars for pediatric services at the beginning of the epidemic (Gómez 2009).

Table 14.1 Pediatric ARV medicines donated to China from the Clinton Foundation, 2005–2011

Year	Number of drug types	Units donated (bottles and/or boxes)	Total (USD)
2005	10	47,981	$73,263.76
2006	9	88,994	$144,372.71
2007	8	47,326	$135,753.14
2008	1	139,661	$721,548.33
2009	1	62,560	$517,223.70
2010	6	35,728	$318,566.46
2011	6	35,104	$466,711.37
Total		457,354	$2,377,439.47

14.2.1.2 Healthcare Workers

Before 2005, domestic expertise on managing pediatric HIV was insufficient. The few pediatric and infectious disease specialists in China rarely had the opportunity to come in contact with pediatric HIV patients, as some died shortly after diagnosis. Building healthcare worker capacity to manage pediatric HIV in China has required the efforts of experts from international organizations, NCAIDS DTC, and other domestic institutions.

Prior to the expansion of the pediatric treatment program, several measures were implemented in the preparation phase in order to build treatment capacity among providers at all levels. Local program managers and healthcare workers, including clinicians, nurses, and laboratory technicians were trained by international experts in the pilot provinces. A national medical team that had been trained overseas was assembled to provide training through lectures and case studies, as well as on-site clinical demonstrations. These trainings also included extensive clinic visits where physicians could observe experts examining and treating patients. Topics in the curriculum included management of opportunistic infections (OIs; especially tuberculosis, skin conditions, and fungal infections), promotion of good hygiene practices (such as hand washing and brushing teeth), and dosage adjustment based on children's weights. Although these issues seem very basic for HIV care in developed countries, there had been little understanding of their significance among local healthcare workers in China. Patient follow-up and regular ongoing site visits by experts every 3 months were also critical components of building capacity for high prevalence areas such as Henan, Xinjiang, and Shanxi. This long-term commitment by international experts to support the growth and development of China's healthcare workforce was critical to the successful building of pediatric HIV treatment capacity in China.

Additionally, a support network was established since 2005 so that local physicians could consult practitioners at province and national levels on case management (Zhao et al. 2010). The DTC also organized semi-annual educational programs on pediatric HIV treatment for physicians. Between 2005 and 2008, almost 500 physicians were trained. Since 2008, the DTC regularly organizes on-site trainings, short-courses, annual trainings, and site visits by experts to provide continuous, ongoing education for healthcare workers.

To support these capacity building activities, educational materials were developed for both clinicians and patients. For healthcare workers, the material supplementing their training included illustrated pamphlets on pediatric HIV, a booklet on mental health concerns and building coping skills among children and adolescents with HIV, and quick reference cards containing information on ARV treatment regimens and their adverse effects. For patients, a calendar was developed to help with scheduling follow-up visits and consultations with specialists.

14.2.1.3 Pediatric Formulations: Development and Manufacturing

Prior to 2005, China had limited access to drug formulations due to the inability to import pediatric ARV drugs, lack of established pediatric treatment guidelines, and little expertise in treating pediatric patients. Additionally, after the adult formulations became available, many domestic companies did not produce pediatric drugs because of the relatively small volume and small pediatric patient population size. The Clinton Foundation provided an initial donation of cotrimaxazole and pediatric ARV medicines for 200 pediatric patients, and the first shipment arrived in May 2005. The Foundation continued to donate pediatric drugs until 2011. Besides providing donated ARV drugs, the Clinton Foundation also helped to build capacity in drug demand and supply forecasting.

After 2011, most pediatric ARV drug formulations are being purchased internally in China and are primarily generics. As the number of children on treatment has gradually risen, the Ministry of Health coordinated with domestic pharmaceutical companies to manufacture pediatric drugs in China. See Table 14.2 for currently available pediatric drugs (Zhao et al. 2010).

Table 14.2 Pediatric antiretroviral medicines currently available in China

Drug	Dose	Formulation	Product
Zidovudine	10 mg/ml	Solution	Branded
	100 mg	Tablet	Domestic
	300 mg	Tablet	
Stavudine	1 mg/ml	Solution	
	15 mg	Tablet	Domestic
	20 mg	Tablet	
Lamivudine	10 mg/ml	Solution	
	150 mg	Tablet	Domestic
	300 mg	Tablet	
Nevirapine	10 mg/ml	Solution	Branded
	200 mg	Tablet	Domestic
Efavirenz	50 mg	Tablet	Domestic
	200 mg	Tablet	Domestic
	600 mg	Tablet	Domestic
Abacavir	20 mg/ml	Solution	Branded
	300 mg	Tablet	
Lopinavir/ritonavir	80 mg/20 mg	Solution	Branded
	200 mg/50 mg	Tablet	
	100 mg/25 mg	Tablet	

14.2.1.4 Pediatric Formulations: Distribution

NCAIDS provides all pediatric drugs to provincial-level drug management institutions. These institutions, as well as drug management institutions at lower levels, are responsible for predicting drug demand and monitoring inventory depletion. The provincial-level institutions distribute drugs to treatment facilities, which report drug demand quarterly. These figures are then reported to the central level by the province to predict drug demand. Additionally, all of these departments have established a drug storage registration system to reduce drug wastage. Currently, NCAIDS has established its own domestic supply of pediatric ARV drugs through in-country manufacturing of generic drugs. Some drugs with brand names will continue to be imported (Zhao et al. 2010).

14.2.1.5 Pediatric ART Database

Similar to adult cases, pediatric cases are reported to an online, real-time database that was established when the pediatric program began. The structure and function of the database is patterned after the adult database. Although pediatric cases could have been tracked inside the adult database, the decision was made to keep the adult and pediatric databases separate since some of the data collected were different. Pediatric cases are transferred to the adult database when patients turn 15 years.

The China CDC and all lower-level CDCs can utilize the case data in the Pediatric ART Database. Provincial CDCs are responsible for monitoring the collection of local data, case reporting, and data management. The types of patient information recorded in the database are as follows (Zhao et al. 2010):

- *At time of ART initiation*: demographics, medical history, baseline laboratory results ($CD4^+$ T-cells [count and %], hematology, chemistries), WHO clinical stage, initial ART regimen, and need for sulfamethoxazole (SMZ).
- *At follow-up visits*: laboratory results (similar to above, plus viral load), self-reported ART regimen adherence, adverse side effects, and ART regimen changes.
- *At time of ART termination*: reason for termination (discontinuation of treatment, loss to follow-up, mortality, transfer of care).

14.2.2 Treatment Eligibility Criteria

The technical guidelines for treating pediatric HIV/AIDS patients in China have evolved since treatment first became available.

From 2004 to 2007, diagnosis of HIV infection never occurred before 18 months of age due to the lack of availability of EID testing. Treatment eligibility criteria during this time were as follows:

- *For children aged 18 months to 5 years*: $CD4^+$ T-cell count must be <500 cells/mm^3 or $CD4^+$ T-cell % must be <15%.
- *For children older than 5 years*: $CD4^+$ T-cell count must be <200 cells/mm^3 or $CD4^+$ T-cell % must be <15%.

From 2007 to 2011, pediatric treatment eligibility criteria were amended to include all children who manifested clinical conditions or symptoms more severe than WHO Stage III or the following:

- *For infants up to 1 year of age*: virological diagnosis.
- *For children aged 1–3 years*: $CD4^+$ T-cell count must be <750 cells/mm^3 or $CD4^+$ T-cell % must be <20%.
- *For children aged 3–5 years*: $CD4^+$ T-cell count must be <350 cells/mm^3 or $CD4^+$ T-cell % must be <15%.
- *For children older than 5 years*: $CD4^+$ T-cell count must be <200 cells/mm^3.

Starting in 2012, all infants delivered by HIV-positive women receive testing for HIV DNA or RNA for early detection of HIV infection. Since 2012 and currently, treatment eligibility criteria include all infants and children under 2 years of age, all children who are identified as WHO Stage III or IV, and as follows:

- *For children over 2 years, but less than 5 years*: $CD4^+$ T-cell count must be <750 cells/mm^3 or $CD4^+$ T-cell % must be <25%.
- For children older than 5 years: $CD4^+$ T-cell count must be ≤350 cells/mm^3 or $CD4^+$ T-cell % must be ≤15%.

From July 2016, the Chinese government announced the "treat all" strategy for the whole HIV infected patients, including infants and children.

14.2.3 Treatment Clinic System

While in other settings, it may be more appropriate to have widespread coverage at the community level, China has elected to pursue a strategy of establishing pediatric HIV/AIDS treatment centers in selected locations. There were several important reasons for this decision. First, because the overall number of pediatric patients has been relatively low, coverage at the community level would mean many centers treating only a handful of patients, which would not be cost effective. Second, establishing treatment centers at selected locations that would draw patients from a broader region facilitated the very rapid roll out and scale up of the Pediatric ART Program. Third, fewer locations meant that high-quality training and capacity building efforts for healthcare workers at these locations was achievable. Finally, although fewer treatment centers meant that many patients must travel to seek care, this is not necessarily a barrier, and may even be a benefit. Due to concerns about privacy and HIV-related stigma, many prefer to travel to a site outside of their community.

The pilot Pediatric ART Program that began in 2003 served only 25 children from less than five communities. As of 2017, pediatric ART had been provided in 981 counties or districts.

14.2.4 Treatment Regimen

In general, children should begin taking tablets or capsules as soon as they are able, and avoid high dose liquid formulations. Additionally, dosage must be determined by body weight or body surface area. In order to prevent the patient from receiving too low of a dose, physicians must weigh patients during each visit. Finally, caregivers should be trained on how to measure the correct dose.

14.2.4.1 First-Line Treatment Regimens

Between 2004 and 2011, pediatric patients were treated with azidothymidine (AZT) or stavudine (d4T), lamivudine (3TC), and neviropine (NVP) or efavirenz (EFV). Starting in 2012, patients newly eligible for treatment were given NRTIs of either AZT and 3TC, or abacavir (ABC) and 3TC. Infants and children who had not been exposed to NNRTIs could be treated with NVP, EFV or lopinavir/ritonavir (LPV/r). Infants or children who have been exposed to NNRTIs are treated with LPV/r (KLC, Kaletra). For children ≤3 years of age or ≤10 kg, either NVP or KLC may be used, depending on circumstances (Zhao et al. 2010).

14.2.4.2 Second-Line Treatment Regimens

Second-line drugs for pediatric patients first became available in 2008. Since then, the recommended regimen for second-line treatment is ABC + 3TC + KLC. Many children who were prescribed adult medications prior to the availability of pediatric drugs, have since become non-responsive to these first-line medications. As a result, it is has been critically important that they be started on second-line regimens (Zhao et al. 2010).

14.2.4.3 Cotrimaxazole Prophylaxis

In 1989, the United States recommended that cotrimoxazole (TMP-SMZ, cotrimaxazole) be used for the prevention of *Pneumocystis jiroveci* pneumonia. Currently, this prophylactic is commonly used worldwide, and the WHO and UNAIDS have included this drug on the list of standard and essential treatments for PLWH. In China, guidelines for administering cotrimaxazole to pediatric patients have been established since 2004 (Zhao et al. 2010). The dose is calculated according to body weight. Children weighing <10–12 kg should take the dose in the form of syrup. Pediatric patients meeting the following criteria should have cotrimaxazole administered:

1. Starting infants born to HIV-positive mothers on sulfamethoxazole 4–6 weeks after birth, until HIV infection status may be excluded;
2. HIV-positive children between 1- and 5-years old who have a $CD4^+$ T lymphocyte count <500 μL^{-1} or $CD4^+$ T lymphocyte percentage <15%;
3. HIV-positive older children above 5 years who have a $CD4^+$ T lymphocyte count <200 μL^{-1} or $CD4^+$ T lymphocyte percentage <15%.
4. In addition to the prevention of *Pneumocystis jiroveci*, cotrimaxazole is also used in the treatment and prevention of other opportunistic infections, such as toxoplasmosis, *Streptococcus pneumoniae*, *Haemophilus influenzae*, non-typhoidal Salmonella and *Staphylococcus aureus*.

14.2.5 Program Outcomes

14.2.5.1 Annual Treatment Number

By mid-2009, a total of 1529 pediatric patients were receiving treatment, and the median age was 7.1 years (standard deviation/standard error 4.1 years). Over two-thirds of these children were 60 months or older, and 59% were male. Of these patients, 60% were considered WHO Stage III or IV, and the median baseline CD4 count was 194 cells/mm^3. As of 2011, there were 2322 children enrolled in the program, representing 85.2% of HIV-positive children reported to the database, and of which 216 were receiving second-line treatment (Zhao et al. 2010). By the end of 2017, 7808 children had received treatment (Fig. 14.3).

14.2.5.2 Mortality

Prior to the availability of antiretroviral treatment, the mortality rate among identified children living with HIV was very high, over 20%. As of 2004, the annual mortality rate dropped to 9.5% and it has remained below 3.0% since 2013. The overall mortality during the first 6 months of treatment declined from 7.5 per 100 child-years in 2004 to 1.0 per 100 child-years in 2010. At three years after initiation of ART, over 94% of children on ART were alive and suggests that large-scale ART for children is feasible and results in decreased mortality (Zhao et al. 2013) (Fig. 14.4).

14.2.6 Treatment and Child Development

HIV infection negatively impacts children's development, including impairing motor skills, cognition, and language (Le Doare et al. 2012). In China, children living with HIV have been observed to be of shorter height, lower in weight, and

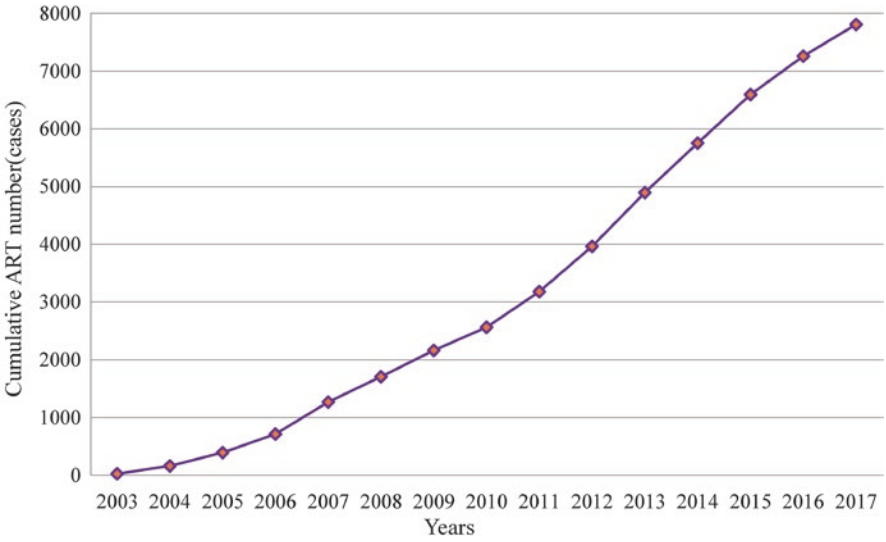

Fig. 14.3 Cumulative pediatric HIV/AIDS cases under 15 years of age initiating ART in China, 2003–2017

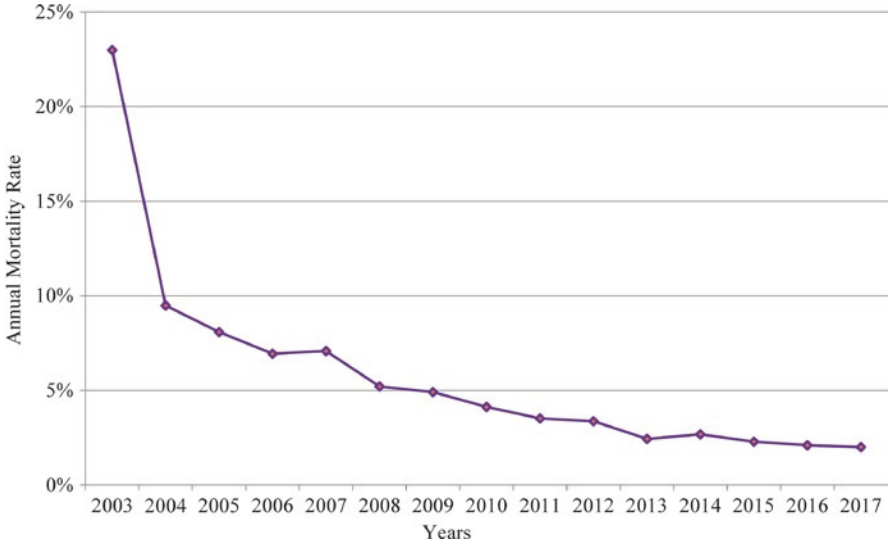

Fig. 14.4 Annual mortality rate of children under 15 years living with HIV in China, 2003–2017. Note: Annual Mortality Rate = Number of deaths in a year/number of children living with HIV by end of the year

smaller in head circumference than children who do not have HIV. Cognitive development scores in infected children, including gross motor skills, language, and sociality are also lower than that of uninfected children (Li et al. 2009). Although ART mitigates some of these effects, treatment initiation marks the start of a lifetime of exposure to ART, the long-term effects of which are not well-understood (Heidari et al. 2012). Additionally, Heidari et al. (2012) note that "treatment in children is complicated by changing drug pharmacokinetics with age, caused by the continuing development and maturation of the organs involved in drug metabolism." The result also suggests that children who were perinatally infected with HIV may have a higher risk of poorer psychiatric outcomes in adolescence (Laughton et al. 2013). The "shocks" resulting from infection and treatment may be amplified by social factors such as stigma against people with HIV and disruptions to family life (Sherr 2011).

14.2.7 Other Domestic Programs Supporting Children Living with HIV

Beyond the National Pediatric ART Program, there are several other domestic programs aimed at supporting children living with HIV. While many of these efforts focus on children who have been impacted by supporting AIDS-impacted children, some also strive to improve health outcomes among children living with HIV.

The government's China Comprehensive AIDS Response Program (China CARES), launched in 2003, strengthened surveillance, treatment, and social support for people living with HIV. For children affected by HIV, the program provided free schooling. As of 2008, the program provided books, schooling fees, and educational boarding subsidies for about 6000 children orphaned by AIDS (Han et al. 2010). China's government has also implemented HIV prevention efforts targeting children and youth. Starting in 2006, the Ministry of Health, Ministry of Education, the Central Youth League, and the State Council AIDS Working Committee Office began disseminating educational material, providing training for school teachers, and holding awareness events (State Council AIDS Working Committee Office and UNAIDS 2008).

In the private sector, the "Nutritional Support Program for Children Living with HIV Receiving ART" is supported by the All-China Federation of Industry and Commerce's China Red Ribbon Foundation and provided 800 children with an additional 100 RMB per month to pay for supplemental nutrition (Ministry of Health of the People's Republic of China 2012). Non-governmental organizations also provide a variety of services to children. In Anhui and Henan, where a large number of FPDs and their families reside, the Fuyang AIDS Orphan Salvation Association serves 600 children affected by HIV and their families, including 25 children living with HIV. The organization provides financial support, an activity center, treatment support, awareness raising activities, and mental health services (Fuyang Aids Orphan Salvation Association 2010). In Yunnan, the Ruili Women and Children Development Center offers HIV prevention services such as workshops and peer education for youth as part of a range of services for those living in ethnic minority villages along the border region (China Development Brief 2015).

14.2.8 Challenges Related to Treatment

Despite the significant progress of the national pediatric program, several interconnected challenges remain in treating pediatric HIV in China. While some of these challenges are specific to China's experience with HIV, many reflect larger concerns within the health system. Coordinated, cost-effective, and feasible responses must be developed.

14.2.8.1 Rural–Urban Disparities in Healthcare

In 2009, significant reforms to China's healthcare system were adopted, many of which were meant to address rural–urban disparities. As a result, 96% of rural residents now have basic medical insurance through enrollment in NCRMS (National Cooperative Rural Medical Scheme). Gaps between rural and urban children in health-related indicators, such as mortality, have also narrowed in recent years, suggesting an improvement in healthcare equity. However, health resources (e.g., personnel, capacity, and infrastructure) continue to be disproportionately allocated,

causing continued concentration in urban areas. These disparities may result in uneven clinical management of HIV in rural areas, difficulty in providing high-quality management of ART over the long term, and lack of capacity for managing complex cases of co-infection and opportunistic infection. Additionally, rural residents face other obstacles to care, including high cost of healthcare despite subsidies, distance from clinics, delay in seeking services, drug and equipment shortages, and limited access to laboratory testing. Combined with a shortage of pediatricians and HIV specialists, quality and accessibility of services in rural areas will continue to be a significant challenge exacerbated by these disparities in the management of HIV in rural children.

14.2.8.2 Shortage of Pediatricians

One reason for the delayed implementation of a pediatric treatment program was the lack of expertise in managing pediatric HIV in China, as children living with HIV are generally seen by infectious disease specialists at designated treatment points rather than by pediatricians. While older adolescents may generally be treated by general practitioners, younger children, especially infants, require the expertise of pediatricians in the clinical management of HIV. Over the past 15 years, there is an estimated national shortage of 200,000 pediatricians. This shortage is especially acute in rural areas as many urban pediatric experts are reluctant to practice in these areas (Zhao et al. 2010). It is also true that pediatrician salaries and prestige are low relative to other specialties. There is a continued need for training in managing pediatric treatment to ensure access to care for the youngest children.

14.2.8.3 Adherence to ART

Due to its many challenges and barriers, adherence to ART is a critical issue for children with HIV. In rural areas, the preference for liquid formulations is a significant obstacle for adherence. It is recommended that children transition to tablets or capsules as soon as they are able to tolerate swallowing them. However, many caregivers prefer liquid formulations due to the perception that liquid formulations are easily absorbed and are more effective. These formulations are heavy, bulky, and difficult to transport from clinics to patients' homes. Additionally, doses are often measured incorrectly. When liquid ART medicines or pediatric formula were not available, in the real world, local health workers had to cut adult pills into parts to be used for children. Previously, the WHO guidelines did not recommend caregivers to cut pills as this practice was seen as being unable to yield the correct doses. However, the WHO revised their stance starting in 2006.

Other challenges related to adherence in children include managing side effects of ART. The most common side effect is vomiting in infants and young children. Physicians need to deal with the side effect itself, replace with alternative ARV medicine, or reduce the dosage. Physicians also need to provide counselling to parents or grandparents to improve their understanding and gain their support. Another challenge for school-age children is taking medications in a school setting. It is extremely important to protect the confidentiality of HIV status of children. Parents and children are strongly advised to not talk about their HIV status in school and not to take ARV medicines in schools.

Finally, adherence is heavily dependent on caregivers. In rural areas, many parents and caregivers have low education levels or are not aware of the need for adherence. Additionally, some children living with HIV have deceased parents and are fostered by relatives and/or elderly caregivers who may not provide adequate supervision, including supervising ART. Elderly caregivers may also have difficulty with caring for children with HIV due to lack of HIV-related knowledge, or changes in memory, eyesight, and physical capacities associated with aging.

Adherence to ART in children has rarely been researched and is difficult to measure as caretakers frequently self-report excellent adherence (Zhang et al. 2009). For children in rural areas, because of the relatively fewer resources available, there is little medical and social support for promoting adherence. Recent laboratory techniques for blood concentration monitoring for adherence should be adapted for children living in these settings. Additionally, research examining adherence and feasible methods to increase adherence should be a priority, especially for children living in rural areas.

14.2.8.4 Drug Resistance and Treatment Failure

Drug resistance and treatment failure continue to be a major challenge in the management of pediatric HIV in China. A study on the first 83 children enrolled in the pilot of the National Pediatric ART Program found that after one year on ART, almost all patients with viral loads >1000 copies/mL displayed NRTI and NNRTI mutations, including 27.5% of ART-naïve children suggesting resistance to at least one of these first-line drugs (Zhang et al. 2009). In another study on this same cohort, almost 50% of participants had suffered virologic failure, a rate higher than in other limited-resource settings. For pediatric patients in China, and other limited-resource settings, successful management of HIV with first-line drugs is important because of the inconsistent supply of second-line ART and uneven laboratory capacity for early detection of virologic failure (Zhao et al. 2011d).

14.2.8.5 Coinfection with Hepatitis

In China, both hepatitis B (HBV) and hepatitis C (HCV) are relatively common. It was estimated that 9.8% and 3.2%, respectively, of the population were carriers in a 2006 national survey. While the impact of hepatitis coinfection on children living with HIV in China is unclear, studies in other settings indicate that coinfection with HCV may contribute to rapid disease progression. In China, a 2010 study found that among children under 16 in the study population, 4.9% tested positive for HBV surface antigens (HBsAG) and 9.6% tested positive for anti-HCV antibodies. However, rates of viral hepatitis testing for children infected with HIV are low and HBV and HCV screening, prevention, and treatment are not included in the pediatric treatment program. It is recommended that program policies be revised to reflect the need for routine screening and access to viral hepatitis prevention and treatment among children. HBV vaccinations administered after birth decreases the risk of chronic infection and access to these vaccinations should be strengthened for the purpose of preventing coinfection (Zhou et al. 2010). Additional research on clinical outcomes and management of HBV or HCV coinfection with HIV on children should be performed.

14.2.8.6 Strengthening Laboratory Testing Capacity

Laboratory testing plays a critical role in the effective clinical management of HIV. Pediatric CD4 counts are normally higher than adults so absolute counts may be misleading in evaluating the need for treatment. CD4% testing is critical for evaluating immunodeficiency status in children, but many health workers were not aware of the need for CD4% testing. Approximately 70% of children did not have access to this test at baseline as it required health worker capacity and additional laboratory equipment; instead, absolute CD4 counts and age were used to evaluate eligibility for ART initiation (Zhao et al. 2010). Other techniques commonly used to address this challenge have been to estimate CD4% using total lymphocytes and blood count in addition to creating treatment guidelines based on CD4% or absolute CD4 count by age. Additionally, viral load testing at baseline, which is crucial for predicting treatment success, was received by less than 20% of children. However, free viral load testing was introduced relatively late, in 2008. Currently, most sites throughout the country have access to testing viral load testing (Zhao et al. 2010).

14.3 Children Living with HIV and Psychosocial Issues

In addition to clinical management, children with HIV also require assistance in facing many serious psychological and social issues. Research in China has focused on children affected by HIV in their families rather than children infected with HIV. However, evidence from these studies is likely to be useful since a significant proportion of children with HIV also have parents who are living with HIV.

Societal stigma against PLWH remains a major issue in China. Like other groups of PLWH, including so-called "blameless" groups like former plasma donors, children experience high levels of HIV-related stigma. Children of all age groups report both public stigma (where community members are seen as having attitudes or actions that stigmatize PLWH) as well as their own stigmatizing views towards PLWH (Lin et al. 2010; Zhao et al. 2011a). As a culture oriented toward collectivism, HIV stigma is likely to impact not only children with HIV but also their families. HIV infection may be seen as a judgment on family members (Ho and Mak 2013). Thus, many of the psychological and social challenges that children with HIV face are rooted in this context.

14.3.1 Disclosure to Child

In a 2009 survey among caregivers of children with HIV in China, 55% chose not to disclose to the child their HIV diagnosis. Out of those who did not disclose, 81% felt that their charges were too young to have HIV disclosed to them and 18% felt that the children would be afraid hearing the information (NCAIDS, unpublished data). A systematic review of studies on disclosure to children of their HIV status found that the strongest predictors of disclosure were older age, initiation of

treatment, and need for improved adherence to ART. Predictors for non-disclosure included fears of emotional consequences for children, disclosure to others, stigma, and child's rejection, as well as feeling that the child is too young or that the caregiver themselves are not adequately prepared to disclose to the child (Pinzón-iregui et al. 2013). Similarly, a qualitative study in Singapore on children with HIV who had not yet been disclosed of their status found that the main factors deterring parents from disclosing included worries over their child's cognitive capability for understanding the disease, fear over the child's disclosure to others and resulting stigma for the family, and feelings of sadness for the child. Additionally, parents cited factors such as the awkwardness of explaining how they and the child acquired the infection or being blamed for the transmission. However, all parents planned to disclose eventually, and felt that their children had a right to know about their illness. They also felt that disclosing would help the child avoid transmission to others and improve adherence (Chew et al. 2012). Additionally, a systematic review of disclosure to children in limited resource settings found that ART adherence improved afterward (Vreeman et al. 2013).

It is likely that even young children have the cognitive capacity to understand illnesses, including HIV, and disclosure should be treated as a process with information added as appropriate for the child's age (Lesch et al. 2007). It may also be beneficial for a multidisciplinary team to work with parents to address parental fears regarding disclosure. In an Asian context, these fears may include feelings of self-blame for not protecting their children from becoming infected or loss of parental supervision over their children (Chew et al. 2012).

14.3.2 Education

A 2009 survey found that 75% of HIV-infected children are currently attending school and 18% are not attending school because they are too young (NCAIDS, unpublished data). Of the 7% of children who should be in school but are not, 58% have health issues preventing them from attending, while 36% do not attend due to stigma. Among HIV-affected children, 12% experience a drop in academic performance following the illness or death of a parent and 34% of HIV-affected children repeat grades (Xu et al. 2010a; Ji et al. 2007). While economic reasons such as dropping out of school to earn money to pay for parents' care have been cited as a reason, provincial governments of Henan, Hubei, and Yunnan have developed policies to better support HIV-affected families. These local responses often include financial assistance and free education for children orphaned by AIDS (Xu et al. 2010a).

14.3.3 Mental Health Concerns

The mental health concerns of children with HIV have not been extensively researched. A review of the published literature found that emotional and behavioral problems (21–30%), as well as elevated levels of depressive (18%) and

anxiety symptoms (17%), were present among American children with HIV (Orban et al. 2010; Murphy et al. 2000; Betancourt et al. 2013). CD4 counts may also impact children's emotional well-being, where children with lower CD4 counts have worse socialization and adaptive behavior than those with higher counts. However, resilience improved for children in all CD4 count groups over time (Nichols et al. 2000).

In China, studies in children affected by HIV also suggest that many children face significant mental health issues including anxiety and depressive symptoms. Often, stigma and discrimination against PLWH was the main cause of feelings of sadness and anxiety. The death of a parent also caused feelings of grief and loss in self-esteem. Children also experienced feelings related to self-stigma, including self-hatred, shame, and self-isolation (Xu et al. 2009). Feelings and perceptions of stigma, self-esteem, and social support are important predictors of depression over time in children affected by HIV (Zhao et al. 2014). Over time, depression and stigma may occur in a cycle for children affected by HIV (Zhao et al. 2012).

Interventions to promote the mental health of children with HIV must address multilevel factors, such as societal stigma, in addition to psychosocial factors. Furthermore, these interventions must involve the family (Chi et al. 2014; Ho and Mak 2013). As it is important for children to be able to discuss rather than repress their thoughts about living with HIV, peer support groups are particularly helpful (Ho and Mak 2013). As depression, poor health, stigma, low self-esteem, and lack of social support are all predictors of depressive symptoms over time, it is important that these interventions address various facets of children's psychosocial well-being (Zhao et al. 2014). Finally, the number of mental health practitioners in China who can provide treatment for children with HIV needs to be increased. Overall, the number of mental health workers per capita in China is low, and expanding this workforce to serve this special pediatric population may be challenging.

14.3.4 Children's HIV Infection, Parental Death from HIV, Household Structure and Dynamics

Families with children with HIV report increased feelings of burden by the primary caregiver than families with HIV-negative children (Lesar and Maldonado 1997). Parental worries about disclosure may result in resentment from children for keeping this secret and reluctance to discuss HIV may cause children to feel stressed and repressed. Additionally, because of the additional caregiving duties required to care for an HIV-infected child, HIV-negative siblings may feel jealous of the uneven parental attention (Miller and Murray 1999).

A survey of 483 children living with HIV attending HIV clinics in Henan, Guangxi, Yunnan, and Xinjiang showed that 85% of mothers (400/469) had HIV infection and 63% (293/466) of fathers had HIV infection. Of the parents, 31% of mothers (126/389) and 28% of fathers (91/327) were deceased (NCAIDS,

unpublished data, 2009). Families affected by HIV reported lower health-related quality of life than families that were not affected, and children in these families report lower psychosocial, emotional, and school-related functioning (Xu et al. 2010a, b). HIV infection has been identified as affecting a family in several ways: isolating families and children due to stigma; straining the family's economic resources due to not being able to work; negatively impacting children's ability to attend school; and compromising children's health and nutrition (Ji et al. 2007). Additionally, in the year prior to the death of an infected parent, many children report frequent conflict between parents and parental desire to divorce (Yang et al. 2006).

The death of a parent may also result in household displacement for children (Sun et al. 2008; Zhao et al. 2011b). Children who reported more displacements were more likely to report committing acts of public property destruction and having suicidal thoughts (Zhao et al. 2011b). Additionally, after the death of a parent, children may have one or more new caregivers. Relationships with these new caregivers are extremely important for children's psychosocial well-being. Caregiver factors, such as parenting skills and literacy levels, have been found to vary widely and poor parenting skills and low literacy have been associated with children's delinquent behavior. Caregiver illiteracy was also associated with child delinquency (Sun et al. 2008). Not surprisingly, more hours spent caring for a child increased the child's reported quality of life (Xu et al. 2010b). Similarly, more trusting relationships with caregivers was independently associated with positive indicators such as rule compliance, good social skills, interest in school, higher self-esteem, and hope for the future (Zhao et al. 2011c). Finally, children's quality of life was also correlated with the degree of familial relationship to their caregivers. For example, those who were cared for by their grandparents reported higher quality of life than those who were cared for by unrelated foster parents (Xu et al. 2010a, b).

14.3.5 Increasing Health Education for Adolescents

Many children born in the 1990s, who were infected as a result of MTCT, have since become adolescents. Furthermore, many adolescents infected by other transmission routes are unaware of their seropositivity. To make matters worse, sex education in schools is weak in China. Most adolescents have little knowledge of HIV, its routes of transmission, and the best ways to prevent becoming infected or infecting someone else. A recent survey of 124 adolescents aged 13–19 in rural Henan Province found that overall levels of reproductive and sexual health knowledge were low. Among this group, 51% did not know what condoms were, though 33% knew that condoms could be used to prevent pregnancy. Very few (20%) had ever discussed puberty with their parents and only 14% had ever received any education on sexual health or puberty in school (NCAIDS, unpublished data, 2009). In rural areas in China, many adolescents get married early, or drop out of school to migrate, and therefore, strengthening early school-based health education is an important intervention for HIV prevention among this group.

14.4 Conclusion

China's National Pediatric ART Program has been piloted, scaled, and implemented rapidly and successfully. From the initial lack of pediatric ARV and expertise, significant progress has been made. Currently, most eligible children are receiving ART at the 1061 clinical sites throughout the country and pediatric ART is now manufactured domestically. HIV among children remains low.

Several challenges regarding pediatric treatment remain. However, these challenges must be addressed in the context of widespread societal stigma against those with HIV, including among children; lack of HIV knowledge in the general population and little sexual health education in schools; and allocation of human resources and healthcare infrastructure that remains concentrated in the cities.

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Protecting the Children of HIV-Infected Mothers

15

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Abstract

Prevention of mother-to-child transmission (PMTCT) of HIV infection has been recognized as a high-priority component of China's national HIV/AIDS response since it launched its National HIV PMTCT Program in 2005. However, the growing realization of the high rate of mother-to-child transmission of other serious infectious diseases, particularly syphilis and hepatitis B virus (HBV), led the Chinese Central Government to design a more comprehensive program and to integrate that program into the existing maternal and child health (MCH) system. Thus, the National PMTCT Program for HIV, Syphilis, and HBV was launched in 2010. Three years later coverage had already increased to 40% and today is universal. As a result, HIV testing rates among pregnant women have increased from 58% in 2005 to over 99% in 2017, the proportion of HIV-infected pregnant women receiving treatment increased from 65% in 2005 to 90% in 2017, and the rate of HIV MTCT fell from 13% in 2005 to 5% in 2017. Similarly, improved outcomes were also observed for syphilis- and HBV-infected mothers and their infants.

15.1 Background and Overview

The first reported case of HIV mother-to-child transmission (MTCT) in China was documented by the Yunnan Center for Disease Control and Prevention (Yunnan CDC) in 1995. Then, 3–4 cases were reported each year until 1999, ten cases were

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reported in 2000, 32 in 2001, and 41 in 2002 (Chen and Qian 2005). HIV MTCT rates were estimated to be approximately 35–38% during this time (Gui et al. 2003; Li et al. 2002; Wang et al. 2008). To address the problem of vertical HIV transmission, the Chinese Center for Disease Control and Prevention (China CDC) launched a prevention of mother-to-child transmission (PMTCT) pilot project in Shangcai county, Henan province, in 2001 with support from China's Ministry of Health (MoH, now known as the National Health Commission), the National Center for Women and Children's Health, and the United Nations International Children's Emergency Fund (UNICEF). After the 2-year pilot study in Henan, the MoH expanded PMTCT to eight counties in Henan, Guangdong, and Yunnan provinces; Guangxi Zhuang Autonomous Region (hereafter Guangxi); and Xinjiang Uyghur Autonomous Region (Xinjiang).

Then, in 2005, the Chinese Central Government supported the launch of China's National PMTCT Program with expanded geographic coverage and scaled-up interventions including free HIV serological screening for pregnant women at participating antenatal care (ANC) clinics, HIV-tailored midwifery services for mothers living with HIV, free antiretroviral therapy (ART), and guidance on safe breastfeeding practices. For HIV-exposed infants, services included free antiretroviral (ARV) medicines, HIV serological screening at 12 and 18 months, and developmental monitoring (Ministry of Health 2004).

The National PMTCT Program continued to scale up across the country between 2005 and 2010. However, China faced many unique challenges as it worked to meet 2015 pediatric HIV and congenital syphilis elimination targets set out by the World Health Organization (WHO). The HIV epidemic was expanding at an accelerating rate, and at the same time, a surging syphilis incidence in China was causing substantial worry. Reported congenital syphilis rates increased from 25.5 per 100,000 live births in 2005 to 60.8 per 100,000 live births in 2009 (Gong et al. 2014). Meanwhile, hepatitis B virus (HBV) infection had also become a serious public health problem in China—despite introduction of an infant vaccine in 1992, 7.2% of the under-60 population was HBV surface antigen positive in a 2006 study (Liang et al. 2009).

To address these issues, the Central Government incorporated the still-new National HIV PMTCT Program, as well as new PMTCT programs for syphilis and HBV into the existing maternal and child health (MCH) care system in late 2010.

15.1.1 The Maternal and Child Health (MCH) System

15.1.1.1 Before National PMTCT Program Integration

With a population of roughly 1.4 billion, China has an enormous number of women and children who, like in many other developing countries, face a heavier disease burden and more barriers to care due to a range of socioeconomic, cultural, and physiological factors. China's MCH system was among the first public health services established in China since 1949 (Du and Wang 2008). It was built upon a prototype of a hierarchical system that started with national-level facilities that

branched into county-level stations. MCH facilities are government-funded, non-profit health agencies. The staff and services delivered through the MCH system are under the leadership of the MCH Department of the National Health Commission. The MCH system is independent and parallel to the clinical hospital system and infectious disease prevention system.

By the end of 2016, the China MCH system had 3063 MCH sites (National Bureau of Statistics of China 2017). The China CDC's National Center of Women's and Children's Health (NCWCH) provides technical support nationally for clinical service delivery conducted by prefecture- and county-level MCH hospitals. The lowest level of the MCH system is composed of district health stations, community health centers, township hospitals, and village clinics. MCH at the county level is comprised of gynecology and obstetrics and pediatrics departments of general hospitals. District-, prefectural-, and provincial-level hospitals are where specialists provide services. China's MCH system focuses on high service coverage in urban and rural areas and strong community networks.

The MCH system provides preventive and curative health care to women and children. All levels provide health education; antenatal screening, diagnosis, and care; screening and management of high-risk pregnancies and pregnancy complications; birth preparedness and delivery; postnatal and neonatal care; family planning and reproductive health services; management of common diseases; and data collection. Additionally, group health education is provided to women and their partners in pregnancy classes.

15.1.1.2 The Rise of HIV, Syphilis, and HBV Among Women

As of the end of 2011, there were an estimated 780,000 PLWH in China. Among them, an estimated 30% were women. A 2005–2012 study of over 100,000 women with HIV between the ages of 15 and 49 found that approximately 60% reported becoming infected via heterosexual contact with a nonmarital partner. Most of these women were from epidemic "hot spots" in Chongqing (municipality), Guangxi, Sichuan, Yunnan, and Xinjiang (Zhang et al. 2015). Women most at risk were those engaged in sex work and those who either had sexual partners who were people who inject drugs (PWID) or were themselves PWID. The disproportionately low rate of HIV testing uptake and high barriers to care including intimate partner violence and societal stigma and discrimination meant that women were often diagnosed later and often experienced poorer outcomes compared to men (see Chap. 7 for more information).

China had virtually eradicated syphilis in the 1960s through a powerful campaign that involved propaganda, mass screening, prostitution crackdowns, and free treatment for sex workers. However, the epidemic reemerged during the economic boom of the 1980s, and syphilis incidence skyrocketed among the general population, with women who worked in the sex industry and women of childbearing age experiencing a particularly high burden of disease. Congenital syphilis had increased dramatically as well, leading to higher infant mortality as well as morbidity. By the late 2000s, the syphilis epidemic was worryingly out of control (see Chap. 3 for more information).

HBV infection is a serious public health problem and is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC). Prior to 2010 in China, HCC was the second leading cause of cancer mortality. Approximately 110,000 Chinese citizens were dying each year from HCC, 45% of HCC deaths worldwide. In China, most cases of HBV infection occur when the virus is transmitted from mothers to infants during the perinatal period and from other horizontal sources to infants and young children. A nationwide study found that the overall prevalence of chronic HBV was nearly 10% in 1992 (Xia et al. 1996). Thus, routine HBV immunization of infants was implemented nationwide in China beginning later that same year (Luo et al. 2012). Thereafter, immunization coverage increased, and HBV infection rates decreased. However, China was still classified as having a moderately high HBV epidemic. In 2013, 5.1% of the 15.4 million pregnant women in China were carriers, meaning that roughly eight million infants were at risk of HBV infection (Wang et al. 2015).

15.1.1.3 After National PMTCT Program Integration

In 2009, the rate of HIV MTCT was approximately 8%, reported cases of congenital syphilis had reached nearly 61 per 100,000 live births, and more than 7% of the Chinese under-60 population was HBV surface antigen positive (Wang et al. 2015). Thus, in 2010, the Chinese Central Government integrated PMTCT for HIV, syphilis, and HBV into the MCH system. A few months later in 2011, the MoH issued the "Protocol for Prevention of Mother-to-Child Transmission of HIV, Syphilis, and Hepatitis B," which provided guidance on implementing this integration. To support these efforts from 2010 to 2013, the Central Government allocated nearly 3.5 billion RMB. By 2013 the program covered 1156 counties, cities, and districts within the 31 provinces, autonomous regions, and municipalities in China, a coverage of approximately 40%. However, coverage was not evenly distributed geographically—the six provincial-level administrative regions with most serious HIV epidemics were given highest priority, and there, 100% of counties were covered. In 2013 alone, more than 12 million pregnant women were tested for HIV, syphilis, and HBV, a coverage level of 96% (Wang et al. 2015). This represents a massive effort to ensure women and their unborn infants are protected from three very dangerous infectious agents. Today, PMTCT interventions are fully integrated into, and delivered by, the MCH system in China.

15.2 Strategies Employed by the National PMTCT Program

PMTCT is one of the most important components of HIV/AIDS prevention and control for the prevention of HIV infections in children under 15 years of age. Specific targets for performance of the National PMTCT Program such as coverage of HIV testing and counseling services among pregnant women and proportion of HIV-infected pregnant women and their infants receiving comprehensive PMTCT interventions were set and adjusted every year and financial support was provided by the Central Government. Based on national and international PMTCT experiences and best practices, a comprehensive strategy tailored to the Chinese context

was laid out in the "Protocol for Prevention of Mother-to-Child Transmission of HIV, Syphilis, and Hepatitis B." Implementation of this strategy would be essential to achieving elimination of MTCT of HIV, syphilis, and HBV.

15.2.1 Government Leadership

A big part of any successful strategy, of course, is leadership. Government officials and health bureaus at all levels were encouraged to fully embrace the importance of PMTCT, formulate supportive policies, conduct scientific planning and target-oriented management, strengthen supervision, and establish a long-term working mechanism for government leadership. Commitments were made to ensure funding was continuously increased and appropriately allocated to ensure the full implementation of PMTCT-related services and expansion of PMTCT coverage. Coordination mechanisms were established, and all sectors were expected to do their part in ensuring the PMTCT program was successful. This included enhanced collaboration between MCH, CDC, and PHC systems.

15.2.2 Health Promotion and Extensive Society Participation

Health administrative departments at all levels actively coordinated with nongovernmental organizations (NGOs), community-based organizations (CBOs), and other relevant entities within civil society. Media campaigns were launched and school and community education was enhanced, all in an effort to improve knowledge of HIV/AIDS, syphilis, and HBV prevention and control among the general population, with particular emphasis on the need for screening among pregnant women. These efforts also focused heavily on people in higher epidemic and poor, remote areas; migrant populations; and youth. However, a further goal of these initiatives was to reduce social stigma and discrimination and create a positive environment for comprehensive prevention and control.

15.2.3 Integration of Health Resources and Reinforcing the MCH System

To achieve optimal PMTCT service delivery, MCH facilities needed renovation and the triple-level MCH service network needed improvement. Furthermore, PMTCT services needed to be integrated into routine MCH, obstetric, and pediatric services. The MCH service network participated in the integration, ensuring the routine and sustainable implementation of the integrated PMTCT program. PMTCT intervention services became seamless within the existing premarital, prenatal, antenatal, child, and adolescence health-care and family planning services. Synergies between PMTCT, reproductive health, and STI prevention and treatment services were sought out and exploited. Other existing health resources, such as the rural cooperative medical system and HIV/AIDS prevention and control programs, were also combined.

15.2.4 Monitoring and Evaluation

Monitoring and evaluation (M&E), under the uniform M&E framework developed as a part of the broader comprehensive prevention and control of HIV/AIDS initiative, was a high priority. Program-level and patient-level data were collected, and this routine data collection activity was standardized and itself evaluated. Efforts have been made to ensure the timeliness, completeness, and accuracy of data.

15.3 Key PMTCT Interventions

To optimize PMTCT program effectiveness and achieve the overall goal of improving maternal and child health in the context of HIV infection, implementation of all four components of the comprehensive PMTCT strategy was needed:

- Primary prevention of HIV, syphilis, and HBV infection among women of childbearing age.
- Prevention of unintended pregnancies among women living with HIV.
- Prevention of HIV transmission from women living with HIV to their infants.
- Provision of appropriate treatment, care, and support to mothers living with HIV and their children and families.

15.3.1 Primary Prevention Among Women of Childbearing Age

In addition to routine reproductive health services (e.g., premarital counseling and care, detection and treatment of common diseases, STI and reproductive tract infection (RTI) prevention and management, and family planning), health providers provide women and their spouses or sexual partners with HIV and syphilis health education and counseling to improve awareness of prevention measures among women of childbearing age. HIV and syphilis testing and consultation are also provided to women who report high-risk behaviors as a prevention intervention. The program also prevents HBV infection through universal, or "catch-up," HBV immunization.

15.3.2 Prevention of Unintended Pregnancies Among Women Living with HIV

Technical guidelines on prevention and termination of unintended and unwanted pregnancies among women with HIV infection have been developed and health providers practicing in China's ANC clinics, within its MCH system, and in the general hospital system are trained on this policy. For women living with HIV who are of childbearing age, a range of services are provided to them and their families to avoid unintended pregnancy. Counseling is provided to ensure awareness and knowledge of the harms associated with HIV MTCT. Appropriate contraceptive

counseling and services are provided to help women living with HIV choose safe sexual practices and develop an appropriate fertility plan. Safe abortion services are provided to women with an unwanted pregnancy.

15.3.3 Interventions for Pregnant Women with HIV Infection and Their Newborns

15.3.3.1 HIV, Syphilis, and HBV Screening

Routine, provider-initiated, opt-out HIV, syphilis, and HBV (surface antigen) screening is conducted among all pregnant women during pregnancy, delivery, and the postpartum period ideally using rapid tests that yield same-day results. When pregnant women receive their initial ANC test results, counseling is provided and follow-up with intervention measures is initiated as quickly as possible. The program also ensures that pregnant women, who do not seek delivery services until they are in labor, receive safe delivery services and receive timely retesting and counseling at that time as well.

15.3.3.2 Maternal Antiretroviral Therapy

Pregnant women living with HIV who are not already on ART should be initiated on an ART regimen as quickly as possible. Standard first-line ART for pregnant women in China is the same as nonpregnant adults but should be adjusted according to the unique needs of the patient if necessary. For those already on ART, viral load should be evaluated. If viral suppression has been achieved, then the woman's current ART regimen should be maintained. However, if viral failure is observed, then the regimen should be adjusted. While on ART, pregnant women living with HIV receive continuous counseling, guidance, and relevant routine monitoring (e.g., blood, urine, liver function, and renal function tests) to help promote treatment adherence and monitor for drug side effects. $CD4^+$ T lymphocyte count and viral load are evaluated every 3 months during pregnancy and 4–6 weeks after delivery. After delivery, ART is continued for the mother regardless of the infant feeding method selected by the mother.

15.3.3.3 Infant Prophylaxis

For infants receiving replacement feeding, 4–6 weeks of ART for prophylaxis is given. Infants breastfed by mothers who are receiving ART should receive 6 weeks of prophylaxis. Infant prophylaxis should start as soon as possible after birth (within 6–12 h). When a breastfeeding mother interrupts ART during breastfeeding, infant prophylaxis should be provided during the whole period of breastfeeding and stopped 1 week after breastfeeding ends.

15.3.3.4 Safe Delivery Assistance Services

Hospital delivery is very important for protecting the safety of both mother and child receiving PMTCT interventions during and after delivery. Information on safe delivery assistance services is provided to, and discussed with, all pregnant women

living with HIV and their families. To decrease the probability of HIV transmission during delivery, precautions are taken in all settings. For example, episiotomy, artificial rupture of membranes, vacuum extraction or forceps delivery, internal fetal monitoring, and other invasive procedures that are likely to increase the risk of HIV MTCT are avoided to the extent possible.

15.3.3.5 Infant Feeding Counseling and Guidance

Replacement feeding with infant formula is strongly recommended in China for infants born to mothers living with HIV infection. If formula feeding is not acceptable, feasible, affordable, sustainable, or safe (AFASS), exclusive breastfeeding can be selected. In this case, mother and/or infant will be provided ART for a maximum of 6 months. However, changing to formula feeding should be done as soon as possible. Mixed feeding (breastfeeding with water, milk, infant formula, and other foods at the same time) can significantly increase the risk of MTCT and, hence, should be avoided. Infant feeding counseling, guidance, and support are provided regardless of the mother's decision on method of feeding.

15.3.3.6 Follow-Up and Testing for Infants and Children

Medical and health-care facilities at all levels should conduct follow-up exams for infants born to HIV-infected women at 1, 3, 6, 9, 12, and 18 months of age to provide them with routine health care including immunization services; to monitor and collect information on growth, development, and nutritional status; and to determine infection status. HIV-exposed infants should receive early infant diagnosis (EID) at 6 weeks and 3 months of age, by polymerase chain reaction (PCR). Health facilities providing children's follow-up services should collect blood samples, transfer and record relevant information, and inform mothers of the results (see Chap. 12 for more information).

15.3.3.7 Cotrimoxazole Prophylaxis

Cotrimoxazole is recommended to prevent opportunistic infections among pregnant women with HIV infection and $CD4^+$ T lymphocyte count ≤ 200 cells/mm^3 and among children with HIV infection and $CD4^+$ T lymphocyte percentage <15%.

15.4 PMTCT Program Outcomes

Since implementing the National PMTCT Program in 2005, more than 114 million pregnant women have visited ANCs at least once. Overall, 96.2% of these 114 million women received HIV testing during their pregnancies. Testing rates increased from 57.8% in 2005 to 99.6% in 2017. A more than eight-fold increase in the number of pregnant women diagnosed with HIV annually has been observed, from 914 cases in 2005 to 7694 cases in 2017. The proportion of pregnant women diagnosed with HIV who were receiving ART increased from 64.6% in 2005 to 89.6% in 2017. Furthermore, the proportion of children born to HIV-infected mothers who were receiving ARV prophylaxis and formula feeding, respectively, also increased from 77.2% and 87.3% in 2005 to 96.5% and 97.2% in 2017. As a result, mother-to-child transmission of HIV fell from 12.8% in 2005 to 4.9% in 2017.

Since PMTCT of syphilis and hepatitis B were integrated into the existing National PMTCT Program in 2010, the percentage of pregnant women tested for syphilis increased from 85.0% in 2011 to 99.7% in 2017. Over 69,000 pregnant women were diagnosed with syphilis and the proportion of syphilis-diagnosed women who received treatment increased from 48.0% in 2011 to 80.0% in 2013. HBV surface antigen testing among pregnant women was successfully increased from 89.3% in 2011 to 99.7% in pregnant women in 2017. Among neonates born to women testing positive for HBV surface antigen, 97.7% received hepatitis B immunoglobulin in 2017.

15.5 Success Factors for the National PMTCT Program

15.5.1 Data, Information, and a Uniform M&E Framework

M&E was prioritized, which ensured the timely availability of quality data upon which program officers and policymakers could make decisions, draft guidelines, and set performance goals. An indicator system was established, and continuously improved, to monitor and evaluate the capacity, quality, and effectiveness of service provision, the management of the program, and progress toward goals. An information system was built and updated after HIV, syphilis, and HBV PMTCT were integrated into the MHC system. Quality control activities and field visits are conducted to ensure standardization of services and accuracy of reported data.

15.5.2 Government Leadership and Commitment

Since the HIV PMTCT program was launched in 2002, and then integrated with syphilis and HBV PMTCT into the MHC system in 2010, the program has become one of the most important components of China's national HIV/AIDS prevention and control program. Goals, targets, and strategies for PMTCT were identified in all relevant policies of the time, such as the foundational "Four Free and One Care" policy, the "Regulation on HIV/AIDS Prevention and Control," and the "National Action Plan for HIV/AIDS Prevention and Control." Meanwhile, a series of policies and notices supporting and guiding the integrated National PMTCT Program specifically have been issued by the Chinese Central Government. The implementation guidelines for the program have been revised and updated several times with the latest policy and technical advancements in the area of PMTCT for HIV, syphilis, and HBV.

15.5.3 Funding

Most importantly, funding from the Central Government continues to increase every year in order to allow integrated PMTCT services to be provided free of charge to all pregnant women nationwide, including free hospital delivery and free infant

formula for 1 year. The Central Government expanded coverage of integrated PMTCT program services nationwide, investing more than 200 million USD per year for 5 years from 2011 to 2015, to support free screening of all pregnant women and free PMTCT services for all pregnant women with HIV, syphilis, and/or HBV infection and their children.

15.5.4 Tailored Services

The integrated service model used for PMTCT in China has been effectively tailored to the Chinese context—it is family-oriented care, integrated into the traditional MCH service network where women would normally seek care, and combined with routine MCH services to increase efficiency for both providers and patients. Appropriate processes for testing, counseling, intervention, follow-up, and other services have been established at all program sites. Through continuous capacity building and training, the knowledge, skills, and capacity of health workers to provide PMTCT services have increased over time. Through outreach, education, and communication activities, awareness and knowledge of the importance of PMTCT among the target population, women of childbearing age, have improved as well. The quality of services and the effectiveness of the program have been increasing and the objectives of early testing, early intervention, and early and frequent follow-up have been achieved.

15.6 Challenges and the Way Forward

15.6.1 Improving the Quality of Services

Continuous improvement of service quality is important and has been prioritized. One way of doing this is through persistent capacity building among health providers at all levels. Since its inception, one of the most important barriers to PMTCT service quality has been providers' inadequate knowledge and skills. Since service quality is known to affect outcomes, this barrier must be addressed and continue to be addressed through comprehensive education, training, and mentoring, as well as other forms of capacity and skill building for PMTCT providers in China. High-quality training and continuing education using curricula and content that is current and relevant as well as sensitive to China's unique sociocultural features is critical. Furthermore, interventions targeting providers that aim to reduce or eliminate stigma and discrimination are crucial.

Another way to improve service quality is to ensure continuity of care. For example, pregnant women with HIV should receive CD4 count testing, viral load testing, and ARV medicines as well as treatment for opportunistic infections or other coinfections at the same facility from the same physician at the same time. Medical service fragmentation is a serious issue in China and a major contributor to the losses to follow-up and poor retention in the HIV care cascade.

Finally, a third way to improve PMTCT service quality is to tailor services to the unique needs of special subpopulations such as migrants, sex workers, drug users, and wives of men who have sex with men. These groups have greater barriers to antenatal care and PMTCT services (e.g., lower knowledge and/or risk perception, greater fear of stigma and discrimination) and may need special assistance with uptake, adherence, and retention (see Chaps. 12 and 13 for more information).

15.6.2 Strengthening Coordination Mechanisms

The success of integrated PMTCT within the MCH system depends on the effective collaboration of officials and workers at all levels within the MCH, CDC, and general hospital systems. For instance, pregnant women are provided with HIV testing and screening at ANC clinics in MCH hospitals and general hospitals. Those with HIV-reactive screening results are required to have confirmation testing at the local CDCs. Then, women with diagnosed HIV infection have CD4 cell count and viral load testing done, again at the local CDC. Once these results are available, they return to their physicians at ANC clinics or MCH hospitals. Cooperation between these sites is low, wait times are long, testing is slow, notification of results is inefficient, and this service fragmentation leads to elevated rates of losses to follow-up. Although today, a new and more streamlined patient testing, diagnosis, linkage to care, and treatment initiation protocol is being implemented nationwide (Wu et al. 2017), China's HIV care continuum is still suboptimal (Ma et al. 2018). Similar health service fragmentation has existed in China for syphilis and HBV as well. Thus, until these issues are successfully and sustainably addressed at a more fundamental level, it is important to strengthen coordination and referrals between the CDC and MCH systems to improve the integrated PMTCT program.

15.6.3 Managing and Using Program Data

The Management Information System (MIS) of China's National PMTCT Program serves as a tool for monitoring and routinely reporting on program performance and as a repository for data and information that can be used to study MTCT of HIV, syphilis, and HBV. Analysis of the information MIS contains has provided key evidence upon which programmatic decisions can be made on a small scale and policies can be made on a broader scale. However, MIS reporting is currently less than ideal. Improvements must be made in terms of timeliness and usefulness of reports generated. More data around a broader range of outcomes need to be collected in order to better evaluate program performance and areas for future improvement. Furthermore, a more regular and more thorough quality control and quality assurance plan needs to be implemented. Finally, the capacity of program staff responsible for extraction, analysis, and presentation of system data and information must be increased through training and skill-building exercises. These critical gaps should become an urgent priority for program leaders.

15.6.4 Focusing on Migrant Populations

As a result of economic development in China, many people in rural areas leave their hometowns and move to cities to work and live. Ideally migrant women who become pregnant should be able to access the same ANC services wherever they are. In reality, this is not the case. ANC sites, the MCH system, and the National PMTCT Program are still working toward standardization of services. However, the larger problem is that many migrant women do not receive HIV, syphilis, and HBV screening because they do not seek care. Failure to seek care may be due to financial concerns, lack of awareness and knowledge, fear of stigma and discrimination, or other barriers. Many who do initially seek care are quickly lost to follow-up due to high mobility and lack of connectivity between sites. Special services, such as educational campaigns and stronger referral networks, focused on migrant women are necessary.

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Preventing HIV Occupational Exposure

16

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Abstract

With the spread of the HIV epidemic, healthcare workers in China have faced an enormous increase in HIV testing and a substantial increase in people living with HIV who need care. The total number of incidents of HIV exposure among healthcare workers has been increasing annually, especially in the hospital setting. In response, China issued guidelines in 2004 addressing the prevention and management of occupational exposure to HIV, which included the adoption of universal precautions and the administration of postexposure prophylaxis (PEP). This new policy has increased knowledge of safety measures and the availability of PEP among healthcare workers. However, although the numbers of HIV cases resulting from occupational exposure has stabilized, barriers to reducing the number of these cases, including selective adherence to universal precautions, issues with accessing PEP, and incomplete reporting and follow-up, persist.

16.1 Introduction

With the expansion of the HIV epidemic, healthcare workers (HCW) and other affiliated personnel in China have faced an enormous increase in HIV testing and a substantial increase in people living with HIV (PLWH) who need care. Furthermore, HIV-related research has greatly expanded, particularly in the past 15 years. Thus, the risk of occupational exposure and transmission of HIV has risen considerably. Although actual, verified HIV transmission to HCW as a result of occupational exposure is rare (0.3% after a needlestick injury and 0.09% after mucous membrane exposure; Donoghue 1993), exposure events may have an enormous emotional

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impact. Such exposures may cause tremendous anxiety, fear, and stress among HCW leading to reduced morale, high turnover, and inadequate staff capacity.

The guidance and support of national laws, regulations, and guidelines; the adherence to universal precautions; and the effective use of biosafety supplies, devices, and facilities are necessary for HCW to reduce their risk of occupational exposure to HIV and other infectious agents. The availability of postexposure prophylaxis (PEP) may reduce the occurrence of occupationally acquired HIV infection among HCW. Ensuring the safety of HCW will help combat fear, and resulting stigma and discrimination, and increase the motivation of HCW and heath researchers to work with PLWH and with HIV-contaminated samples for research purposes. It may also help to improve retention of HCW in settings where PLWH are tested and treated.

The present chapter discusses HIV transmission in healthcare and research settings, occupation-specific risk reduction strategies, features of this transmission route in the China setting, and challenges with preventing occupational transmission of HIV infection in China.

16.2 Occupationally Exposed Workers

Here, we define HCW as any employee in a healthcare setting. In China, healthcare settings are categorized based on their main functions, such as centers for disease control and prevention (CDC) sites, hospitals, blood banks, maternal and child health (MCH) clinics, and border quarantine facilities. Occupationally exposed HCW are defined as those who are potentially exposed to infectious materials such as blood, specific bodily fluids (e.g., semen, vaginal fluid), and medical supplies, equipment, or environmental surfaces contaminated with these fluids, during the routine course of work (Chinese Center for Disease Control and Prevention 2009). These workers may be exposed to HIV through percutaneous injury, such as through a needlestick or sharps cut, or contact with the mucus membranes of an infected person.

HCW working in hospitals, including physicians, nurses, and nursing assistants, are considered health providers. Among all HCW, health providers are most at risk for occupational exposure to HIV infection. However, studies on occupational exposure in hospitals have indicated that nurses are at the highest risk of occupational exposure to blood-borne pathogens overall (Wang et al. 2010; Li et al. 2003). Nurses are at especially high risk because they have the most direct contact with patients and their blood and bodily fluids, including frequent procedures involving needles (e.g., injections, IV insertions) and responsibility to dispose of infected and contaminated materials. In addition, nursing staff members are heavily involved in all procedures in obstetrics and gynecology and surgery departments, where most exposure events occur (Li et al. 2003).

HCW working in CDC sites are primarily laboratory technicians or other laboratory personnel, who perform testing and/or experiments with potentially high-risk specimens (see Chap. 5 for more information). Although laboratory workers are

rarely in direct contact with PLWH, the risk of exposure to an HIV-infected specimen is high. Examples of occupational exposure in the laboratory include nonintact skin contact, needlestick injury, or mucous membrane exposure.

HCW working in other healthcare facilities that perform HIV testing and research, such as blood banks, MCH clinics, border quarantine facilities, and research institutions, also are at risk of occupational exposure, but the risk is not as high as in hospitals and CDC sites.

Besides HCW, public security officers (e.g., police, penitentiary officers, and detoxification center personnel) are also at risk of occupational exposure to HIV. Public security officers often have direct and frequent contact with members of key populations, such as people who inject drugs (PWID), and the levels of occupational exposure are even higher than that of laboratory workers (Qiang et al. 2006).

16.3 Reducing Risks for Healthcare Workers

In China, available data indicate that nurses are the most frequently exposed providers, likely because they come into contact with blood and bodily fluids during routine patient care. Providers are most commonly exposed by needlesticks, with nearly 50% of such exposures occurring in operating room and emergency room settings (Jia et al. 2008; Li et al. 2003; Zhang et al. 2011; Zou 2011), and nearly 90% of exposures occur on the hands (Zou 2011).

Strategies for reducing risks for healthcare providers who have direct patient contact include adequate training, appropriate facilities, sufficient supply of personal protective equipment, and the safe management and disposal of contaminated materials. Workers receive training on blood and bodily fluid exposure prior to beginning work, including the proper strategies for handling contaminated needles and correct use of personal protective equipment. However, in some areas, training is insufficient, especially on standard precautions, the handling of exposures, and reporting procedures (Wu et al. 2016). Much of the training is also not yet tailored to resource-limited settings and thus does not account for, or acknowledge, challenges such as insufficient numbers of healthcare personnel, unreliability of personal protective equipment supply, difficulties in accessing electronic reporting systems, and prejudicial attitudes of HCW toward PLWH (Li et al. 2006; Xu et al. 2012).

16.3.1 Universal Precautions

The principle of universal precautions in healthcare settings requires that HCW assume that the blood and bodily fluids of all patients are potentially infectious and act accordingly. HCW adhering to universal precautions regularly employ measures such as washing hands, using personal protective equipment, and handling and disposing of needles and sharps in a safe fashion.

In 2004, in response to the rising number of HIV cases and concerns about occupational exposure to HIV, the Chinese Ministry of Health (MoH, now the National Health Commission) issued a new guideline, "Occupational Exposure Prevention Guideline for Health Care Providers Working in HIV/AIDS Care," which was based on recommendations from the United States CDC and World Health Organization (WHO). This new MoH policy was the first official national document on universal precautions in China and was a significant step toward building a modernized healthcare system. HCW at hospitals, CDC sites, and blood banks were required to comply with the guidelines, and public security officers also were requested to refer to the guidelines after potential occupational exposure.

Also in 2004, the China CDC published the "National Guideline for Detection of HIV/AIDS" (Chinese Center for Disease Control and Prevention 2009), which was the first technical guideline for workers in HIV testing laboratories. Under these guidelines, more detailed protocols on laboratory biosafety were provided, including universal precautions for laboratory workers that included handwashing after experiments, prohibition of needle recapping (a common cause of needlesticks), and required disposal of used needles and other sharps into designated biohazard sharps containers.

When universal precautions are applied for laboratory workers, all specimens in the laboratory setting are similarly considered potentially infectious. Specimens to which universal precautions apply include whole blood, serum, plasma, urine, saliva, cultures, and virus strains. Educating laboratory technicians on the realistic risks of occupationally contracting HIV and the value of compliance with universal precaution guidelines may reduce the risk of exposure. All work with specimens must adhere to standard operating procedure (SOP) no matter their infection status.

For healthcare providers, universal precautions are to be applied to tissues, blood, semen, and vaginal, cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids. Although all patients should be treated in the same manner regardless of their HIV status—using universal precautions to prevent occupational exposure—many healthcare providers in China continue to practice selective adherence or nonadherence to universal precautions in their daily medical practice (Wu et al. 2008). This is especially true within resource-limited healthcare systems and in healthcare systems in smaller, more rural communities. However, selective adherence to universal precautions in daily medical practice appears to not be related to the level of experience of the individual provider (Lin et al. 2008). For example, several studies have found low self-reported glove use. Only 47% of HCW in a major Beijing hospital and just 39% of county-level obstetrics and gynecology HCW in Anhui province report using gloves (Ji et al. 2005; Zhang et al. 2009). In a study of universal precautions among nurses, roughly half of participants in both the experimental and control groups were observed to wash their hands prior to patient contact while three-quarters washed their hands after patient contact. In the same study, 60% of obstetrics and gynecology HCW reported always washing their hands (Huang et al. 2002; Ji et al. 2005).

Despite the higher levels of adherence to universal precautions reported in more recent studies, sharps handling remains a significant issue. Prior to an educational

intervention, over 50% of nurses were observed recapping needles and almost three-quarters of HCW in rural Shaanxi reported this practice (Huang et al. 2002; Wu et al. 2016). Frequently cited reasons for selectively adhering or not adhering at all to universal precautions include perceptions that the measures are unnecessary or inconvenient, that there is a lack of supplies, and that time constraints are too great (Ji et al. 2005; Li et al. 2011; Zhang et al. 2009). Important factors that have emerged as predictors of adherence include institutional support for these measures, having received training, knowledge of universal precautions, and perception of accessible supplies (Ji et al. 2005; Li et al. 2011; Wu et al. 2016; Zhang et al. 2009). However, while nurses reported high levels of relevant knowledge, they were less likely to follow universal precautions compared to those in other specialty professions (Li et al. 2011).

16.3.2 Postexposure Prophylaxis

Postexposure prophylaxis (PEP) is a biomedical intervention to minimize the risk of infection risk following potential exposure to HIV. Since the first documented case of occupationally acquired HIV in 1984 (Lancet 1984), a range of regulations and interventions have been implemented to prevent infection after occupational exposure to maximize the safety of HCW. Official guidelines disseminated in China in 2004 described the management of occupational exposures to HIV and recommendations for PEP. That same year, the China CDC published the "National Guideline for Detection of HIV/AIDS" (revised in 2009; Chinese Center for Disease Control and Prevention 2009), which contained more detailed guidance on the technical management of PEP and the comprehensive management of cases of occupational exposure to HIV. These revised national guidelines included immediate steps to be taken in response to an exposure event, risk assessments, and provision of a short-term, 28-day course of antiretroviral (ARV) drugs, along with counseling, relevant laboratory tests, and a follow-up evaluation.

PEP is available in China as either a basic regimen or an expanded regimen. The basic regimen includes two nucleoside reverse transcriptase inhibitors (NRTIs). The expanded regimen contains two NRTIs and one protease inhibitor (PI). According to the third edition of the guidelines for the National Free Antiretroviral Therapy Program (NFATP), zidovudine (ZDV) and lamivudine (3TC) or ZDV and tenofovir (TDF) were suggested for the basic regimen. The expanded regimen consisted of the basic regimen and lopinavir/ritonavir (LPV/r) or efavirenz (EFV). Nevirapine (NVP) is not suggested for PEP because of side effects. For pregnant women in the first trimester, EFV is avoided for PEP because of its teratogenic effects. PEP is best when started within one hour after exposure, and still recommended even up to one to two weeks after exposure for a high-risk exposure.

To ensure that HCW are able to take PEP after occupational exposure, seven dedicated ARV drug banks were built in 2002, one each in Beijing, Shanghai, Chengdu, Guangzhou, Xinjiang, Henan, and Yunnan. With the "Four Frees and One Care" policy, which was implemented in 2004, free antiretroviral therapy (ART) has

been made available nationwide in China as part of the NFATP. The ARV drugs provided for PEP after occupational injuries became available in every province during the successful scale-up of the NFATP after 2004 (see Chap. 13 for more information).

16.3.3 Mandatory HIV Testing of Patients

Voluntary disclosure of HIV-positive serostatus by PLWH in healthcare settings in China is still rare because of continued high levels of societal stigma against HIV, PLWH, and people associated with PLWH. PLWH seeking care for HIV-unrelated health issues fear stigma and discrimination by HCW and potential loss of confidentiality and privacy in healthcare settings. Moreover, individuals who seek care in hospital settings seldom volunteer for HIV testing. One study found that only 11% of patients voluntarily asked for HIV screening in such a situation (Huang et al. 2009).

A mandatory HIV testing (MHT) strategy, implemented especially among patients from key populations, may do better to protect healthcare providers from infection through accidental exposure (Li et al. 2007). Providers were most likely to endorse MHT for those with high-risk behaviors and for all patients before surgery. Professional surgical societies in several countries have recommended MHT before elective surgery (Chapman et al. 1995; Grove and Mulligan 1990; Sheldon 2004), and many studies conducted among healthcare providers demonstrated the support for MHT for patients before elective surgery. A survey in China showed that 91% of providers felt that patients with high-risk behaviors should be subjected to MHT and 82% supported testing for all patients before an operation. Chinese healthcare providers perceived MHT as a self-protection strategy due to a fear of occupational infection risk and over 43% endorsed MHT for all patients admitted to the hospital, regardless of their need for any surgical procedures (Li et al. 2007).

At present, there is no national strategy on MHT for hospital patients. However, provider-initiated testing and counseling (PITC) for HIV was instituted nationally starting from 2007, which sets the expectation that healthcare providers will strongly encourage patients to accept an HIV test based on their medical judgment (Wu et al. 2007). At the provincial level, some regulations have been issued on MHT in hospitals for patients having surgical procedures and procedures involving blood transfusions (Sun and Liu 2011; Wang 2006).

However, MHT and PITC in the hospital setting must be performed along with professional counseling in a confidential setting, which strains already limited resources. Furthermore, healthcare providers' assessments of whether their patients are at "high-risk" of having HIV infection or display symptoms consistent with possible HIV infection are often incorrect. Thus, the implementation of these strategies for both the protection of HCW from occupational exposure and the protection of patients from continued undiagnosed and untreated infection remains sub-optimal. This, in turn, perpetuates the perception of low risk of occupational exposure to HIV among HCW, which becomes an additional barrier to effectively implementing universal precaution procedures in China (see Chap. 12 for more information).

Another issue limiting the protective benefit to HCW of patient testing is the possibility of testing during the "window period"—the roughly 2- to 3-week time period after infection with HIV, but before standard-of-care antibody-based screening tests are capable of detecting infection. False-negative HIV screening results may give providers a false sense of security, resulting in failure to strictly adhere to universal precautions and potential occupational exposure to HIV.

16.4 Reducing Risk for Laboratory Workers

Worldwide, 21% of documented cases of occupational HIV infection have occurred among laboratory workers (Petrosillo et al. 2001). HIV diagnostic and follow-up testing and experimental testing for research purposes involving HIV-infected specimens are usually performed in laboratory settings. All HIV-infected specimens, as well as materials, equipment, and surfaces used during testing procedures, represent potential biological hazards for laboratory workers and researchers. These individuals are considered to be at great risk for acquiring HIV.

Since the late 1980s, a series of national strategic, managerial, and technical guidelines have been developed to establish a tiered laboratory system that could accurately diagnose large numbers of infected persons in China. Free HIV antibody screening and free ART services have been provided to the public since 2004. Free CD4 cell enumeration, viral load determination, and antibody confirmatory testing were provided beginning in 2004, 2006, and 2008, respectively. The introduction of these services increased HIV testing and treatment coverage. More laboratories were built, and more health providers were engaged in HIV work. The number of screening laboratories, for HIV ELISA or rapid testing, increased from 2382 in 2003 to 8273 in 2009, and then to above 10,000 by the end of 2012. Originally, these screening laboratories were only located in CDC facilities, but by the end of 2009, 57% were integrated into the hospital system. As the National HIV/AIDS Testing Laboratory Network and the National Free ART Program continued to expand, the number of screening laboratories located in the hospital system further increased (Jiang et al. 2010).

The development of laboratory biosafety in China has been strengthened since 2004, when a series of regulations focused on all aspects of laboratory work with biohazardous materials were established. These regulations addressed issues including laboratory facilities, personnel, SOPs, personal precautions and personal protective equipment, and risk assessments to improve laboratory biosafety management, especially within the Chinese Center for Disease Control and Prevention (China CDC) network of laboratories. This resulted in improved infection control at the national and provincial level laboratories, and the number of biosafety level 3 certified laboratories expanded to nearly 30 by the end of 2013, from less than 10 in 2004.

Research laboratories pose the highest risk of infection. Promoting a safe and healthy workplace in the biomedical research laboratory setting reduces the risk of HIV exposure for laboratory workers. Safe methods for managing infectious agents

(i.e., containment) in the laboratory setting include appropriate training, development of SOPs, providing safety equipment, appropriate facility design, and safe handling of biohazardous materials with proper disinfection procedures. To reduce the risk of exposure to infectious agents like HIV in the biomedical research laboratory setting, infection control measures should not only align with guidelines and regulations (biosafety levels), but also should include adequate training, appropriate facilities, and the use of personal protective equipment. However, more efforts are needed to reduce risks for laboratory workers in China.

16.4.1 Training

Training is necessary in order to safely conduct high-quality laboratory work. Unfamiliar laboratory conditions, equipment, and procedures increase the risk of exposure for all laboratory personnel, not just the one or few who are undertrained or inexperienced. Most reports have indicated that inadequate training on the safe execution of routine laboratory procedures was responsible for the majority of occupational exposures in this setting (Wang et al. 2010; Reda et al. 2010; Sadoh et al. 2006).

Safety regulations and SOPs must be established before the laboratory is running, including procedures for handling accidents, specimen management (transport), and performing testing. Additionally, laboratory workers must be trained to recognize key personnel and personal responsibilities, in order to control biohazard risk. According to regulations currently in place, each incoming laboratory worker must be trained on all SOPs and must be made aware of the potential risks involved. They are restricted from beginning any laboratory work until they have completed all their training and passed an exam. All laboratory workers are then retrained at least once per year to ensure continued safe practice of their tasks.

Laboratory workers must be trained on the biohazards present in their work environment. It is important that they understand their risks of occupational exposure to these biohazards so that they may take appropriate and immediate actions after potential exposure as well as long-term follow-up actions. This careful training in laboratory biosafety is mandatory not only for self-protection, but for the safety of other workers as well, given that more than one worker uses the same laboratory facility in most circumstances.

As the national HIV/AIDS management guidelines require, laboratory staff must take biosafety training and test-specific training as well as a biannual refresher training in order to perform clinical testing. Training is conducted in a top-down, stepwise manner. National HIV/AIDS Laboratory staff trains staff from provincial and confirmatory laboratories. These trainees in turn provide training to the staff at the lower level laboratories. The National HIV Reference Laboratory and the China CDC laboratory management division are responsible for national training courses, not only for technical training on conducting testing, but also for proper adherence to biosafety regulations and the safe operation of laboratory facilities (see Chap. 5 for more information).

In 2009, the 229 technical staff from the 35 provincial laboratories received an average of 2.7 trainings per person. The 27,886 technical staff from the screening laboratories received 0.95 trainings per person (Jiang et al. 2010). In recognition of the importance of biosafety training for the prevention of occupational exposure in the laboratory, training for laboratory personnel has become routine. However, the frequency and quality of this training must continue to improve.

16.4.2 Adequate Laboratory Facilities

According to the MoH Risk Group Classification of Infectious Agents issued in 2006, HIV is classified as a Risk Group 2 agent, which is defined as high individual risk and low community risk. HIV-related work should be conducted in biosafety level (BSL)-2 and BSL-3 laboratories. BSL-2 laboratories are suitable for conducting immunological and virological testing on specimens. However, for viral culturing, BSL-3 laboratory facilities are necessary.

Laboratories must be constructed according to the national HIV/AIDS management guidelines. For example, a serologic testing laboratory is required to have three operational areas: clean, semi-contaminated, and contaminated. Virological testing (i.e., polymerase chain reaction [PCR]-based testing) must be conducted in a facility with three separate rooms—one for reagent preparation, one for blood sample processing, and one for PCR amplification. A BSL-2 laboratory must furthermore be equipped with a biological safety cabinet (BSC), while a BSL-3 laboratory requires special engineering and design features.

Additionally, biosafety instruments have been widely installed in China's laboratories since the mid-2000s, including BSCs, biosafety centrifuges, and autoclaves. Improved availability of biosafety equipment protects workers from occupational exposure when performing testing. Periodic testing of safety equipment is mandated to ensure correct operation. For example, centrifuges and other instruments are tested and calibrated yearly. This periodic maintenance of critical equipment also serves to reduce the risk of laboratory workers' exposure to biohazards in the workplace.

16.4.3 Personal Protective Equipment

Use of appropriate personal protective equipment, such as gloves, lab coats, aprons, masks, and protective eyewear, provided a barrier that prevents skin and mucosa exposure to blood or other bodily fluids. Laboratories need adequate personal protective equipment or safety-engineered devices. In some laboratories, based on the risk assessment, two gloves are required for the handling of HIV-positive specimens. For eyewear and masks, comfort is an important factor for ensuring that they are worn by laboratory workers to prevent specimens from being sprayed into the eyes, nose, and mouth.

16.4.4 Management of Samples

In the laboratory, specimens are the main source of infection. Improper collection, transport, storage, and handling of specimens in the laboratory create risk of infection to personnel involved. Standard precautions as specified in the technical guideline must be followed by each worker in the laboratory. For example, disposable needles or syringes must be used when specimens are collected. For procedures such as the collection of a dried blood spot (DBS), after the skin is pierced, precautions should be taken to prevent blood from contaminating other surfaces, and the sample should only be packaged and delivered after it has completely dried. Workers who unpack specimens are trained to be aware of the potential hazards involved and to use PPE to protect themselves. The specimen package must only be unpacked in a BSC. Disinfectants should be available and used as indicated. In addition, sharps, such as needles, slides, or glass containers should be rarely used in the laboratory to reduce the risk of injury. Glass should be replaced by plastics whenever possible. Finally, used sharps should be placed in a designated container for further disinfection.

16.4.5 Assuring the Safe Health Status of Workers

When occupational exposure to HIV pathogens is a risk, employers should consider collecting and storing a serum specimen from each employee prior to the initiation of work with the agent. The baseline blood for each laboratory technician needs be kept and tested in each laboratory. This specimen can be used to establish baseline seroreactivity, should additional blood samples need to be collected for serological testing after a recognized or suspected exposure.

16.5 Responding to Exposure

16.5.1 Numbers of Occupationally Exposed Health Workers

Beginning in 1997, information on occupational exposures to HIV was collected by provincial CDCs and reported to the National HIV Reference Laboratory (NHRL) of the National Center for AIDS/STD Control and Prevention (NCAIDS) within the China CDC. However, no formal reporting system and accompanying requirements had been officially established. In 2004, national guidelines on occupational exposure were issued by China's MoH, which required each medical institution to report the number of cases of occupational HIV exposure to the China CDC every year (Fig. 16.1). A paper reporting system was developed to meet these new requirements. This manual system was then superseded by an electronic system by the end of 2012.

In 2004, the Chinese Government's new "Four Frees and One Care" policy resulted in a significant increase in the number of people being tested for HIV and

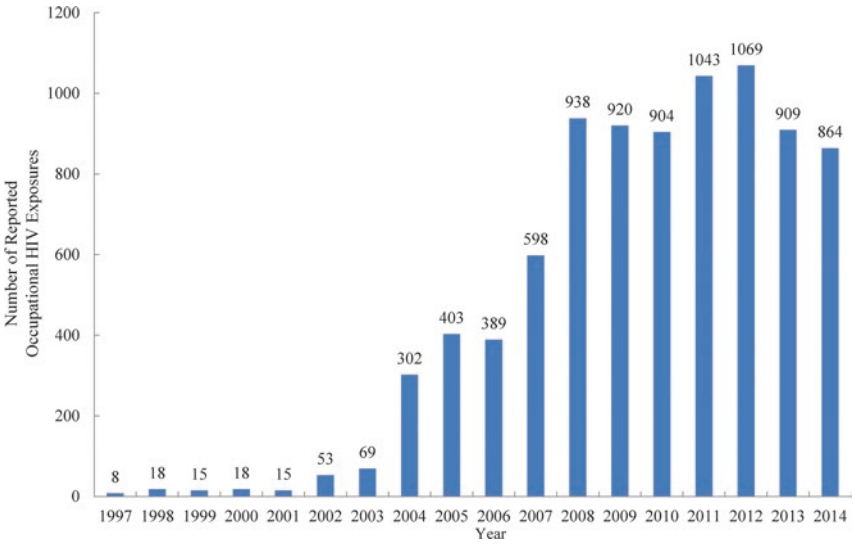

Fig. 16.1 The annual numbers of reported occupational HIV exposures in China, 1997–2014

receiving ART treatment. This led to an increase in the number of occupational HIV exposures among healthcare providers and laboratory workers. However, new biosafety regulations and on-site laboratory evaluations as well as stricter requirements for reporting of occupational HIV exposures stipulated by the "National Technical Guidelines for Detection of HIV/AIDS" also meant that the increase in exposures observed after 2004 was partly due to better reporting. From 2008 to 2014, the numbers of cases reported remained relatively stable, roughly 1000 cases annually, despite expansions in both HIV testing and treatment. This plateau is likely due to extensive training and strengthening of biosafety procedures for HCW and laboratory personnel during this timeframe.

Based on reported information, no health worker has been infected with HIV after occupational exposure. The lack of occupational HIV infections can be attributed to effective training on the exposure response and timely PEP administration. In addition, there are insufficient data to estimate the proportion of exposed who received treatment in the last decade. According to the 2013 data, 711 workers with HIV occupational exposure took PEP.

16.5.2 Distribution of Occupationally Exposed Health Workers

Prior to 2000, occupationally exposed health workers were most commonly working in CDC facilities. After laboratory biosafety was improved in this setting, the number of HIV exposures within the CDC began to fall. However, at the same time, more PLWH began seeking testing and treatment in hospitals and occupational exposures in hospitals increased and became the leading type of site for

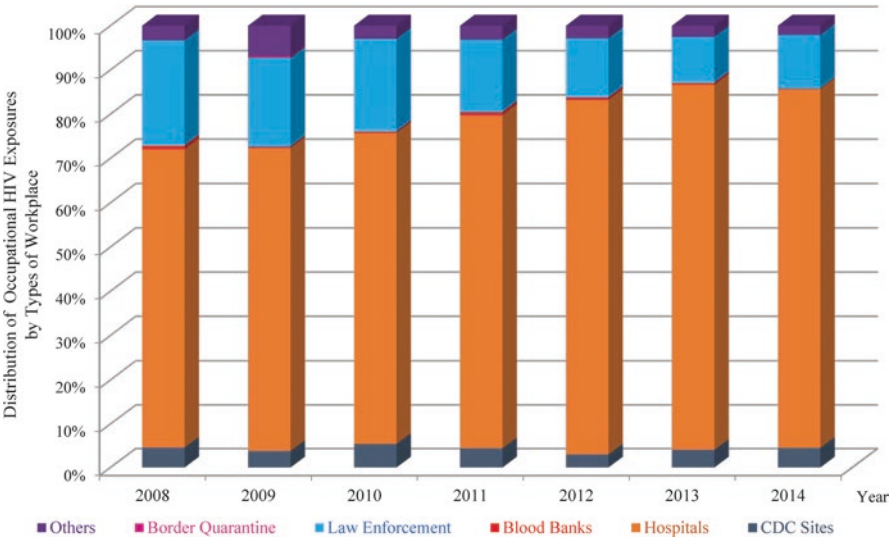

Fig. 16.2 The proportion of occupational exposure to HIV by settings in China, 2008–2014

occupational HIV exposure. From 2003 to 2014, over 62% of reported exposures occurred in hospitals (Fig. 16.2). The lack of awareness and knowledge of risk of occupational exposure and HIV, inexperience, and low perception of risk were some of the causes of increasing rates of occupational exposure (Jia et al. 2008; Han et al. 2005; Li et al. 2006). In addition, in small, local hospitals with limited resources, inadequate training, lack of SOPs, and insufficient PEP, risk of exposure and infection are higher (Chen et al. 2006; Dong et al. 2008).

At the same time, occupational exposure cases in security facilities were higher than in CDCs from 2002. In the 3 years from 2008 to 2010, the exposure proportion among the total occupation exposure was 23.0%, which did not rise above 20% until 2011. With the strengthening of policing of drug users, the police had more frequent contact with PLWH than before. However, the police generally have low HIV knowledge and insufficient protective measures, which result in an increased risk of exposure.

16.5.3 Guidelines and Strategies for Postexposure Prophylaxis

According to technical guidelines in China, a series of procedures must be executed for healthcare workers who are occupationally exposed. These steps include immediate action, risk assessment, PEP treatment, monitoring, reporting, and follow-up. The immediate response after a potential HIV exposure is the set of actions intended to reduce contact time with potentially contaminated blood, bodily fluids, or tissues and to clean and decontaminate the site of the exposure. The immediate actions recommended include squeezing the injury site to see if the skin is broken following

an injury with a used needle or sharp instrument and washing the site immediately using soap or a mild disinfectant solution that will not irritate the skin (such as a chlorhexidine gluconate solution).

Once the immediate action for the injury has been taken, the exposed HCW should report the incident. Immediate risk assessment should then be performed. Every worker exposed to HIV should fill in a case information sheet, which is sent to China CDC yearly. This form collects general information, such as occupation, exposure time and place, activity occurring when the exposure happened, and whether the worker had received training. The exposure route should be recorded, including mucous membrane, nonintact skin, or percutaneous exposure, mild or severe, duration of exposure, the infection status of the source, and CD4 and viral load results of the source. The immediate action, the assessment result, and the treatment information are recorded. After the assessment, the treatment and the testing information would be followed-up and recorded in the sheet. The case information sheet also indicates who filled out the sheet and who conducted the audit and follow-up.

PEP should be started for exposed workers within 2 h. National ART Guidelines for the use of PEP have been implemented. Percutaneous injuries with needles, exposures to bodily fluids other than blood, and exposures to the nonintact skin are classified as low risk. PEP treatment regimens are chosen based on risk assessment results. Free ARV drugs are provided. Appointments for follow-up visits are scheduled (2 weeks and 1, 3, and 6 months). Full blood counts are checked at baseline and at follow-up visits. HIV tests are scheduled at three and 6 months.

16.6 Limitations and Challenges

16.6.1 Incomplete Adoption of Universal Precautions

Healthcare providers have the highest rates of occupational exposure to HIV in China. Yet, in many rural or low-prevalence areas, this population continues to incorrectly and/or inconsistently apply universal precautions (Li et al. 2003; Lin et al. 2008; Reda et al. 2010; Wu et al. 2008). Further training is necessary for all health workers to finally and completely adopt universal precautions. In addition, training on immediate response, risk assessment, and PEP treatment after occupational exposure are necessary for all health workers.

16.6.2 Incomplete Reporting of Occupational Exposures

Occupational exposures are likely still underreported in China. Detailed information such as the immediate actions taken, circumstances at the time of exposure, and testing for the exposed worker are often missing—what reports are made are commonly incomplete. Furthermore, little data exist on the efficacy of PEP after occupational exposures.

Despite a mandate for reporting of occupational exposures to HIV and a move from paper to electronic reporting, there remain many challenges with obtaining this information. For example, the electronic reporting system for occupational HIV exposure has not been set up in some of China's local-level hospitals. Many healthcare facilities do not have a designated staff person responsible for reporting and following up on these incidents. Despite an adequate logistical organization, insufficient awareness of the need for reporting among healthcare workers and poor follow up after the first consultation for PEP persist. After the reporting system shifted to an electronic system, the timeliness and completeness of reporting improved. However, measures to improve quality of exposure evaluation including active tracing of healthcare workers who were not followed up after PEP need to be implemented.

16.6.3 Low HIV Knowledge and Uptake of PEP

Along with the scaling up of the national treatment program, each province established a PEP reserve. These ARV drugs intended to support HIV treatment could be adapted to be used as PEP. However, at each drug storage point, especially at institutions that were not treating many HIV patients, PEP was not always readily available. In some areas, healthcare providers are unaware of the existence of PEP. Additionally, many healthcare providers underestimate the risk of HIV transmission and are unwilling to take ARV drugs.

16.6.4 Integrating Care for HIV, HBV, and HCV

Risk of HIV infection should not be the only concern after the occurrence of a percutaneous injury. For example, the risk of HBV infection after these types of exposures can be as high as 22–30% (Palmović and Crnjaković-Palmović 1993; Werner and Grady 1982), while risk of HCV is less than 2% (Lanphear et al. 1994; Mitsui et al. 1992; Puro et al. 1995) and risk of HIV is less than 1% (Donoghue 1993). According to data from the China CDC, the number of reported cases of HCV has been rising annually. In 2012, 201,622 newly diagnosed cases were reported in China. A postexposure vaccine is being promoted for occupational exposures to HBV, but there are no recommendations for HCV. Occupational exposure to all three of these infectious agents should be addressed together.

16.7 Conclusions

As the number of PLWH in China grows, the healthcare workforce, including healthcare providers and laboratory workers, increasingly face risk of exposure to HIV in occupational settings. The Chinese Government and its health system have taken steps to address occupational exposure through development of guidelines,

provision of training, implementation of universal precautions at health facilities, and assurance of PEP availability. The effectiveness of these measures has been reflected in the recent low rates of occupational infection. However, challenges such as availability and consistent use of personal protective equipment, adherence to universal precaution, knowledge of HIV risk, and uptake of PEP remain. Further efforts in strengthening safety measures across health and laboratory workplace settings are needed. Training should emphasize the necessity of sometimes-inconvenient safety measures like wearing personal protective equipment. In low-prevalence areas, health workers should receive education on the continued necessity of following universal precautions without further stigmatizing PLWH. These investments in HIV prevention among the health workforce will further support the ability of health workers to offer quality care to all.

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Part IV

Environment and Infrastructure

Political, Economic, and Social Change

17

Qian Liu, Hong He, and Jonas Tillman

Abstract

The dramatic changes China has gone through politically, economically, and socially have changed the landscape of sexually transmitted infection transmission and created conditions that contributed to the outbreak and epidemic expansion of HIV. Increased mobility of large portions of the population, changing social norms, and the reemergence of the commercial sex industry and alternative lifestyle choices, sexual orientations, and sexual behaviors have changed the way in which disease spreads in China and has also necessitated a change in the way the Chinese government has had to respond. Previously, during the days of a centrally planned economy, the physical well-being of the people was one of the main metrics by which governance was evaluated. However, in shifting to the market economy of modern-day China, the government has had to accept some of the negative side effects. With the increased freedoms the Chinese people enjoy today, the spread of diseases, such as HIV, become more difficult to control. However, China's new political, economic, and social norms also better facilitate some aspects of an effective HIV/AIDS response.

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17.1 Introduction

HIV, which first came to global attention in 1981, has spread at a nearly exponential rate across the globe and is the only disease for which the United Nations has established a designated subunit, the Joint United Nations Programme on HIV/AIDS (UNAIDS; Barnett and Whiteside 2002). HIV has had profound social, economic, and cultural impacts in countries throughout the world, including China.

Rapid social change over the past several decades has played a major role in creating a societal structure that ultimately facilitated the first outbreaks of HIV, as well as the expansion of the HIV epidemic nationwide in China. The first case of HIV in China was reported in 1985, at a time when significant changes, both in terms of Chinese government policy and ideology, were underway. These changes have been commonly traced back to the Third Plenary Session of the 11th Central Committee of the Chinese Communist Party in 1978. The Chairman of the Communist Party at the time, Deng Xiaoping, delivered the keynote speech that marked the start of the transition from a planned, socialist economy to a market-driven economy.

Since then, China has become a key player in global affairs and is currently one of the largest economies in the world. The shift in the Chinese government's political and economic focus has also resulted in a change from a collectivist to a more individualistic philosophy, both on a macro- and on a microscale. With rapid economic development has come a sharp increase in the gap between more developed urban areas in the east and along the coast and less developed rural regions in central and western China.

Knowledge of this political, economic, and social backdrop is important for understanding the evolution of both the HIV epidemic in China and the Chinese government's response. The purpose of this chapter is to describe this backdrop and to highlight its interconnectedness with China's HIV/AIDS epidemic and public health response.

17.2 China Before 1978: Historical Context and Background

In China, disease and public health response to disease are highly sensitive topics. This is partly due to the fact that historically, the health of the Chinese people has often been used as a metric for the political leadership. When Japanese and Western forces invaded China in the nineteenth century, China was referred to as "the sick man of Asia"—opium use had severely weakened the Chinese army and syphilis was rampant among the general population. Ever since this humiliation and national stigma was brought upon China by Japan and the West, disease control and public health concerns have been tightly tied to political narratives (Hood 2011).

When the People's Republic of China was founded in 1949, one of the first political agendas advanced aimed to wipe out prostitution across the country and eradicate sexually transmitted infections (STIs). During the crackdown on brothels in

1949, 95% of the more than 1300 sex workers in Beijing who were sent to reeducation-through-labor camps had acquired at least one STI. These detention centers provided job training and STI treatment, and marriages arranged by the Party were also common. Penicillin intended to supply the military was diverted and reallocated for the treatment of sex workers with STIs (Yang and He 1988). According to official statistics reported at that time, the rampant epidemic of STIs in China was fully controlled by the late 1950s. Surveys conducted between 1960 and 1963 reported only one case of syphilis in a study population of almost 1.3 million (Hu et al. 1965). This example was widely used as a way to convince the general public of the efficiency and superiority of the communist model, often contrasted with statistics from United States, saying that there were 1.2 million untreated cases of syphilis in the USA in 1957 (see Chap. 3 for more information).

Also in the 1950s, the Chinese government introduced a set of programs, referred to as "patriotic health movements." The public was instructed to drain swamps and eradicate disease-carrying bugs, rats, mosquitoes, and flies. In the 1960s and 1970s millions of reeducated former farmers and other workers, who had received rudimentary medical training (so called "barefoot doctors"), took part in the Party's plans for providing basic health services in rural areas (Lynch 2012).

From a political perspective, China had limited diplomatic contact with the international community before the 1980s. Communist ideology dominated the lives of citizens, and diversity and expressions of individualism was discouraged. Rather, individual concerns were deemed secondary to collective concerns, which, in turn, were viewed as synonymous with the concerns of the Party and the State. All social movements, including public health efforts during this time were designed and implemented by the central government in a highly centralized, top-down manner.

From an economic standpoint, this period in China's history was characterized by stagnation. The government applied an economic model where resources were pooled and shared within the community, similar to the practice in other communist countries. Furthermore, the distribution of social welfare across the county was egalitarian in nature, and there was almost no difference in income level between citizens. The country struggled with widespread poverty, burdened by the need to support a huge population with limited resources and an explicit goal to be self-sufficient, which was something of a necessity for a country hardly participating in the global market.

Against this political and economic background, people lived in an environment of collectivism and totalitarianism. Political campaigns initiated by the central government had to be accepted, embraced, and followed by the people in the name of communism. This was not a large deviation from historical Chinese political traditions—the Chinese people have long followed the authority of a strong centralized state. Basic healthcare, including treatment for STIs, and sanitary conditions were provided through standard practices across the country. Individual needs were not recognized. Citizens tended to suppress their individual urges and needs, particularly aspects and behavior that were frowned upon, such as "divergent" and "excessive" sexual desires, practices, and preferences (Pan and Huang 2011).

17.3 China Since 1978: Marketization and Individualism on the Rise

Chinese society has faced dramatic changes since 1978, when Deng Xiaoping emerged as the leading figure in Chinese politics—rapid marketization and increased individualism have characterized the past few decades. These changes have affected all aspects of daily life in China, many of which directly contributed to creating conditions that were ripe for the emergence of the HIV/AIDS epidemic.

17.3.1 Political Change

Deng Xiaoping altered the Chinese political and ideological narrative and landscape by promoting the idea of a disconnect between communism and a market-driven economy, something that has been consistently emphasized by Chinese political leaders ever since. In this framework, improving overall national strength and raising the standard of living became explicitly stated priorities. To help achieve this, Deng advocated for openness to the international community and active engagement in economic and diplomatic dialogues with other communist and noncommunist countries alike. Through this increased international exposure, both capitalism and individualism have become deeply rooted in contemporary Chinese society. Even though China's long history of centralized rule still lingers on and is evident in a lot of China's current governmental structure, decentralization and streamlining of administration have been some of the most prominent themes in this era of political reform. As a result, social organizations, including nongovernmental organizations (NGOs) and community-based organizations (CBOs), have sprouted (Hildebrandt 2013).

The strongly centralized and purely top-down political solutions to public health challenges that had been implemented prior to 1978 became impossible because of ever-increasing decentralization of China's government and external political pressure for human rights-based approaches. Policymakers within the Chinese government have been consistently forced, since then, to take into account the individual needs and rights of its citizens and political pressures from the international community. Moreover, it has had to allow, and in some cases even request or promote, the involvement of international aid organizations and domestic civil society in public health causes (see Chaps. 20 and 22 for more information).

17.3.2 Economic Change

The move toward a market economy and the ideological shift that followed has been the most distinctive feature of the reforms in the post-1978 era. Market-friendly policies have diminished the strength of the often highly inefficient, state-owned enterprises (SOEs), and given incentives for individuals to make use of, and sometimes exploit, market opportunities. While deregulation has facilitated the creation

or resurrection of many active and very lucrative markets, some of these have been more desirable, socially, than others. For example, a new market for blood products emerged, and the illicit drug trade and commercial sex industries came out of their long Mao-era slumber and are continuing to grow. All three of these markets, each in their own way, contributed heavily to China's HIV/AIDS epidemic.

Marketization, or the transformation of an entire economy from a planned system to a market-based system, where production and allocation of goods and services are influenced by incentives in the market rather than directed by the government, can dramatically increase competition and efficiency. However, if not properly regulated, there is imminent risk of marketization also resulting in serious, negative outcomes.

Unfortunately, the dangers of unregulated new markets were realized in central China in the early 1990s and the story of HIV transmission through unsafe blood product collection has now become a striking and well-known cautionary tale. In 1984, HIV was detected in foreign blood products imported into China. In response, the Chinese government banned importation of most blood products by August 1985. This trade barrier meant that the market for domestic blood products was suddenly shielded from international competition—dramatically reducing supply while demand grew. Profits soared, and a large number of companies entered this newly attractive market. Meanwhile, although marketization had significantly improved the quality of life for China's rural residents, it had also created a widening wealth gap such that farmers and rural villagers were increasingly economically marginalized. Thus, new players in the blood product market raced for profits and ultimately took advantage of this population of poor, rural farmers, particularly in central China's Henan province, to obtain a large supply of low-cost blood.

The organic growth of the market and the development of its internal logistics—linking together blood sellers, blood collectors, blood product processers, blood transporters, hospitals, and blood product recipients—took only about 5–6 years (Jing 2011). The rapid pace of market development was challenging for the government to keep up with, and as a result, it went many years without the proper regulations, controls, and oversight. Not surprisingly, large numbers of poor rural farmers and villagers in central China earned money by selling blood and became infected with HIV before the problem was identified and the market was shut down in the mid-1990s (see Chap. 1 for more information).

The widening wealth gap caused by marketization was not unanticipated. In fact, Deng Xiaoping stated repeatedly that some people have to become rich first. The thinking was that wealth would eventually trickle-down and all would become more well-off. Indeed, China's Gini coefficient (a measure of the degree of inequity) rose from 0.42 in 1993 to 0.44 in 1999, the sharpest rise among all countries during this period (Guo 2007).

Furthermore, China's economic development raised the standard of living for most, if not all, Chinese citizens, and there has been a consistent prioritization on the part of the Chinese Central Government to combat poverty. In 1978, China reported that some 250 million of its people were living in absolute poverty. Just 7

years later, that number was cut in half by Deng's rural reform policies. In 2000, China declared that it had eliminated absolute poverty, defined by China as annual income less than 635 RMB, or approximately USD 77 at that time (People's Daily 2000). Then, in 2010, China announced that it had become the first developing country to reach the United Nations Millennium Development Goal of reducing poverty by 50% by cutting its 94 million poor (10%) in 2000, to 27 million (2.8%) in 2010 (People's Daily 2010). However, despite revisions in the definition of poverty in China, it remains today something close the equivalent of living on slightly less than 1 USD per day (Chow 2018).

Wealth inequality results in economically marginalized populations facing disproportional risks due to reduced economic opportunity, limited social capital, and poor access to healthcare services. During the Mao era, individuals were assigned to a "danwei" (work unit) and were prohibited from attempting to find other opportunities outside the rigorous party system. However, with marketization came also a significant loosening of government controls over the people's movements within China's boarders. This, together with rising inequity, has, for example, incentivized laborers in the Chinese countryside to migrate to urban areas in pursuit of opportunity. Migrant workers live on the fringe of the capitalist system, often exploited by businesses that take advantage of their quasi-illegal status and limited earning potential. At the same time, migrant workers have limited access to healthcare, since these services remain tied to household registrations, which no longer match their places of residence.

A large proportion of migrant workers who are female end up working in the commercial sex industry, and escaping poverty is known to be one of the primary motivating factors for women to engage in prostitution (Fish 2017). In fact, the probability of a woman being a sex worker is roughly 80-fold greater among rural-to-urban female migrants compared to females who are residents of urban areas (Xia and Yang 2006). Making matters worse, the gender–income inequality gap continued to widen. Relative to men, women earned 56% (rural) to 67% (urban) in 2010 compared to 78% (urban) to 79% (rural) in 1990 (Fish 2017).

Expanding inequity directly fueled the commercial sex industry—the more skewed the income distribution became, the more some were able to afford sexual services, and the more others were driven to provide them. This also created power imbalances between clients and sex workers such that sex workers are less capable of negotiating safer sex and are more susceptible to client violence. Together with severe social stigma and poor access to healthcare services, sex workers in China are extremely vulnerable and at risk for both acquiring and transmitting HIV and other STIs (see Chap. 7 for more information).

Although the Chinese government is aware of these issues and does try to limit these and other socially undesirable by-products of marketization and economic growth, it only does so to the extent that its interventions do not negatively affect overall economic development.

17.3.3 Social Change

All the above-described political and economic changes affected Chinese social and cultural norms. For much of China's long history, settled agriculture had been the standard way of living for most Chinese people, which created both an emotional connection to, and a strong dependence on, cultivating land. To maintain harmony within such an agriculturally focused society, organization into clans was an instrumental way of regulating inheritance of land and ensuring adequate manpower to cultivate it (Fei 1946). As a result, China has traditionally had a collectivism philosophy that emphasizes a process of decision-making where the most basic, and most important, unit within the social structure was not the individual. It was the nuclear and extended family. Always, the concerns of the family were placed above the concerns of the individual.

In this social structure, an emphasis on the responsibility toward the family still lingers, where individuals generally remain locked into their position in the family hierarchy. This social and cultural norm manifests itself in several ways. For example, in 2007, the divorce rate was 3.6 per 1000 in America, 2.3 per 1000 in Australia, 2.0 per 1000 in Japan, yet only 1.85 per 1000 in China (Sun et al. 2012). As another example, most men who have sex with men (MSM) in China go to great lengths to hide their sexual preferences from their parents because of social stigma and the burden of familial expectations around producing offspring to maintain the family line (Agence France Presse 2017).

However, with loosening of government controls and increasing capitalism, mobility, and exposure to the West, contemporary Chinese society has begun to turn from its collectivist roots, and individualism has grown more and more with each passing decade. The concepts of what is valued by society and how people are judged based on how they choose to lead their lives has shifted—the traditional sense of heavy responsibility to one's family and collectivist framework is lifting, and younger generations in contemporary China are more focused on their personal rights and entitlements (Yan 2011). People are turning away from the traditional Chinese view that continuing the family line is the main function of a family. Although increasing numbers of young couples across China are actively choosing to refrain from having children, the social pressure is enormous and unbearable for some. To remedy this, couples are increasingly relenting and having one child and then giving the child to their parents to raise so that they can resume their independent, childless lifestyle (Xin 2017).

In ancient China, sexual behavior and family relations were closely related not only to collectivism and preserving the family line, but also to nationalism and consolidation and maintenance of power (Fei 1946). For a man of high rank, an ability to manage his relations with his wife and concubines in an effective manner served as testament to his capacity to successfully govern and conduct state affairs (Gulik 1990). When China engaged in the Cultural Revolution in the 1960s and 1970s, sexuality gradually became more tightly controlled by the government (Pan and

Huang 2011). Beginning in the 1980s, a sexual revolution progressively changed almost all aspects of Chinese people's lives. In the 1980s, only very few Chinese citizens reported having had more than one sexual partner, but the proportion who have had more than one lifetime sexual partner has grown enormously in the past two decades. Additionally, the proportion of Chinese people who reported having extramarital partners (defined as partners outside of their marital or cohabiting relationships) increased from 11% in 2000 to 15% in 2006 (Pan and Huang 2011). However, sexual health education has unfortunately not kept pace with these changes. As a result, these new circumstances additionally contributed to the reemergence of STIs and the expansion of China's HIV epidemic.

In contemporary China, the pursuit of sexual satisfaction increasingly became more of a personal matter and a human right, whereas in ancient China, it was mainly a means of reproduction to continue the family lineage and contribute more manpower for agricultural cultivation. For some, this has encouraged engagement in commercial sex as a reasonable way to satisfy one's sexual desires. This has been particularly true among older men. Furthermore, commercial sex has been, and continues to be, closely linked to the conduct of business in Chinese culture, and there is a perception that in order to build a professional business network in China, one would have to be involved in commercial sex at some point. In this context, the current trend of increasing HIV prevalence among the older adult male population in China is not surprising. Newly diagnosed cases of HIV infection among men aged 50–64 increased from 1.6% in 2000 to 14% in 2011, and among men aged 65 and older increased from 0.3% in 2000 to 7.3% in 2011 (Ministry of Health 2012) (see Chap. 7 for more information).

Although homosexuality has never been explicitly banned since the founding of the People's Republic of China in 1949, men involved in same sex activities were commonly arrested by police under Article 106 of the Chinese Criminal Code, which prohibited "hooliganism," making it punishable by up to seven years in prison. In 1997, "hooliganism" was deleted from the criminal code, which was widely viewed as a proxy for the legalization of homosexuality in China. Increased internet access and speed has paved the way for rapid expansion and increased connectivity of China's gay and bisexual community. According to a survey in 1989, only 16% of MSM had partners that were from other Chinese cities or villages. This percentage increased to 24% in 2000 and then, doubled, to 48% in 2010 (Jing et al. 2012). However, although the general public is fairly knowledgeable of alternative sexual orientations, acceptance overall remains low, and stigma and discrimination persists. A 2010 survey of urban teenagers found that most respondents believed that homosexuals should have equal rights and should not be discriminated against based on their sexual orientation. This acceptance among younger generations of Chinese stands in sharp contrast to the harsh stigma and discrimination with which MSM are treated by adults and older adults in Chinese society. Fear of this social stigma and discrimination has become a major barrier, preventing MSM from seeking HIV prevention, testing, and treatment services. Choosing to remain hidden and, for many, to remain undiagnosed has further fueled the expansion of China's HIV epidemic (see Chap. 8 for more information).

The general shift to less restrained sexual and lifestyle preferences and increased diversity of sexual behaviors has greatly contributed to the increased transmission of STIs, including HIV, in China. In 2010, sexual contact was the dominant transmission route observed among newly diagnosed HIV cases—58% of cases were attributed to heterosexual contact, 12% to homosexual contact, and 30% to all other routes combined. In 2014, 66% of new infections were reported as heterosexual contact and 26% as homosexual contact, with just 8% as all other routes combined (Ministry of Health 2015). China is perhaps not far from transitioning from an epidemic concentrated among key populations and specific geographical regions to becoming more generalized.

17.4 Legal Processes in Support of HIV/AIDS Control

The ruling Communist Party sees the development of a more comprehensive legal system as a crucial means of supporting and facilitating further modernization. As a recent example, in a 2014 speech before the 18th National Congress of the Communist Party of China, President Xi Jinping said, "The use of rule of law is one of the basic strategies for governing the country. Ruling according to the law is instrumental in managing the Party and following the law is one of the basic principles of administration. Rule of law should be applied to all levels of government, in regulating the Party and the administration of the government." The Chinese government has recognized some of the negative outcomes of marketization and liberalization and, in the context of HIV/AIDS control and prevention, has implemented a series of laws and regulations, such as the "Four Frees and One Care," to reduce stigma, provide care for HIV-infected individuals, and respond to the spread of the epidemic. These official policies reflect the use of legal processes to respond to the HIV epidemic and attempt to reduce the burden of the disease among those infected.

In the process of strengthening the legal framework, the Chinese government has clearly demonstrated their determination to control the domestic HIV epidemic. Regulations on prevention and control of HIV were first officially issued by the State Council on January 26, 2006. This marked the first time in China that laws were passed specifically for the prevention and control of an infectious disease. Some provincial level governments have also launched HIV prevention and control regulations at lower administrative levels. The implementation of the laws and regulations on HIV/AIDS prevention and care has helped create a more stable and comprehensive management system, with clearer guidelines for accountability. For example, Item 22 of the HIV/AIDS control regulations of 2006 states that the Chinese Center for Disease Control and Prevention (China CDC) is responsible for routine surveillance of HIV prevalence. Before these regulations were implemented, no single government agency was fully responsible and accountable for monitoring China's HIV epidemic.

Beyond specific regulations targeting HIV/AIDS issues directly, there were also other laws that have been (and still are) instrumental in improving the country's

ability to effectively respond to disease outbreaks and epidemics and protect the general health and well-being of its population. For example, the Blood Donation Law requires blood stations to guarantee blood safety, and it placed strict regulations on blood collection, stopped commercial blood trade, and effectively eliminated receipt of contaminated blood products and unsafe blood donation practices as modes of HIV transmission in China (see Chap. 18 for more information).

Despite these notable legal advancements, there are still areas in China's legal framework that are lacking, many of which reflect the current general state of the Chinese legal system. These shortcomings can be generally categorized as ethical dilemmas and legal inconsistencies.

There are plenty of examples of ethical dilemmas surrounding HIV/AIDS-related legislation, such as the debate over the Guangxi Provincial HIV/AIDS Prevention and Control Regulation, which went into effect in 2013. Among other things, it forces individuals to confirm their identity by providing certain required information when being tested for HIV. Information collected includes names, addresses, employment information, pictures, and medical history. This information is then supposed to be kept confidential by testing facilities. Supporters of the legislation have argued that it is necessary to be able to identify people living with HIV (PLWH) in order to effectively facilitate HIV prevention and treatment. Those opposing the law say that it infringes on personal privacy and that confidentiality cannot be guaranteed. There is still severe stigma attached to HIV in China, and opponents of this law argue that people have a right to privacy regarding their HIV status. As a part of the same law, PLWH are required to disclose their serostatus to their partner(s) within one month of diagnosis and encourage them to get tested for HIV. This also brings significant privacy and confidentiality concerns, particularly since PLWH who refuse to comply are at risk of being exposed anyway since the CDC has the responsibility to inform spouses or other sexual partners without the consent of PLWH.

Confidentiality and respect for patient privacy as an ethical principle sometimes stands in direct opposition to the needs of the society at large, in this case, effective public health policy. This type of ethical dilemma is particularly challenging on the backdrop of traditional Chinese cultural values of collectivism, where the concerns of the family or the many always outweighed the concerns of the individual or the few.

Another pitfall of the legal process is the existence of contradictory elements between different pieces of legislation. Chinese Criminal Procedure Law states that a public security organization may detain a suspect who, on the basis of the crime they are suspected to have committed, should be arrested. However, since HIV is designated a class B infectious disease, PLWH are listed as not suitable to be detained according to detention center regulations and prison law. Such inconsistencies among different parts of the legal framework can lead to situations where PLWH who are criminals cannot be properly dealt with by the law.

The achievements and remaining shortcomings of the legal processes developed to handle the HIV epidemic mirror the larger legal environment in China today. The legal system is developing rapidly and is continuously altered to better suit the needs of the society, but with limited resources, the ways in which the laws are

implemented still varies greatly. The ethical dilemmas and inconsistencies between different pieces of legislation must be addressed if China is to progress to more advanced capability in infectious disease control and epidemic response efforts (see Chap. 19 for more information).

17.5 Conclusion

The rapid political, economic, and social changes that China has experienced over the last few decades have created conditions likely to have influenced the outbreak of HIV and the pattern of its spread throughout the population. There has been a rising disparity between rich and poor, as the country transitioned to a market economy, with an increasing acceptance of behavioral differences between people, such as nontraditional lifestyle choices and less restricted sexual behaviors. These social changes have occurred in the context of a cultural tradition that is unique to China. These two conflicting forces have individually and synergistically helped promote the spread of HIV. Unbalanced economic development accelerated by marketization marginalized parts of the population, making them vulnerable and more prone to engage in high-risk behavior. Combined with a limited knowledge of sexual health, the population was at high risk of HIV infection. The sexual health education has also not been able to keep up with the sexual revolution underway in China, where people are having increasing numbers of sexual partners, increasingly engaging in risky sexual behavior, and alternative sexual orientations and lifestyles are simultaneously more accepted and still stigmatized within society and culture. An improved legislative framework, and more emphasis put on rule of law, is another recent development. This contributes to the effective implementation of HIV prevention and control measures but still needs improvement in order to fully support a comprehensive HIV/AIDS response.

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Evolution of HIV/AIDS Policy

18

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Abstract

The HIV/AIDS-related policy framework in China has come a long way from initially attempting to prevent HIV from entering the country in the early stages of the epidemic to facilitating comprehensive national HIV response of today. Each step of the way, policymakers in China have strived to ensure that HIV-related policies were pragmatic, tailored to the Chinese context, aligned with international best practices, and based upon the best available information at the time. Although there have been a great many policy actions since HIV was first discovered on the mainland, a few key policies were foundational, had a major impact on the epidemic, and marked an important shift China's HIV response, for example, the Blood Donation Law (1998), the first Five-Year Action Plan for the Containment and Control of HIV/AIDS (2001), and the "Four Frees and One Care" policy (2003). These and other key policies are highlighted here. Going forward, as China's HIV epidemic increases in size and complexity, policymakers need to remain grounded in evidence but also be open to alternative and innovative approaches.

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18.1 Introduction

China has sought to develop and implement HIV/AIDS-related policies that are pragmatic, tailored to the Chinese context, aligned with international best practices, and based upon the best available information at the time. For roughly 10 years after the first HIV case was first discovered on the mainland in 1986 (a foreign national diagnosed with AIDS), the best information available was from case reporting. However, during this period, nearly all cases were identified very late, when patients presented to hospitals with already severe symptoms of advanced HIV disease or AIDS. Thus, case reporting information was already many years out of date, and policymakers were unable to see the current picture of the HIV epidemic during this time. To make matters worse, while there were certainly more people living with HIV (PLWH) who were still undiagnosed compared to those diagnosed and therefore counted among case reports (i.e. a total of 20,711 by the end of 2003), there was uncertainty and substantial worry surrounding just how many Chinese citizens had HIV infection and did not know it (Wang et al. 2010).

Thus, on advice from the World Health Organization (WHO) and under the leadership of the Chinese Academy of Preventive Medicine (the institute was renamed as Chinese Center for Disease Control and Prevention—China CDC, in 2002), the National HIV Sentinel Surveillance System was developed and launched in 1995. This system did not take the place of case reporting. Rather, it acted in parallel, and the two sources of information were complementary to each other. The surveillance system began with collection of data among key, high-risk groups including drug users, female sex workers (FSW), pregnant women, sexually transmitted infection (STI) clinic attendees, long-distance truck drivers, and military recruits. It also began with data collection in geographical areas most affected by the HIV epidemic based on case reports, for example, Yunnan province. Although the system started out very small, with only 42 sentinel sites operating from 1995 to 1996, it quickly expanded both in terms of numbers of sites (i.e. 101 by 2000 and 194 by 2003) and in terms of key populations covered (i.e. former plasma donors [FPD] were added in 1998, men who have sex with men [MSM] were added in 2002). This system became a key source of information for HIV/AIDS policy formulation (Lin et al. 2012) (see Chap. 2 for more information).

Also important in shaping HIV/AIDS-related policy in China was an international agreement made in 2004 among international aid agencies and other donors, developing countries, and United Nations (UN) agencies. The core principles of this agreement, called the "Three Ones," were:

> *one agreed HIV/AIDS action framework that provides the basis for coordinating the work of all partners, one national AIDS coordinating authority, with a broad based multi-sector mandate, and one agreed country-level monitoring and evaluation system.*

The purpose of these principles was to help ensure that the global HIV/AIDS response was well coordinated among members of the international community and to ensure that limited resources were used as efficiently as possible with a goal of

targeting priority issues, making maximal impact, and preventing duplication of effort (Joint United Nations Programme on HIV/AIDS 2004).

Over time, more sources of information became available that were also important in further understanding China's HIV epidemic and informing policy supporting China's HIV/AIDS response. For example, behavioral surveillance among some risk groups began in 2004, active testing campaigns were launched in 2004 and 2005, improved methods of estimating the total number of PLWH in China (diagnosed and undiagnosed) were incorporated and made routine in 2005, and several large, special epidemiological surveys were conducted beginning in the latter half of the 2000s. Many international aid programs were also generating data during this time as well and all of these sources of partially overlapping and nonstandardized data gathered via disparate methods began to be overwhelming. The days of not having enough data were over, but the true nature of the epidemic was not clearer. Thus, in 2008, China launched its National HIV/AIDS Comprehensive Response Information Management System (CRIMS), which integrated eight smaller systems (i.e. case reporting, testing and counseling, sentinel surveillance, behavioral surveillance, antiretroviral therapy [ART] for adults, ART for children, high-risk group behavioral intervention, and methadone maintenance treatment [MMT]) and one new system (i.e. county demographic information) into a single, unified, web-based, real-time monitoring and evaluation data system. From 2008 on, CRIMS has been the primary source of data informing policy development and implementation for China's HIV/AIDS response (Mao et al. 2010) (see Chap. 24 for more information).

The Chinese Government at all levels has issued hundreds of HIV/AIDS-related policies since the start of the epidemic, and they cannot all be covered in detail here. Thus, this chapter highlights some of the most significant national-level policies, which were critically important to China's HIV/AIDS response.

18.2 Key HIV/AIDS Policies

An overview of the major, national-level HIV/AIDS-related policies issued by the Chinese Central Government is summarized in chronological order in Table 18.1. This overview is provided along with a short description of the status of the HIV epidemic at the time these policies were issued (see Chap. 1 for more information).

18.2.1 Implementation and Repeal of the Travel Ban

By 1988, 22 HIV/AIDS cases had been reported on the mainland, mostly among foreigners, Chinese residents returning from overseas, or locals who had received imported blood products that were contaminated. This spurred the Chinese Government to take action, issuing a series of early policies focused mainly on preventing the virus from entering the country, whether carried by infected individuals or by contaminated blood products. Foreign students, researchers, business people, and others visiting China on 12-month visas had to submit to an HIV test within

1 month of entering the country. Foreigners already residing in China for more than 12 months were required to provide health certificates that specified HIV status. HIV testing was set up at major border crossings and customs checkpoints and in large cities. Foreigners attempting to enter the country who were found to have HIV infection were denied entry, quarantined, and then deported (Ministry of Health 1985; Ministry of Health et al. 1988; Ministry of Public Security and Ministry of Foreign Affairs 1986; State Education Commission and Ministry of Health of China 1986; Ministry of Health and Ministry of Public Security 1987; Sun et al. 2010).

The travel ban was temporarily lifted for a few special events including, for example, the 1990 Asian Games, the 1995 UN Fourth World Conference on Women, the 2007 Global Fund Board Member Meeting, and the 2008 Olympics Games. However, over time and with improved quality and timeliness of data, officials

Table 18.1 An overview of key, national-level HIV/AIDS policies. Adapted with permission from Sun et al. (2010)

HIV epidemic status	Policy and response
1985–1988: In 1985, a US citizen was diagnosed with HIV infection while traveling in China, and four patients with hemophilia, treated with imported blood products, were also diagnosed with HIV. By 1988, a total of 22 cases had been reported across seven provincial-level administrative areas, most among foreigners or citizens returning from abroad (see Chap. 1 for more information)	The Chinese Central Government responded with policies aimed at stopping HIV from entering China and at initiating case reporting **1984**: *Blood Product Imports*—This policy banned the importation of foreign blood products into China (Ministry of Health 1984) **1985**: *Surveillance of Imported Cases*—This policy established checkpoints and quarantine facilities at border crossings and in major cities (Ministry of Health 1985) **1986**: *Notifiable Disease Designation*—This policy designated HIV/AIDS a Class B notifiable disease, requiring newly identified cases be reported within 24 h (Ministry of Health 1986) **1986**: *Travel Ban Invoked*—This policy instituted a ban on entry into China by PLWH (Ministry of Public Security and Ministry of Foreign Affairs 1986) **1986, 1987, 1988**: *Foreigner Health Certificates*—This series of policies required that all foreigners seeking entry or remaining in China for 12 months provide a certification of health that included HIV status (State Education Commission and Ministry of Health 1986; Ministry of Health and Ministry of Public Security 1987; Ministry of Health et al. 1988).
1989–1994: An outbreak of HIV was discovered among people who inject drugs (PWID) in remote, rural Yunnan province (Ma et al. 1990; Shao et al. 1991; Zhang et al. 1994). HIV began to spread rapidly. By 1994, roughly 2000 cases had been reported in 22 of 31 provincial-level administrative areas	The response of the Chinese Government during this period was primarily punitive, attempting to combat HIV via increased policing and organized "crackdowns" on drug use and prostitution (Ministry of Health and Ministry of Public Security of China 1991). Officials within China's Ministry of Health (MOH) also began to discuss implementing behavioral interventions among high-risk populations, including providing STI testing and treatment for FSW (see Chaps. 3 and 7 for more information)

Table 18.1 (continued)

HIV epidemic status	Policy and response
1995–2002: A much larger outbreak of HIV was discovered among FPD in rural central China—HIV had spread to tens of thousands of poor farmers through unsafe plasma collection practices (Wu et al. 1995, 2001, 2008). Meanwhile, HIV continued to spread among PWID, FSW, and other high-risk groups. By 1998 all 31 provincial-level administrative areas had reported HIV cases. By 2002, approximately 10,000 PLWH had been diagnosed	Senior-level officials within the Chinese Central Government became aware of the seriousness of the HIV epidemic and the critical and urgent need for a response, resulting in another series of policies and actions: **1995**: *Sentinel Surveillance*—China CDC was directed to lead the development and launch of a national sentinel surveillance system to monitor the HIV/AIDS epidemic **1996**: *Multi-Sector Coordination*—The State Council STD/AIDS Prevention and Control Coordinating Meeting Mechanism was established to strengthen cooperation between government agencies **1998**: *NCAIDS Established*—The MOH created the National Center for STD/AIDS Control and Prevention (NCAIDS) within the China CDC, tasking it to provide technical guidance for HIV/AIDS prevention and control nationwide **1998**: *Blood Donation Law*—This law ensured the safety of blood for clinical use and safeguarded the health of blood donors and recipients. It stressed that blood donation be voluntary and devoid of compensation (Standing Committee of the National People's Congress 1998) **1998**: *Medium- and Long-Term Plan*—The China Medium- and Long-Term Plan for HIV/AIDS Prevention and Control (1998–2010) encouraged condom use promotion as a means of preventing sexual transmission of HIV (Ministry of Health et al. 1998) **2000**: *Delineation of Responsibilities*—A policy entitled Working Duty in HIV/AIDS Prevention and Control for Related Ministries, Committees, Administrations and Social Groups was issued to ensure responsibility and accountability for different components of the HIV/AIDS response was clear (Ministry of Health 2000) **2001**: *First Five-Year Plan*—The first Five-Year Action Plan for the Containment and Control of HIV/AIDS (2001–2005) was issued, setting up a regular planning cycle for the HIV response and allowing the exploration of harm reduction strategies such as MMT (State Council 2001)

(continued)

Table 18.1 (continued)

HIV epidemic status	Policy and response
2003–2013: Improved methods for estimating the total number of PLWH were implemented beginning in 2005, yielding reliable biennial estimates (Wang et al. 2010). In 2005, an estimated 650,000 were infected. Just 8 years later in 2013, the estimate was 810,000 (Ma et al. 2018). Nevertheless, the epidemic remained concentrated both geographically and within high-risk groups, although expansion to new high-risk groups occurred (e.g., MSM; Wu et al. 2013). Availability and uptake of prevention, harm reduction, testing, and treatment services improved during this time, and as a result, more cases were identified, and individual and community outcomes improved (He et al. 2013; Zhang et al. 2009, 2011; Zhao et al. 2013a, b), but extremely poor retention in care was a major problem (Gu et al. 2016; Ma et al. 2018)	After the 2003 outbreak of severe acute respiratory syndrome (SARS) virus, support for public health efforts rose, and the HIV response was strengthened by high-level political support and an influx of domestic and international funds. Policies developed and implemented during this period included the following: **2002**: *Importation of Medicines*—The Ministry of Health, Ministry of Finance, State Taxation Administration, and General Customs Administration jointly obtained approval from the State Council for the 5-year tariff-free import of AIDS-related medications **2003**: *Domestic Medicines*—The State Food and Drug Administration (SFDA) approved the production of four antiretroviral (ARV) drugs by domestic pharmaceutical manufacturers, increasing access to ART **2003**: *Four Frees and One Care*—The Four Frees and One Care policy, which aimed to increase access to HIV testing and clinical care services, was a foundational policy that marked a critical turning point in the evolution of China's HIV response (State Council 2004; Wu et al. 2007). **2004**: *Active Testing Campaigns*—The scale-up of HIV testing, including active testing campaigns among key populations and mandatory testing for incarcerated drug users, resulted in an enormous increase in the numbers of diagnosed PLWH (Ministry of Health et al. 2004; Ministry of Health 2004) (see Chap. 12 for more information) **2005**: *Harm Reduction*—Establishment and rapid expansion of MMT and needle and syringe exchange programs (see Chaps. 9 and 10 for more information) **2006**: *Regulations on Prevention and Treatment*—Not just a promotion of prevention and treatment initiatives, this policy also protected the legal rights of PLWH and their families and set up a framework of consequences for failure to implement HIV-related policy (State Council 2006a). **2006**: *Second Five-Year Plan*—Launch of China's Second Five-Year Action Plan for the Containment and Control of HIV/AIDS (2006–2010), which was characterized by more specific and ambitious targets for the HIV response (State Council 2006b) **2010**: *Travel Ban Revoked*—The State Council lifted its ban on PLWH entering the country (State Council 2010a) **2010**: *Five Expands, Six Strengths*—This policy aimed to increase health education, HIV testing, and prevention and care services (State Council 2010b) **2011**: *12th Five-Year Plan*—Launch of China's Third Five-Year Action Plan for the Containment and Control of HIV/AIDS (2011–2015), which emphasized the importance of involvement of civil society in the HIV response (State Council 2012)

Table 18.1 (continued)

HIV epidemic status	Policy and response
2014–Present: In 2014, sexual transmission became the primary driver of the epidemic and MSM became the high-risk group with the fastest rise in prevalence (National Health and Family Planning Commission 2015)	Two important changes in the global strategy to combat HIV/AIDS were influential during this period. First, the Joint United Nations Programme on HIV/AIDS (UNAIDS) 90-90-90 Targets refocused international efforts on improving testing and treatment services and addressing poor retention in care (Joint United Nations Programme on HIV/AIDS 2014, b). Secondly, substantial evidence of individual and community benefit of early ART led WHO to eliminate the ART eligibility criterion and recommend ART for all PLWH (World Health Organization 2016) **2016**: *13th Five-Year Plan*—China's 13th Five-Year Action Plan for the Containment and Control of HIV/AIDS (2016–2020) contained three very important changes in national HIV-response strategy: (1) the 90-90-90 Targets were adopted as a national strategy, (2) the CD4 count-based ART eligibility criterion was eliminated, and (3) a new, streamlined and accelerated protocol for PLWH to obtain a confirmed diagnosis, complete clinical staging, and initiation of treatment, the so-called "One4All" strategy, was adopted (State Council 2017)

within China's Central Government came to realize that foreigners were not driving the HIV epidemic in China. In fact, between 2007 and 2009, foreigners accounted for only 0.3% of all newly identified HIV infections within China. Therefore, in 2010, the more than two-decades-old travel ban was finally revoked (State Council 2010a; Sun et al. 2010).

18.2.2 Blood Donation Law

In the mid-1990s, a massive outbreak of HIV infection was discovered among FPD in rural central and eastern China (Wu et al. 1995, 2001, 2008). Those affected were largely poor farmers who sold their blood to support their families. Domestic blood collectors and blood product manufacturers, finding themselves in a market suddenly shielded from international competition because of the ban on importation of foreign blood products, took advantage in the lag in government regulation and oversight of this new and highly lucrative market. Interest in growing profits eclipsed concerns for quality and safety, and the health of donors and recipients was compromised when equipment became contaminated and tens of thousands became infected with HIV. The outbreak became one of the worst tragedies of the global HIV pandemic (Sun et al. 2010; Wu et al. 2007).

In response to the crisis, blood collection stations were shut down within several weeks nationwide, and in 1996, China's Blood Donation Law was drafted. Enacted in 1998, the most important component of the law was the prohibition of blood

donation outside nationally regulated blood collection facilities. However, the law also emphasized that blood donation must be voluntary, and donors may not be compensated (Standing Committee of the National People's Congress 1998). Since the enactment of the Blood Donation Law, only a handful cases of HIV infection via blood transfusion have been reported (Sun et al. 2010; Wu et al. 2007). Substantial effort has been made to develop standards and quality assurance programs to ensure the safety of the nation's blood supply. This has included improved testing methods to ensure that even a "window-period" donation (i.e. donation from an individual who is in the window period of infection when it is still undetectable by traditional antibody-based serological tests) is caught and removed before it enters the blood supply (see Chap. 6 for more information).

18.2.3 China's First Five-Year Action Plan (2001–2005)

To improve the coordination of the response to China's growing HIV epidemic, high-level representatives from the Ministries of Health, Finance, Public Security, and Justice, as well as the Development Commission met to discuss the introduction of harm reduction measures including MMT, needle and syringe exchange, and condom use promotion. The decision was made to move forward with formulation of policies supporting these measures and endorsing small pilot studies of harm reduction interventions. The result was that harm reduction strategies were included in China's First Five-Year Action Plan for the Containment and Control of HIV/AIDS (2001–2005; State Council 2001; Sun et al. 2010).

Unfortunately, the plan was not sufficiently funded, which weakened its impact, particularly in its early years from 2001 to 2003. However, the SARS outbreak in 2003 caused public health to rise to the top of China's policy agenda, and funding was dramatically improved (Sun et al. 2010; Wu et al. 2007). Funding issues aside, the mere inclusion of harm reduction in the plan was a major step forward and a victory for public health specialists who had been advocating for harm reduction already for many years. Long-standing sociocultural barriers to harm reduction were beginning to fall away (see Chap. 19 for more information).

18.2.4 The "Four Frees and One Care" Policy

The massive HIV outbreak in central China among FPD led to a huge demand for treatment and care, as a growing proportion of this population progressed to advanced HIV disease and AIDS, and experienced high and increasing morbidity and mortality (see Chap. 1 for more information).

In response, the Chinese Government announced a major, new commitment to engage in a more comprehensive HIV response at the UN High-Level Special Meeting in late 2003. This commitment, which later became known as the "Four Frees and One Care" policy, included the following five promises:

1. Free ART for AIDS patients in rural areas and those without medical insurance living in urban areas,
2. Free HIV voluntary counseling and testing (VCT) services,
3. Free ART for pregnant women living with HIV for the prevention of mother-to-child transmission (PMTCT) and free HIV testing for their HIV-exposed infants,
4. Free schooling for children orphaned by AIDS, and
5. Care and economic assistance to households of PLWH.

Implemented beginning in early 2004, the "Four Frees and One Care" policy has had an enormous impact on the HIV/AIDS epidemic in China (State Council 2004; Sun et al. 2010; Wu et al. 2007). Most importantly, it caused a dramatic increase in ART coverage for PLWH. Led by the National Free ART Program (NFATP) and facilitated by a massive support program called China CARES, the number of PLWH on ART in 2003 was only roughly about 100, but by 2005, this number had increased to 20,000 and by 2007, to 34,000 (Ma et al. 2018). ART scale-up had a major impact on HIV/AIDS-related mortality (Zhang et al. 2009), and as evidence of the benefits of ART accumulated, requirements restricting ART eligibility were relaxed and greater and greater proportions of PLWH who were diagnosed were receiving treatment (Ma et al. 2018). Additionally, HIV testing overall increased, and the number of pregnant women screened for HIV and provided PMTCT services increased dramatically. All children orphaned by AIDS were taken in by relatives, neighbors, or local government-run social welfare programs. Moreover, although not a primary objective of the policy, stigma and discrimination appeared to be positively impacted in the wake of the "Four Frees and One Care" policy, particularly in areas where the epidemic was driven by contaminated plasma collection (Cao et al. 2006) (see Chaps. 13, 25, and 28 for more information).

18.2.5 Regulations on AIDS Prevention and Treatment

In 2006, the Chinese Government issued the Regulations on AIDS Prevention and Treatment, which helped define the roles and responsibilities of the different relevant agencies within the government, civil society, and PLWH (State Council 2006a). However, it importantly was the first piece of legislation in China that dealt with the protections of the rights of PLWH. Stigma associated with HIV/AIDS has been very severe in China since the beginning of the epidemic. PLWH and their family members, neighbors, or friends have been discriminated against due to their medical diagnosis or their association with someone with an HIV diagnosis. Discrimination resulting from stigmatizing attitudes has been particularly severe in the workplace and in healthcare settings. This policy clearly set out, specifically, the right to marry, the right to access healthcare services, the right to equal employment opportunities, and the right to receive an education for all PLWH. The primary aim of the regulations was to address stigma and discrimination against PLWH and to create legal protection for politically sensitive prevention measures, particularly harm reduction interventions including MMT, needle and syringe exchange, and condom use

promotion. It furthermore described consequences for failure to implement HIV/AIDS-related policy. However, implementation and enforcement of this regulation has been inconsistent across geographies, levels of government, and sectors within the government (Sun et al. 2010). Nevertheless, this was a very important piece of legislation that again marked a turning point in China's HIV response (see Chap. 28 for more information).

18.2.6 The Second Five-Year Action Plan (2006–2010)

The new administration led by President Hu Jintao, Premier Wen Jiabao, and Vice Premier and then Minister of Health Wu Yi placed HIV policy high on the national agenda (Sun et al. 2010; Wu et al. 2007), and this more supportive political environment greatly facilitated the development of China's Second Five-Year Action Plan for the Containment and Control of HIV/AIDS (2006–2010; State Council 2006b). The plan set more specific and ambitious targets, particularly for prevention programs for marginalized, high-risk groups, such as PWID, FSW, MSM, and migrant workers. It also contained targets for harm reduction programs. For example, one target was to establish MMT clinics in all counties and cities with more than 500 registered drug users, and for MMT coverage to reach at least 70% of registered opioid users. This explicit target, and the funding associated with it, was instrumental in the successful scale-up the MMT program. Finally, the plan also contained targets related to treatment including ART coverage of at least 80% for AIDS patients by 2010 and PMTCT coverage of more than 90% for pregnant women living with HIV by 2010 (Sun et al. 2010).

18.2.7 The "Five Expands, Six Strengths" Strategy

The "Five Expands, Six Strengths" strategy was introduced in 2010, when the HIV epidemic was continuing to grow at an ever-faster rate despite the government's prior efforts—a large population of PLWH remained undiagnosed, and transmission dynamics were shifting more toward sexual contact, and new high-risk groups were becoming affected. This strategy was meant to combat the HIV epidemic with renewed focus and greater commitment. The five "expands" were expand coverage of (1) information, education, and communication (IEC) interventions; (2) HIV testing; (3) PMTCT services; (4) integrated interventions; and (5) ART services. The six "strengths" were strengthen (1) blood safety management, (2) health insurance, (3) care and support, (4) rights protections, (5) organizational leadership, and (6) response teams.

18.2.8 The 12th Five-Year Action Plan (2011–2015)

The estimated number of PLWH in China had climbed from 650,000 in 2005 to 700,000 in 2007, and then to 740,000 in 2009. Although the proportion of all PLWH

who were diagnosed was improving, there was still a huge number of PLWH who did not know they were infected—74% of all PLWH in 2007 were unaware of their status (Ma et al. 2018). Additionally, while the epidemic remained concentrated geographically and among key populations, new high-risk groups were being affected (e.g., MSM, migrants, serodiscordant couples) and more people were progressing to AIDS. China's HIV epidemic was becoming more dynamic and more complex. Thus, when it came time to draft the third plan for 2011–2015, policymakers had realized that the HIV response required renewed vigor and new measures that would increase the efficiency and effectiveness. Therefore, in the 12th Five-Year Action Plan for the Containment and Control of HIV/AIDS (2011–2015; called the 12th instead of the third to align with the national planning cycle), policymakers took a new direction, and for the first time, civil society was included as an important partner in the HIV response. The new plan heavily emphasized the need to support the involvement of organizations outside the government, such as nongovernmental organizations (NGOs) and community-based organizations (CBOs), in HIV prevention and care. This was groundbreaking and added much needed additional capacity for implementation of interventions. Additional key components of the plan included strengthening the prevention and control capacity of local administrative levels and further expanding coverage of prevention and care services (State Council 2012).

18.2.9 The 13th Five-Year Action Plan (2016–2020)

Already in 2014, sexual transmission had become the primary driver of China's HIV epidemic, and high-risk groups had changed—HIV among MSM was escalating at an alarming rate. In 2007, just 3.4% of all newly diagnosed cases were among MSM, but by 2014, 26% were among MSM (National Health and Family Planning Commission 2015). At the same time, the epidemic overall was continuing to grow and the expansion of testing and treatment services were still lagging. The estimated total number of PLWH in China was 850,000 at the end of 2015, one-third of whom did not know their status (Ma et al. 2018).

Internationally, the global effort to combat the HIV pandemic was becoming increasingly coordinated by UNAIDS, among others. In 2014, UNAIDS, seeking to galvanize support and create momentum for further expansion of treatment, launched a new, ambitious goal for the global HIV response. It took the form of what has been named the 90-90-90 Targets. These targets are 90% of all PLWH know their status, 90% of all diagnosed PLWH are on treatment, and 90% of all PLWH on treatment achieve viral suppression by 2020 (Joint United Nations Programme on HIV/AIDS 2014). The targets placed emphasis not just on scale-up of ART but on finding the many people who still do not know they have HIV infection, getting them onto life-saving and community-protecting treatment, and helping them to achieve the goal of that treatment, viral suppression (Joint United Nations Programme on HIV/AIDS 2017). It has stimulated countries, like China, to take a closer look at the failings of their HIV care continua from HIV screening to treatment to clinical outcomes.

Additionally, by 2015, considerable, high-quality evidence from both observational studies and clinical trials had accumulated, demonstrating the significant individual clinical benefits and community preventive benefits of early ART (i.e. treating HIV infection with antiretroviral drugs before $CD4^+$ T-lymphocyte populations declined below 500 cells/mm^3). Therefore, in 2016, WHO announced revised treatment recommendations. Historically, it had recommended that only PLWH with low CD4 counts receive ART, and although this criterion had been expanded over time, from <200 cells/mm^3 to <350 cells/mm^3 and then to <500 cells/mm^3, it was now eliminating the requirement altogether recommending that all PLWH, regardless of CD4 count receive ART (World Health Organization 2016).

In the meantime, China had been examining its HIV care continuum and had already been studying the effects of early ART for expanded populations of PLWH in the Chinese setting. As of 2015, it had not yet met the 90-90-90 targets, but it had measured performance against them and found that 68% of its PLWH were diagnosed, 67% of its diagnosed PLWH were on ART, and 65% of its PLWH on ART had achieved viral suppression (Ma et al. 2018). It had also examined loss to follow-up along the continuum (Gu et al. 2016) and found that creating a simplified and streamlined patient pathway, known as the "One4All" strategy, from screening HIV-reactive to receiving a confirmed diagnosis to being initiated on ART, regardless of CD4 count, had important clinical benefits including a dramatic reduction in all-cause mortality (Wu et al. 2015, 2017).

Thus, when it came time for the State Council to draft its next five-year plan, some very important strategic changes were included. The 13th Five-Year Action Plan for the Containment and Control of HIV/AIDS (2016–2020) adopted the 90-90-90 Targets as a national strategy, eliminated the CD4 count-based ART eligibility criterion, and incorporated the "One4All" strategy (State Council 2017).

18.3 Challenges and Future Directions

China has made enormous progress over the past 30 years, and in particular in the most recent 15. However, China faces a myriad of challenges in responding to its HIV epidemic and the needs of its affected citizens. By the end of 2015, an estimated 850,000 people in China were living with HIV, but only 574,000 (68%) had been diagnosed. Among those diagnosed, only 383,000 (67%) were receiving treatment. Clearly, there is still a long way to go toward the ultimate goal of elimination of HIV infection (Ma et al. 2018).

Stigma and discrimination are still unacceptably prevalent and cause the vulnerable and the marginalized to choose not to access prevention, testing, treatment, and care services for fear of being exposed. Consistent condom use, one of the most effective and affordable prevention measures available, is still low both among heterosexual couples and homosexual couples as well as in the context of extramarital noncommercial and commercial sexual contact. Harm reduction measures still do not cover all those in need of services, and retention is

persistently poor. Testing uptake even among those who are aware and knowledgeable, educated, and financially stable is suboptimal—many do not access testing frequently enough, and many more have never tested. HIV VCT services are slow, PITC services are poorly targeted and routinely identify infection too late, and self-testing, which could be very promising for reaching those who choose not to access facility-based or government-run testing services, suffers from a lack of regulation, quality assurance, and linkage to care mechanisms. Enormous numbers of PLWH who screen HIV-reactive or are diagnosed with HIV infection are lost to follow-up before they start treatment due to fragmented services, long wait times, complicated procedures, and difficulty in navigating a complex health system. Those who do successfully start treatment struggle with follow-up and adherence to medications and often do not achieve the all-important treatment goal of viral suppression. Furthermore, treatment for coinfections such as hepatitis B virus, hepatitis C virus, and tuberculosis is not integrated into HIV services. Together, these factors contribute to high mortality and morbidity even among China's treated PLWH.

Since the beginning of China's HIV/AIDS epidemic, leaders and policymakers have sought to find pragmatic solutions, tailored to the Chinese context, aligned with international best practices, and grounded in the best available information at the time. However, implementation of existing policy has been uneven and inconsistent and more importantly, China's epidemic has changed, and China itself has changed. New, innovative approaches must be developed, and bold steps must be taken, if China's current HIV epidemic is to be confronted and controlled.

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Ethics of the HIV/AIDS Response

19

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Abstract

Since HIV came to China in the mid-1980s, many ethical issues have challenged Chinese public health workers, officials, and policymakers. This chapter reviews many of the controversies, dilemmas, and other ethical issues related to the HIV/AIDS response in China, as well as HIV/AIDS research. Specifically, ethical issues surrounding harm reduction measures (i.e. condom promotion, needle exchange, and methadone treatment), HIV testing formats (i.e. anonymous testing, active testing, mandatory testing), disclosure of HIV status, and antiretroviral therapy (ART; i.e. methods and funding) are discussed. Finally, ethical concerns regarding HIV research (i.e. protection of human subjects, responsible conduct of research) are described, and means of addressing those concerns are discussed. These ethical issues and others have been complex and difficult to navigate. However, the Chinese Central Government, as well as leading public health and research institutions have shown increasing commitment to the careful and thoughtful analysis of these problems, debate and discussion of all viewpoints, and development of policies, regulations, and guidelines that focus on the well-being of all peoples.

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19.1 Introduction

The arrival of HIV in China caused a panicked response in the mid-1980s. At that time China was just opening to the rest of the world and embarking on sweeping political, economic, and social reforms, yet was very cautious about western cultures. HIV, strongly associated with homosexuality, promiscuity, and drug use, was thought of as a "human disaster," a "super-cancer," and a "deadly plague" caused by a "poisonous capitalist lifestyle." Given this politicized and stigmatized view, which was fueled by propaganda, preventive measures focused on blocking any opportunity for the disease to enter China.

In the late 1980s and early 1990s, many poor Chinese in Yunnan province had been infected with HIV through injection drug use, which heralded the failure of the "block-HIV-entry" strategy. In the early 2000s, China switched gears and adopted harm reduction strategies—condom use promotion, needle and syringe exchange, and methadone maintenance treatment (MMT)—to prevent the spread of HIV. In 2006, the Chinese Government officially endorsed these harm reduction strategies. But at the time, concerns remained about the ethical nature of these strategies, and general consensus had not been reached. Harm reduction approaches caused heated ethical debates primarily because of the illegal, and perceived immoral, status of sex work and drug use. It has taken great effort on the part of government, academic communities, and grassroots community-based organizations (CBOs) to help ensure the harm reduction components of China's National HIV/AIDS Program became well accepted.

China tried many types of HIV testing strategies, some of which were fraught with ethical issues that are still being debated today. The controversy surrounded anonymous versus "real-name" testing (i.e. registering for HIV testing under one's real name and using accurate contact information), passive versus active HIV testing, voluntary versus mandatory HIV testing (MHT), and disclosure of results.

The development of antiretroviral therapy (ART) for the treatment of HIV disease was a revolution in itself, but new evidence strongly demonstrating both the individual and community benefits of early and immediate ART for all people living with HIV (PLWH) meant that there were new ethical questions surrounding ART delivery that would need to be addressed. Additionally, the magnitude of expenditure of public funds for HIV control has received increasing attention in recent years, and the ethics and politics of resource reallocation has become a heated issue.

Beginning in the early 2000s, many large-scale HIV epidemiological studies, clinical trials, and vaccine trials were conducted in China. Institutional Review Boards (IRBs) were developed to protect the rights and well-being of participants. Community Advisory Boards (CABs) were also developed as a means of liaising with communities in which studies were being conducted and advising study leaders of sociocultural issues and community concerns in an attempt to further ensure that research is conducted with the utmost integrity and respect for participants and their communities. Finally, responsible conduct of research, research integrity, and research misconduct have received renewed attention in China and issues surrounding the ethical conduct of research are discussed.

19.2 Ethical Issues Surrounding Harm Reduction

While the international community has accepted that harm reduction is an effective approach for controlling HIV spread among vulnerable populations, conducting such interventions among populations that are stigmatized, discriminated against, and therefore "hidden" is never an unencumbered course. Immoral and stigmatized stereotypes of these groups have impeded consensus building for harm reduction approaches in China. Even in countries in which such interventions have been well implemented, years or even decades of heated debates occurred. Besides moral concerns, there are two attributes of the Chinese context that make these ethical issues more complex.

19.2.1 Dual Legal Identity of Key Affected Populations

The first of these attributes is the dual legal identity of vulnerable populations—they are simultaneously the target of both elimination and protection. On the one hand, both commercial sex and drug use are illegal under public security and administrative law. Thus, police and other law enforcement arms of the various levels of government are tasked with surveilling for this criminal activity, conducting "crackdowns," and investigating and incarcerating those suspected of these crimes. Condoms can be used as evidence of commercial sex and needles and other drug injecting paraphernalia can be used as evidence of drug abuse. On the other hand, since commercial sex workers and people who use drugs are vulnerable to a myriad of harms—violence, infectious diseases, and chronic physical and mental illness—both health workers and public health workers are responsible for protecting and treating them. Sex workers' and drug users' individual human rights to make healthy choices, like obtaining and using condoms and clean needles, are protected by the law in China. Public health workers are, for instance, tasked with promoting 100% condom use through outreach, education, counseling, and condom-distribution campaigns. Similarly, public health workers operate needle and syringe exchange programs (NSEP), encouraging people who inject drugs (PWID) to practice safer injecting behaviors, and MMT clinics, helping opioid users to stop using in favor of opioid substitution therapy.

This difficult opposition set up between public security and public health in the form of dual legal identity for vulnerable groups has caused difficulty and dilemmas and, in practice, has hampered the piloting, implementation, scale-up, and ongoing operation of harm reduction programs in China. Here we have included descriptions of these difficulties provided by just a few of those affected in their own words.

A public health department official described these challenges as making his work nearly impossible:

> *It is really hard to gain the cooperation of sex workers. Sometimes we go to an entertainment establishment to distribute condoms. Ten minutes after we leave, the public security guys go there to crack down on prostitution. The condoms we distributed are taken away as evidence. The boss and girls are very angry. The boss questions us, 'why do you give us condoms and then take them away as evidence?' It is really hard to explain. I totally understand their*

anger. Sometimes I feel embarrassed to ask for cooperation. The only thing we can do is to ask for coordination at the upper level. At least, policemen should not go to the establishment on the same day we visit. We also suggest that they do not use condoms with our program logo as evidence [of prostitution]. (26-year-old professional man who serves as a public health department official)

From the standpoint of vulnerable groups, the dual legal identity causes ambivalence and refusal to accept services. Individuals in these groups may want easier access to HIV education and prevention services, but to avoid punishment or stigma, they tend to hide instead (Xia and Yang 2006). A female sex worker expressed her concerns as follows:

Your [HIV/AIDS education] *classes are quite useful. But at first, I was not willing to talk with you. I did not want to accept any condoms or attend any classes. What if you were sent by policemen? Doctor Chen gave me condoms and I threw them back to her. I told her I was just a waitress and I did not need that stuff. The day you came to talk about HIV, my friend and I skipped out of work. The manager told us it was safe, and you were doctors. We still feared. We thought you would videotape us or write something down about us. These things would be exposed on the internet. The policemen would come to me. My family would know I am a bad woman. I would rather die if my family knows what I am doing here.* (26-year-old, semiliterate woman working in a karaoke bar)

A similar puzzle exists with respect to NSEPs and MMT. A heroin user explained:

I think government should give us human rights and methadone, just like what the Hong Kong government does. I once bought methadone from the black market. It was very expensive. Yet even that I cannot get anymore now. If policemen do not capture drug users [at the methadone clinic in my community], *I definitely would go there. I think 80% of us would like to go. But if the government continues to strike drug users, nobody would go there. … We do not have needle exchange program over here. Needles are cheap, but not so easy to buy. Every time I go to the pharmacy, I always look around cautiously. Sometimes policemen with plain clothes would wait there and some people got caught. I know needles should be used only once and cannot be shared with others. Otherwise we may get HIV. I rarely share needles with my friends. But sometimes my needle is used up, and then I borrow from others.* (52-year-old man with a junior high school education)

19.2.2 A Painful History of Rampant Immoral Behavior

The second contextual feature driving ethical issues surrounding harm reduction approaches in China is the ideological concern associated with a humiliating time in China's history. In the first half of the twentieth century, prostitution, sexually transmitted infections (STIs), drug use, and a myriad of "immoral" behaviors were rampant. When Mao Zedong came to power in 1949 and formed the People's Republic of China, he immediately placed enormous emphasis on "cleaning up" China's immoral and out of control society. He led a huge movement to rid the nation of drug addiction, prostitution, and STIs, which was recognized as a superior achievement of the new government. It became a point of cultural pride and a driver of nationalist emotions. At the same time, it also created deep-seated fears about the return of these scourges to the mainland.

Thus, it is not surprising that harm reduction measures such as condom promotion among sex workers suffered harsh criticism. People believed that promoting condom use would encourage commercial sex. In general, this thinking was as follows: "*Since prostitutes are illegal, you need to catch them when you find them. Giving them condoms indicates acquiescence*." Needle exchange faced even harsher opposition, many insisting that drug users should not be provided with needles under any circumstances. For example:

> *If they are criminals, you should arrest them. Heroin users are dangerous. They threaten others. If you happen to see someone setting a fire, what should you do? Would you teach them how to set fire in a safer way? It is nonsense. Clean-needle programs are helping them to threaten society. If they are victims, it is also nonsense. Heroin will destroy them and their families. They are pitiful. If that is the case, how could you watch them die? You should send them to a rehabilitation center.* (23-year-old male undergraduate student)

19.2.3 Harm Reduction Moves Forward

Despite these very strong cultural influences, a favorable social environment for HIV prevention finally began to form. Social norms in China were changing. Opioid users became more accepted as patients with an illness rather than as criminals deliberately selecting deviant and illegal behaviors. Although selling sex was regarded as an immoral type of illegal behavior, condoms alone were no longer permitted to be used as evidence of commercial sex.

The State Council HIV/AIDS Prevention Committee was formed in 2004 and was tasked with coordinating multiple departments and promoting implementation of preventive measures. The Central Government provided comprehensive economic and social assistance to PLWH and their families. The Regulation on the Prevention and Treatment of HIV/AIDS was enacted by the State Council in 2006. It explicitly stated that China had acknowledged and adopted harm reduction approaches for HIV prevention and control. In this legal document, the Chinese Government promised to protect the basic human rights of PLWH, including their right to healthcare, education, and employment. The regulation required all provincial governments to promote condom use and MMT in their jurisdictions. It recognized that legal measures aimed at the elimination of commercial sex and drug use should be complimented by harm reduction programs as an essential means of controlling the HIV epidemic. On paper, ethical dilemmas caused by the dual legality of key affected populations were resolved by this Central Government action as emphasis was shifted away from criminalization toward human rights-based public health principles. Since then, condom use promotion programs, NSEPs, and MMT as a national-level program have all been established and steadily scaled up in China.

Several factors contributed to facilitating shifts in social norms in China that have been instrumental in ensuring harm reduction interventions could move forward not just in theory, but in practicality. First among these was education. In this early to mid-2000s period, the Chinese Government emphasized the important role of communication, information, and education in helping PLWH and high-risk

groups. Mass media began to employ a more neutral and comprehensive perspective. Images of PLWH were no longer exclusively horrific and desperate. A large number of films, TV depictions, and other forms of performance about PLWH were produced. Government leaders, goodwill ambassadors, celebrities, and other famous figures began to publicly show support for PLWH and the government-led National HIV/AIDS Response. Scholars were organized to identify and remove expressions of stigma and discrimination against PLWH from government documents. To further enhance awareness of HIV prevention among government officials, the State Council HIV/AIDS Prevention Committee launched a training program. Tens of thousands of officials from all levels of governments received training. These measures were aimed at reducing prejudice and misunderstanding (see Chap. 11 for more information).

Another important factor was civil participation via nongovernmental organizations (NGOs). The role of NGOs in HIV prevention cannot be overemphasized. Although China no longer considers eliminating prostitution and drug use a realistic prevention method, commercial sex workers and people who use drugs are still susceptible to punitive actions according to current regulations. Often, commercial sex workers and people who use drugs try to avoid government services for fear of being fined, "reeducated," or incarcerated. NGOs offer a more attractive alternative for many PLWH and individuals at high risk. Thus, NGOs can more easily contact and work with hard-to-reach populations who may shy away from government workers. Their support efforts and advocacy not only help deliver HIV services to PLWH in need and reduce HIV risk for key affected populations, but also reduce HIV stigma and discrimination in broader society (Gruskin et al. 2007). In 2012, an estimated 1000 NGOs specifically involved in the HIV response were operating in China. This number has since grown. Premier Li Keqiang described the role of HIV NGOs as "an irreplaceable and unique force" for HIV prevention, and the Chinese Government has been expected to continue to give them the political space and financial support they need to continue their mission well into the future (see Chap. 22 for more information).

A third factor promoting the harm reduction approach was the accumulation of many positive experiences from international cooperation programs, trial studies, and small pilot programs. Since the early 1980s, China has carried out many research programs with a growing belief that "practice is the only criteria for judging the truth." The thinking was that if these small-scale harm-reduction studies showed benefits with limited disadvantages, risks, or negative social impacts, then perhaps they could be adapted, scaled up, and have a positive impact on the HIV epidemic. As an example, an experiment conducted in Jiangsu promoting 100% condom use resulted in significantly decreased unprotected sex among female sex workers (He et al. 2003). In another example, a study in Guangdong found that needle exchange reduced the needle sharing rate by 58% (Lin et al. 2004). These studies provided strong evidence for the benefit of harm reduction approaches, and also helped to address public concerns as well as concerns within public security forces about the potential negative consequences of harm reduction interventions.

Official government statistics show that, by the end of 2011, less than 5 years after the regulations enabling harm reduction approaches were enacted, HIV interventions promoting condoms had covered 81% of commercial sex workers and 77% of men who have sex with men (MSM), another key affected population that was in need of condom use harm reduction intervention. NSEPs had expanded to cover 19 provinces with over 900 sites, serving an average of more than 45,000 PWID monthly. Similarly, MMT ramped up very rapidly—by the end of 2011, 738 MMT clinics in 28 provinces had served a cumulative total of 340,000 clients.

As of 2018, condom use harm reduction intervention has expanded dramatically. With the HIV epidemic in China now driven primarily by sexual contact transmission routes, promotion of consistent condom use now targets not only commercial sex workers, but also a broad range of overlapping risk groups—the clients of commercial sex workers, migrants, older adults, MSM and men who have sex with men and women (MSMW), adolescents, youth, students, serodiscordant couples, and ethnic minorities (see Chaps. 7 and 8 for more information).

In terms of harm reduction for people who use drugs as of 2015, NSEP was serving an average of approximately 42,000 PWID monthly at 900 sites nationwide and the National MMT Program was serving approximately 170,000 regular clients who were former PWID at 785 full-service "brick-and-mortar" clinics and 29 mobile vans, as well as 325 satellite sites covering all provinces (see Chaps. 9 and 10 for more information). By adopting harm reduction strategies, China has made significant progress in HIV prevention and the HIV epidemic among PWID has been brought under control.

19.3 Ethical Issues Surrounding HIV Testing and Treatment

19.3.1 Controversies Over Scale-Up of Testing and Real-Name Testing

During the early epidemic, HIV infection was fatal. Once an individual became infected, they were certain to eventually develop AIDS and die. Thus, knowledge of one's HIV infection status did not have much value. This resulted in controversy over the issue of how rapidly to scale up HIV testing among former blood plasma donors in central China. Local officials argued that more testing was not better since it provided little benefit to individuals and the larger numbers of villagers diagnosed with HIV would only cause fear, worry, and stress in these communities. Furthermore, increased numbers of people tested created increased potential for exacerbating stigma and discrimination were there to be a breech in confidentiality.

However, epidemiologists and public health specialists argued that HIV testing did have considerable community-level benefit—evaluation of HIV prevalence in communities provided officials with critical information about the magnitude of the epidemic, as well as important features of the epidemic, which were critical for health services planning. HIV testing and care services would need to be scaled up ahead of demand; otherwise coverage would never be adequate. Moreover,

secondary sexual HIV transmission was a real concern. Blocking this transmission route could only be accomplished if those who had HIV infection knew their status and were counseled on how to protect their partners (Wu et al. 2017a).

Although from the mid-1990s up to 2003, HIV testing slowly expanded; it was predominantly anonymous testing. The logic was that anonymity was the ultimate protector of confidentiality, and therefore, more people would voluntarily test if they did not have to worry about being "found out" and thereby being subjected to stigma and discrimination. However, once antiretroviral therapy (ART) became available in China, not having the real names and accurate contact details of those with HIV infection became a serious problem. No one knew who needed treatment and how to contact them. Complicating the issue even further, government funding and other resources related to ART delivery could not be deployed to areas in need because the local governments could not name the individuals who would be receiving benefits. As a result, anonymous testing became a thing of the past and by mid-2004 all those seeking HIV testing needed to register (see Chap. 12 for more information).

19.3.2 Controversy Over Active HIV Testing

By 2004, both HIV testing (under one's real name) and HIV treatment with ART were offered for free. Availability of both was also steadily increasing and coverage was improving quickly. Nevertheless, very few people were accessing testing, and the reasons for low uptake were poorly understood. Thus, increasingly, public health specialists were coming to the realization that passive testing (i.e. waiting for people to come and test) was not working and that actively seeking out and providing people with counseling and encouraging them to test would be necessary.

As a result, massive, active testing campaigns were proposed and hotly debated as the ethical concerns surrounding this strategy were numerous and complicated. The proposal was strongly opposed primarily because officials were worried over how such a move would be viewed by the international community. This kind of testing strategy had never been attempted elsewhere in the world and was inconsistent with the principles of ethical voluntary counseling and testing (VCT) set out by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO). Not surprisingly, the proposal incited harsh criticism internationally as a violation of basic human rights.

However, Chinese epidemiologists claimed that the active approach to HIV testing does not violate the basic human rights of those being tested. Rather, they argued, actively approaching those who might already be infected and encouraging them to have an HIV test is actually a means of protecting their individual human rights. Firstly, PLWH have a right to know their infection status, and this right cannot be denied because of insufficient knowledge (about HIV/AIDS and testing and treatment availability) required to make an informed choice (to test or not to test). Secondly, PLWH have a right to critical, life-saving treatment that is provided by the government for free, and similarly, this right also cannot be denied because of

insufficient knowledge (about one's infection status) to make an informed choice (to treat or not to treat). Thirdly, PLWH have a right to protect their partners and their partners have a right to protect themselves. Fourthly, active testing is not the same as mandatory testing. Actively approaching people who were likely exposed and encouraging them to test does not mean they are required to take the test they are offered—HIV testing in this active format is still voluntary, and everyone approached has the right to decline. Finally, although HIV/AIDS has many unique features, this "specialness" does not eclipse the fact that at its most basic, HIV is an infectious disease, and the universally accepted principles of infectious disease epidemic control still apply—early diagnosis, early treatment, and early blockade of transmission routes should form the foundation of the epidemic response. Diagnosis at the level of the individual is the first step toward control at the community level, and the first step toward treatment, care, and support for PLWH.

Ultimately, a series of large-scale active testing campaigns moved forward, with the decision that the small risk of potentially infringing on the individual rights of the few was outweighed by the protection of the rights of the many and the potentially large benefit to communities. While the active testing campaigns were deemed a huge success, the strategy remains extremely controversial even today both inside and outside of China (Wu et al. 2006, 2017a) (see Chap. 12 for more information).

19.3.3 Controversy Over Mandatory HIV Testing

Mandatory HIV testing (MHT) is controversial internationally as well as in China with the principal concern being that it violates individuals' human rights because they are not fully informed, they do not have the freedom to decline, and they are often not informed of test results nor successfully linked to treatment and care. In China, MHT occurs in two main contexts: prisons (e.g., compulsory detoxification centers, reeducation-through-labor camps, and reform-through-labor prisons) and health facilities (e.g., general and specialty hospitals/clinics, blood donation stations, antenatal care (ANC) centers, and NSEP and MMT sites).

In 2004, the Chinese Ministry of Health (now the National Health Commission) jointly with the Ministry of Justice issued a notification instructing all prisons, nationwide, to begin screening detainees for HIV. Since then, HIV screening for prisoners has gradually become mandatory as a part of routine healthcare provided in these settings. Although the numbers of HIV screening tests provided in these settings is monitored and MHT detection rates in prisons are high relative to other testing settings, there is little information on testing coverage and frequency, HIV prevalence, and rates of successful notification of HIV status and linkage to HIV treatment, care, and support for those diagnosed (Pisani and Wu 2017; Yap et al. 2015; Zhang et al. 2015).

In medical settings in China, the line between provider-initiated testing and counseling (PITC) and MHT is sometimes difficult to discern. In general, HIV testing in medical settings follows a PITC format. However, in the cases of, for example, surgical patients, blood product donors and recipients, and pregnant women, HIV

testing is standardly performed based upon hospital, local, provincial, or other policy. Recipients are often neither informed nor asked for consent in these situations. While some may argue that this is for the protection of the patient as well as hospital staff, it is often more a matter of limiting possible liability should the patient be diagnosed with HIV infection soon after receiving care at a medical facility. Furthermore, there is some question as to whether failure to inform the patient that he or she is being tested for HIV limits their opportunity to seek to become informed of their test results and subsequently to seek definitive diagnosis and treatment.

Although not officially sanctioned, MHT does occur with some lesser frequency in other situations as well. For example, commercial sex workers who fear the consequences of interactions with public security forces feel extreme pressure to accept HIV testing offered by police officers. The power imbalance between police and commercial sex workers removes their freedom to decline and renders this form of testing much closer to involuntary than voluntary. The tension between public security and public health in China is still felt in a variety of contexts like this one, and understanding of ethical issues such as this is still limited (see Chap. 12 for more information).

19.3.4 Dilemmas Over Disclosure

Reducing HIV transmission within heterosexual serodiscordant couples is a serious challenge in China (Chen et al. 2013; He et al. 2013; Li et al. 2012). Surveillance data in China shows high HIV infection rates for the partners of PLWH, with a majority of transmission events occurring between a seropositive male and his seronegative female partner. Thus, females in serodiscordant relationships are at particularly high risk of HIV infection.

In China, regulations require PLWH to disclose their HIV status to their sexual partners. Those who fail to do so can face a possible criminal charge for "intentionally spreading infectious disease." Physicians and local CDC staff are also required to notify sexual partners of PLWH diagnosed under their care. The puzzling ethical problem is how should testing agencies, usually the local CDCs, inform the sexual partners of PLWH? If the infected individual refuses to disclose their status to their partner, how and under what conditions should the local CDCs do so? Healthcare providers and public health workers need training and capacity building around disclosure and partner notification. It is difficult for health and public health workers to navigate the many ethical issues and pitfalls that are inherent in the balance between respecting their patient's privacy and individual rights and protecting the health and welfare of that patient's wife and/or other sexual partners as well as the broader community (Nie et al. 2015) (see Chap. 7 for more information).

However, these are not the only disclosure dilemmas faced by health and public health workers diagnosing patients with HIV infection. Human and patients' rights in China, like in much of the rest of the world, are ever-evolving concepts that are complex and deeply rooted in the local sociocultural experience. Thus, decisions about disclosure of HIV status are highly contextual and spark dilemmas over

disclosure to family members and even patients themselves. Familial involvement in the patient–physician relationship has been well-documented, and the practice of informing a family leader prior to informing the patient of an HIV diagnosis is common. In doing so, the healthcare provider is operating under the assumption that family involvement in the patient's care will be beneficial. However, this is not always the case and providers need support and skill building in correctly assessing family dynamics and thoughtfully judging who to notify and when (Nie et al. 2015).

Additionally, "truth-telling" to patients has not always been valued in the same way over time and across cultures. Providers in China often withhold important health information from patients and instead only notify family members, particularly if it is regarding a terminal condition, thereby sparing the patient undue psychological stress. However, neglecting to tell or lying to patients can cause similar or even greater psychological and even physical harm to patients and, in the case of HIV, can needlessly cause the exposure of others to infection. Hence, health workers similarly require capacity building in resolving dilemmas over their patients' rights to truthful information about their clinical conditions (Nie et al. 2015).

Finally, HIV is spreading rapidly among MSM in China today. MSM are known to typically have more former and concurrent partners than heterosexual men and many MSM also have both male and female partners. Thus, when MSM are diagnosed with HIV infection, there are usually more partners potentially exposed to HIV in need of notification, and due to stigma and discrimination still felt by MSM in China, there are important concerns about patient privacy and confidentiality when it comes to partner notification. Thus, health and public health workers urgently require capacity building in this area as well (see Chap. 8 for more information).

19.3.5 The Ethics of Expanding and Accelerating Treatment

Observational studies and clinical trials have now definitively demonstrated both the treatment and preventative benefits of early ART (Borges et al. 2016; Cohen et al. 2011; Grinsztejn et al. 2014; Lima et al. 2015; Lundgren et al. 2015; Martin et al. 2014; Rahman et al. 2016), and early ART is now recommended for all PLWH (WHO 2016). However, taking full advantage of these benefits requires knowledge of one's HIV infection status, rapid linkage to care, initiation of treatment, and ultimately attainment of virological suppression.

Yet, many PLWH in China still remain undiagnosed or are diagnosed late, and the HIV care continuum (i.e. all the successive steps from screening HIV-reactive to achieving virological suppression) continues to be inefficient in China, and many people are quickly lost to follow-up or drop out of care before treatment and prevention goals are realized (Ma et al. 2018). Clearly, further scale-up of testing and treatment is required, but also, new strategies for encouraging testing uptake and linkage to care are urgently needed. But, how aggressively can seeking and testing PLWH become and remain ethical? New evidence of immediate ART initiation after diagnosis and a streamlined and patient-focused algorithm for faster diagnosis and treatment initiation have shown to have not only survival benefits, but also

prevention benefits via improved viral suppression (Wu et al. 2015, 2017b; Zhao et al. 2018, 2019). Similarly, how aggressively can treating and retaining PLWH become and still be ethical? These questions are not new but are returning to debate as health and public health officials and policymakers weigh new scientific evidence and redevelop guidelines, protocols, and training (see Chap. 13 for more information).

19.3.6 Who Should Bear the Cost of Treatment?

The Chinese Government implemented the "Four Frees and One Care" policy in 2004, which provides ART to HIV patients free of charge. However, there is still ongoing debate over whether taxpayers should continue to bear all of the costs. PLWH are living longer and hence, they are on treatment for much longer than was expected when this policy was first issued. And what about side effects, opportunistic infections, coinfections, and other HIV-associated care needs? Should public moneys also cover these costs? This ethical dilemma has become a serious issue in China as public health expenditures associated with HIV treatment continue to grow at an astounding rate. The issue is further complicated by the fact that public health expenditures for other infectious diseases (e.g., tuberculosis, sexually transmitted infections) and noninfectious chronic conditions (i.e. cancers, diabetes) have not grown substantially. As time goes by, more and more Chinese officials, policymakers, health and public health specialists, and ordinary citizens ask these questions and argue that this policy is unfair and problematic. No consensus has been reached on how, on the broader societal scale, to maximize benefits and minimize the harm, and to balance the interests of vulnerable groups who are in the minority with the majority who perceive themselves as separate and unaffected.

19.4 Ethical Issues Surrounding Research

19.4.1 The Protection of Human Subjects in HIV Research

19.4.1.1 Institutional Review Boards

In 2001, the first NIH-funded HIV/AIDS clinical research project in China—HIV Prevention Trials Network (HPTN) study 033—was implemented. Shortly thereafter, another study, HPTN 058, was also launched. During the preparation phases of these programs, an Institutional Review Board (IRB) was established at the National Center for AIDS/STD Control and Prevention (NCAIDS), Chinese Center for Disease Control and Prevention (China CDC), in Beijing. Before 2001, there were no IRBs conducting ethical reviews of HIV-related research proposals in all of China. At the beginning, the NCAIDS IRB only reviewed research funded by the US National Institutes of Health (NIH), then gradually all HIV research conducted by NCAIDS scientists was reviewed by the NCAIDS IRB.

The China Integrated Program for Research on AIDS (China CIPRA), funded by the NIH, was the first large-scale international program for research on HIV designed by Chinese scientists. This program began in June of 2006. Apart from the NCAIDS IRB, three local/program site IRBs were established to support the China CIPRA project—one in Shanxi, one in Anhui, and one in Yunnan. These IRBs were comprised of experts in ethics, law, and medicine. Their primary mandate was to protect the rights and welfare of human research subjects. All China CIPRA project proposals were required to go before these IRBs for review and approval, as well as regular progress reporting, and annual review. All protocols were reviewed and approved by not only the local IRBs, but also the NCAIDS IRB, before study initiation.

In 2007, the Chinese Ministry of Health issued "Regulations on Ethical Review of Biomedical Research Involving Human Subjects." The China Food and Drug Administration (China FDA) also issued "Working Guideline Principles for Drug Clinical Trial Ethical Review" in 2010. These regulations required establishment of IRBs for ethical review of biomedical research involving human subjects, including vaccine trials. But HIV research requires more, and more careful, consideration relative to other types of research—interventional trials and even observational research studies tend to target vulnerable populations, and by targeting them, researchers can make them more vulnerable. For example, participants may experience HIV-related social stigma and discrimination because of their involvement in studies. Therefore, in practice, the NCAIDS IRB began reviewing all research proposals (not just US-funded clinical trials), exercising its judgment on ethical issues and ensuring human subjects were adequately and appropriately protected from all types of harms. NCAIDS also acted to help these vulnerable participants and prevent potential problems by, for example, organizing workshops to ensure sufficient training for researchers on the sensitivities surrounding their projects and setting up CABs to promote better communication between researchers and communities.

Today, NCAIDS IRB is composed of 11 carefully selected and trained members (five women and six men), including a chair and two vice-chairs. It meets quarterly yet reviews 120–200 projects per year on average. Since this initial IRB was established, many more have been formed at other research institutions. Continued development and capacity building around ethical review for the protection of human subjects in research is an ongoing need, as is the establishment of more IRBs and staffing IRBs more fully so that they can handle their ever-increasing workload.

Furthermore, the work coming before IRBs in China is becoming more complex as research proposals are increasingly including the use of information technology, mobile devices, internet, and social media. For example, proposals that are increasingly submitted to IRBs in China include "eHealth" (electronic health; i.e. integration of health and public health with information technology in the form of electronic health records, electronic prescribing, telemedicine, consumer health informatics, and health education platforms) and "mHealth" (mobile health; i.e. health or public health practice supported by mobile devices such as smart phones) as a means of observation and/or intervention. Also, the use of software applications or "apps" on mobile devices with a range of different functionality, from texting and chatting

individually or in groups to finding friends or dates or participating in virtual communities (social networking) that incorporate global positioning satellite (GPS) technology, have increasingly been included in research proposals seeking to reach hidden populations such as MSM. These technologies are being developed, launched, and adopted at a rapid rate in China. Health and public health researchers seeking to harness the power of the "big data" collected by the background function of these applications or the power of the huge number of users of these "apps" for delivery of interventions or observation of behavior are writing and submitting proposals with increasing frequency. The electronic collection of informed consent, use of data that app users perhaps were not aware was collected, delivery of interventions such as testing with little to no counseling or linkage to care provided, and conducting trials in which little to no benefit is actually received by participants are just some of the ethical issues that need to be explored, discussed, and debated. Data security and maintenance of participant privacy and confidentiality are also concerns. IRBs in China are in urgent need of new knowledge and skills to handle review of such proposals.

19.4.1.2 Community Advisory Boards

During the implementation of HPTN studies and the China CIPRA project, Community Advisory Boards (CABs) were also formed. CAB members are local community representatives. The CABs function as bridges between research teams and communities where studies are implemented. Unlike IRBs, which have authority to approve, or reject study proposals, modify protocols, and halt studies, CABs are advisory bodies, intended to inform, facilitate, and guide the development of a community-centered and ethical research agenda; to liaise with participants, communities, and investigators; and to identify challenges and provide suggestions for research. CABs help to promote understanding of community needs and issues among investigators, integrate the participation of various communities, and inform and advise investigators on the concerns and needs of participants. In the early 2000s, six CABs were established in local study site communities—among PWID in Wenxi, Fuyang, Gejiu, and Kaiyuan, and among former blood plasma donors and FSW in Urumqi and Heng Xian.

Guided by NIH and Family Health International (FHI), investigators involved in both the HPTN studies and the China CIPRA project developed best practices for comprehensive community involvement in HIV clinical trials that were tailored to the Chinese sociocultural context. A Chinese CAB guideline was developed and implemented as a result of this research.

In practice, the ethical issues in HIV research extend beyond the reach of IRBs and CABs. Cultural and social norms are continually shifting; social media and its involvement in biomedical research, especially HIV research, are getting more complex, and the ethical questions surrounding it have not yet received enough attention; and finally, training and capacity building for IRBs as teams and for individual members are sorely needed. The NCAIDS IRB has had increasing pressure to expand its responsibilities beyond its primary duty (i.e. to protect the rights and welfare of human research participants) to many other duties, such as publication clearance,

data and safety monitoring, and scientific integrity. However, currently the NCAIDS IRB does not have the capacity to absorb this additional, but much needed, work.

19.4.2 The Responsible Conduct of Research

Over the past roughly 40 years, China has emerged as a leader in scientific research. However, this rapid shift from near complete stagnation in the research and education sectors to world leader occurred on a background of social and cultural norms that did not intrinsically encourage the ethical conduct of research. Traditionally, education relied on copying and rote memorization, and business was conducted through relationships, and loyalties combined with deference to authority and avoidance of confrontation created potential for conflicts of interest and corruption and deterred whistle-blowing and investigation. The scientific community awarded bonuses and promotions to those who published in top journals while withholding degrees and jobs from those who did not publish. This environment promoted fabrication, falsification, and plagiarism, as well as exaggeration of research findings, inappropriate authorship practices, and manipulation of the peer review process. These conditions allowed unethical and irresponsible conduct to go unchecked, and research misconduct unfortunately became prevalent within the Chinese biomedical research community (Lim 2011; Nordrum 2015; Resnik and Zeng 2010).

However, the State Council and the Communist Party of China has formally recognized the rampant disrespect for research integrity within its scientific research community and issued a strong, new policy in 2018, "Principles for Further Strengthening Research Integrity" (Cyranoski 2018; Jia 2018; Nature 2018). The new regulations have assigned the Ministry of Science and Technology (MOST) and the Chinese Academy of Social Sciences (CASS) the task of overseeing the natural sciences and the social sciences, respectively, establishing research integrity auditing bodies and frameworks that define research misconduct and proceduralize surveillance, identification, investigation, and adjudication. Punishments for those found guilty of research misconduct may include loss of funding and fines, demotion and firing, and even imprisonment (Cyranoski 2018, Jia 2018, Nature 2018).

19.5 Summary

In summary, the above-described ethical issues, controversies, and dilemmas surrounding response efforts to the HIV epidemic in China have been complex and difficult to navigate. However, the Chinese Central Government as well as leading public health and research institutions such as NCAIDS, China CDC, have shown increasing commitment to the careful and thoughtful analysis of these problems, debate and discussion of all viewpoints, and development of policies, regulations, and guidelines that focus on the well-being of all peoples—vulnerable and not, infected and not, study subject and not. At every step, there has been a deliberate attempt to always ensure that good quality evidence, gathered within the Chinese

context, guided pragmatic decision-making and the development of best practices. However, social and cultural norms do not stand still, technological advancements are accelerating, and the world is becoming a smaller place. Understanding and acceptance of individual human rights, community rights, and patients' rights in the Chinese milieu is evolving. Hence, ethical considerations related to the HIV response in China change over time as well, and we must remain vigilant and dedicated to continued work in bioethics.

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International Cooperation Projects and the HIV/AIDS Response

20

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Abstract

In the process of going from passive HIV surveillance to active case finding strategies, international cooperation partners have been highly influential in pushing the agenda and introducing new approaches. Before HIV prevention was high on the agenda of the central government, much of the funding deficiency was covered by international partners that also were driving changes in methods used for prevention work and introducing best practices. In recent years, the Chinese HIV response has moved in a more pluralistic direction, involving multiple sectors and advocating participation by more parts of society in the fight against the epidemic, many international partners are not as actively involved with major programs as before. China's HIV/AIDS response has developed, matured, and expanded and is now almost completely domestically funded, and China has begun providing support to other developing countries in their HIV responses. China's path to an HIV/AIDS response has come full circle, and it will be forever grateful for the support provided by the many international partners who came to its aid.

20.1 Introduction

Since 1988, when the World Health Organization (WHO) invested the first international cooperation project funds in China to support HIV testing, more and more programs have become involved in providing support to China's HIV response. In 2001, after signing the United Nations General Assembly Special

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Session (UNGASS) declaration, the joint United Kingdom Department for International Development (UK DFID), the Australian Agency for International Development (AusAID), and the United States National Institutes of Health (US NIH) support program entered China. In 2003, the US Centers for Disease Control and Prevention (CDC) Global AIDS Program (GAP) was approved and began to implement programs, and between 2004 and 2007, the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) rounds GF3, GF4, GF5, and GF6 were successively implemented. Between 2007 and 2010, the amount of international funding increased significantly, mainly originating from the Bill and Melinda Gates Foundation, the Merck Sharp & Dohme (MSD) program, DFID, AusAID, and the Global Fund Rolling Continuation Channel Program (RCC). Following that, WHO, the Joint United Nations Programme on HIV/AIDS (UNAIDS), DFID, the Bill and Melinda Gates Foundation, the Global Fund, US CDC GAP Program, and the Clinton Foundation were China's most important donors for HIV programs. However, as of 2016, of the major cooperation partners, only US CDC GAP and the United Nations International Children's Emergency Relief Fund (UNICEF) are providing ongoing support to China's HIV response (Fig. 20.1).

From 2001 to 2004, the total amount of funding provided via international cooperation projects in support of China's HIV response averaged 101 million RMB annually, approximately 28% of which was provided by the Chinese central government. From 2005 to 2010, the equivalent yearly average was 586 million RMB, 54% provided by the Chinese government. According to national progress reports, international cooperation project funding support for China contributed an average of 540 million RMB annually during the years from 2008 to 2012.

Since China's HIV epidemic has been concentrated geographically, funding has as well. Thus, Yunnan, Sichuan, Guangxi, Xinjiang, and Henan have received a majority of funding from international cooperation projects, primarily for policy advocacy and capability building, and interventions among high-risk populations.

20.2 Stages of International HIV Cooperation Programs in China

20.2.1 The Startup Stage (1988–1994)

At this stage, when only relatively scattered cases of HIV were detected within Chinese borders, the international community helped China build its initial HIV surveillance system to deliver public awareness campaigns and training. Various UN agencies (e.g., United Nations Development Programme [UNDP], UNICEF, UNAIDS), the European Union (EU), and a number of other international organizations and nongovernmental organizations (NGOs) were early actors involved in HIV prevention work, mainly focused on education/awareness programs, monitoring programs, policy research, pilot interventions, and capacity building.

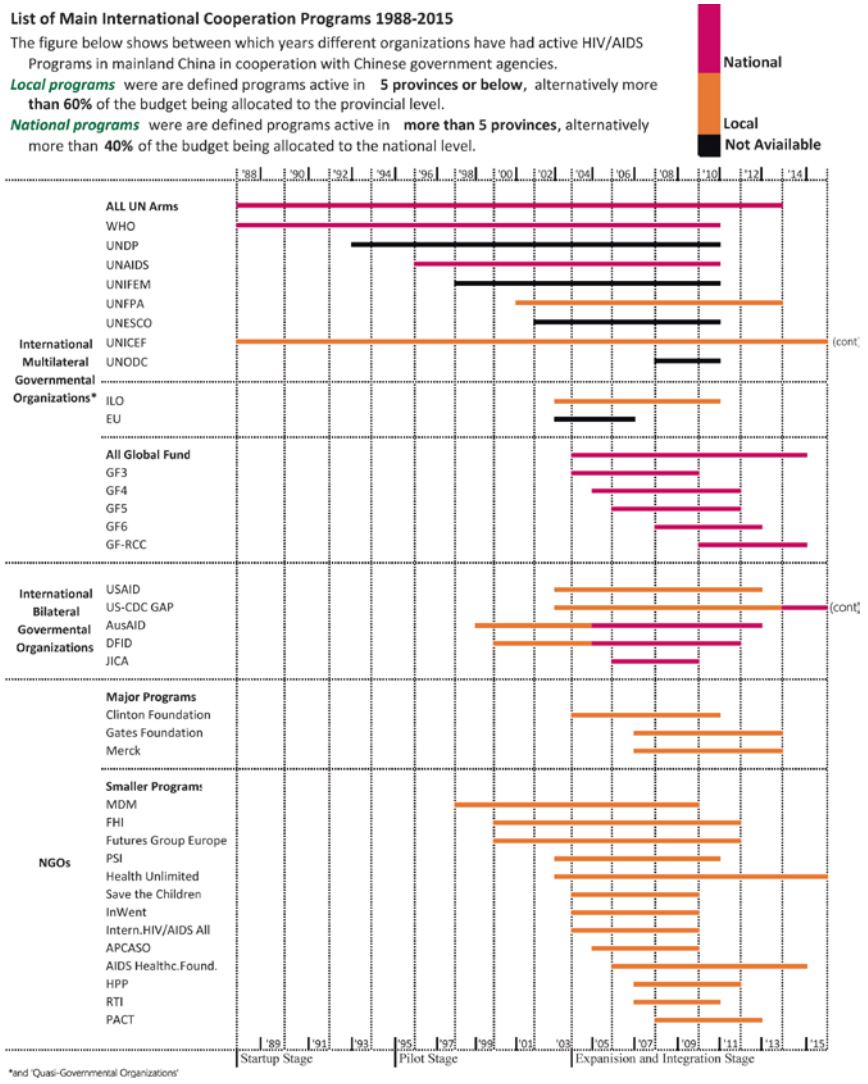

Fig. 20.1 International cooperation programs supporting China's HIV/AIDS response with scope of projects and years of funding indicated

20.2.1.1 Awareness and Knowledge

International cooperation programs have played an important and complimentary role to the programs run independently by government agencies aimed at raising awareness and improving knowledge of HIV prevention and control in China. Nearly every international cooperation program has allocated a proportion of funds for education, particularly development of educational materials aimed at different key, high-risk groups. They have also supported media outlets in spreading HIV/

AIDS awareness messages since these early stages of the epidemic. With the support of international cooperation programs like those run by UNICEF, and through activities such as selecting and recruiting celebrities as AIDS Ambassadors, the media has been intentionally engaged by international cooperation project teams (see Chap. 11 for more information).

20.2.1.2 Monitoring

The WHO was the first international organization to assist China in improving its HIV/AIDS monitoring. Beginning in 1988, WHO provided funds to help with HIV testing equipment in eight provinces and municipalities. After discovering the localized AIDS epidemic among drug users in Yunnan in 1989, WHO provided 2.5 million USD in support of China's first AIDS prevention and control plan (Wu et al. 2004). The plan outlined basic measures for HIV/AIDS prevention and control strategies in China, focusing on monitoring, advocacy, and training in 13 provinces, municipalities, and autonomous regions throughout China. WHO provided sustained technical and financial assistance for technical standardization and quality enhancement of China's HIV/AIDS sentinel surveillance (see Chap. 2 for more information).

20.2.2 The Pilot Stage (1995–2003)

In this stage China explored alternative models for HIV prevention and control, many of which were first introduced through international cooperation projects. These models were commonly piloted and, if successful, rolled out on a larger scale. At this time, there were localized areas of high HIV prevalence, resulting in a more comprehensive HIV prevention program covering more areas and target populations than previously. The first major programs where the cooperative partners were NGOs and bilateral governmental cooperation organizations were started during this phase (Fig. 20.1), with projects that included HIV surveillance and testing, awareness and education, training, prevention intervention, policy advocacy, and care and support interventions.

20.2.2.1 Monitoring

Beginning in 2000, China began to study the techniques and best practices put forward by WHO and UNAIDS in its "Guidelines for Second Generation HIV Surveillance" (WHO and UNAIDS 2000), for example, conducting behavioral surveillance surveys based upon serological monitoring. Many of these new forms of monitoring were implemented under the framework of the World Bank Health 9 Project. Provinces initiated behavioral surveillance surveys (BSS) for groups known to be at high risk, groups possibly at risk, and the general population. After the project concluded, 22 out of 31 Chinese provinces were able to conduct second-generation HIV/AIDS monitoring in accordance with WHO and UNAIDS standards. The monitoring techniques have proved extremely useful in providing early warning signs of epidemic developments, establishing prevention policies, and helping evaluate the effects of such policies.

By taking into consideration local conditions and the need to develop HIV/AIDS monitoring within its borders, China was able to advance the concept of "integrated surveillance," advocating for the incorporation of HIV/AIDS monitoring with the monitoring of other sexually transmitted infections (STIs), as well as combining the use of serological monitoring with behavioral surveillance surveys in order to get more complete data that could be used to better understand the epidemic (see Chap. 2 for more information).

20.2.2.2 Counseling and Testing

In 2000, China initiated its voluntary counseling and testing (VCT) pilot program with support from the WHO, the United Nations Population Fund (UNFPA), and the China-UK program. The outcome of the pilot was very favorable and resulted in VCT becoming one of the foundational national strategies for HIV/AIDS prevention and control in 2004. By the end of 2009, 7335 VCT sites had been established nationwide, and these sites had provided VCT services a total of 1,605,079 person-times and found 20,885 new HIV cases.

The pilot program for another important approach, provider-initiated testing and counseling (PITC), was started in 2008 with the support of the US CDC GAP, which has been one of the most important collaborative partners in the Chinese HIV/AIDS response since 2003. The HIV PITC pilot focused on the integration of HIV testing and counseling into routine medical practice. Through the implementation of the pilot program, service providers' understanding of the importance of providing these services and willingness to providing them was strengthened, the quality of referral services was improved, and the coordination between relevant sectors was enhanced. In the three pilot sites by mid-2009, 45% of the almost 170,000 people who had been recommended by their provider to be tested for HIV had agreed to be tested. PITC pilot program significantly improved HIV testing coverage, and hence, PITC also became a measure foundational to China's national HIV/AIDS response.

Additionally, projects and organizations like the World Bank Health 9 Project, the Global Fund, the Clinton Foundation, and a number of bilateral governmental organizations (including US CDC GAP) have provided critical technical support, training, and laboratory equipment crucial to the effective scale-up of testing efforts (see Chap. 12 for more information).

20.2.2.3 Prevention and Intervention

International cooperation programs introduced several intervention strategies and methods that have proved effective in the Chinese context, many of them first introduced during this pilot stage (1995–2004).

Interventions Targeting Female Sex Workers (FSW)

Although high-risk behaviors were common and the prevalence of STIs were high among FSW, no systematic intervention program with adequate coverage targeting this population had been introduced before 1999. In 2000, the World Bank Health 9 Project initiated its first high-risk behavior intervention pilot program among FSW at entertainment venues in four provinces. The following year, in cooperation with

WHO, the China CDC system launched the 100% condom use project in Hubei, Jiangsu, Hunan, and Hainan provinces. This pilot program was modeled after a similar and successful program in Thailand. Several intervention models, including the STI clinic-based outreach model as an example, were all explored and piloted during this stage. Most are still used today, albeit further developed and expanded into national HIV prevention strategies that are employed throughout the country (see Chap. 7 for more information).

Interventions Targeting People Who Inject Drugs (PWID)

During the early stages of implementation, needle exchange pilots with limited scope were conducted unilaterally. After accumulating experience and evidence from this early research, the first government-initiated needle and syringe exchange program (NSEP) was launched with support from the World Bank Health 9 Project and bilateral cooperation projects with Australia and the UK in 2001. This program has evolved over time and become more comprehensive and standardized with the support of international cooperation projects. As an example, the Xinjiang Yili NSEP, due to its good design, comprehensive content, standardized management, excellent coverage, and proven effectiveness, was scaled up and adopted as the model for all project areas in China. NSEP projects carried out in other cities used combined mobile needle exchange through peer and clinic-based exchanges, a service model that was later also adopted in other areas (see Chap. 10 for more information).

Interventions Targeting Pregnant Women for Prevention of Mother-to-Child Transmission (PMTCT)

International cooperation programs played a vital role in exploring models for improved PMTCT. Some of the main program partners for PMTCT interventions have been UNICEF, WHO, the China Global Fund AIDS Program, the Clinton Foundation, and the US CDC GAP. These programs have been involved in activities including monitoring and evaluation, staff training, strategy research, and service model exploration in the field of PMTCT (Sun et al. 2010) (see Chap. 15 for more information).

Interventions Targeting Men Who Have Sex with Men (MSM)

In 2002, the first government-initiated intervention program targeting MSM was introduced in Yunnan and Sichuan with support from the China-UK program. Several new intervention activities were conducted with the cooperation of the MSM community, including telephone hotlines, face-to-face counseling, theme parties, Internet-based education, and peer education. These intervention methods were widely adopted and have since become some of the pillars of behavioral intervention for MSM in China (see Chap. 8 for more information).

20.2.2.4 Treatment and Care

China's National Free Antiretroviral Therapy (ART) Program has received both technical and financial support from many international organizations, such as

WHO, UNICEF, the Global Fund, the US CDC GAP, the Clinton Foundation, and others. With the support of international organizations, the program explored various treatment and care models, including pediatric treatment (using pediatric ARV drugs donated by the Clinton Foundation), and diagnosis and treatment of HIV/tuberculosis (TB) coinfection. Means of providing support to people living with HIV (PLWH) who are able to work, such as via provision of microcredit, employment support, and community-based care, were also evaluated. International organizations provided support for the development, translation, and revision of technical documents, guidelines, and protocols, ensuring standardized, high-quality, and efficient treatment. Furthermore, training materials and programs for local health providers were also jointly developed in corporation with, and partly funded by, international organizations (see Chap. 13 for more information).

20.2.2.5 Team Capacity Building and Knowledge Acquisition

Increased contact with international actors, via study tours abroad and seminars and training workshops organized by or in cooperation with external actors, helped HIV prevention intervention teams gain insight into alternative approaches to HIV prevention. These capacity building opportunities became increasingly common during this phase. The knowledge that was acquired by Chinese health and public health workers as a result of these opportunities may have been one of the many reasons for changes observed in China during and following this period. Alternative concepts and ideas slowly permeated the thinking of leading public health officials active in the field, eventually resulting in some relatively progressive pilot studies being implemented. As an example, there was a marked shift from "cracking down" on risk groups to working more closely with them, trying to gain their trust and help them to receive the HIV prevention, testing, treatment, and care services they need. Information gathered from study tours abroad preceded the piloting of methadone maintenance treatment in China. The increased contact between the international public health and medical research communities, through programs such as the China Integrated Program for Research on AIDS (CIPRA)—a collaboration between Chinese and US scientific communities—has helped China become better prepared to react to HIV as well as other infectious disease outbreaks (see Chap. 27 for more information).

20.2.3 The Expansion and Integration Stage (2004–2013)

International cooperation projects were gradually integrated into national and local HIV/AIDS prevention and control activities at all administrative levels during the years from 2004 to 2013. Far-reaching efforts to use homogenous metrics, with standardized management structures, and pooled resources were undertaken (Wu et al. 2011). As part of China's response to HIV/AIDS, the Chinese central government began requiring that the objectives of international cooperation projects be consistent with the national and local frameworks for HIV prevention and control. For example, the China Global Fund AIDS Program has become coordinated with

China CARES, and intervention programs among MSM supported by China Global Fund AIDS Program and the China-Gates Program were also integrated into national MSM intervention programs (Han et al. 2010).

The need to integrate programs originated from the overwhelming amount of administrative work that was created by separately conducting so many individual programs. Furthermore, the sheer number of programs underway at the time had resulted in considerable overlap both geographically and among the different risk populations. Thus, the integration was driven primarily by the need to improve efficiency and was an important positive step forward (Wu et al. 2011).

However, even before the integration (and certainly also after), it was difficult to evaluate the effects of any one intervention and thus also the return on investment by any one funding agency because there were so many programs ongoing within the same geographical regions and the same risk groups (Wu et al. 2011). At the same time, China was undergoing swift economic development, which resulted in the country being eligible for fewer and fewer external aid programs.

Additionally, as knowledge, experience, and capacity increased among China's health and public health specialists and officials and China's HIV/AIDS response developed and matured, the role of China in the context of the global epidemic and in the international public health community began to shift. Instead of being only a recipient of international aid, China began to assist other developing countries in their HIV responses, including both Asian and African countries.

20.2.3.1 Mobilizing Broad Involvement of Multiple Sectors and Social Organizations

International cooperation programs have actively promoted multisector involvement and mobilization of social organizations in AIDS prevention and control work. Organizations and programs including US CDC GAP, China Global Fund AIDS Program Rounds GF3, GF4, GF5, and GF6, UNICEF, and China-Gates Program all have provided support in this domain. These projects initially supported public security and justice department involvement and later expanded to cover more than 20 departments in total, including the department of education, civil affairs, agriculture, and others.

NGOs, in particular, have helped advocate for the inclusion of social organizations and community-based organizations (CBOs) and have provided these organizations with financial and technical support. This continued support has made CBOs instrumental in the current Chinese HIV response efforts, with an increasing number of them possessing the knowledge and resources needed to influence future epidemiological developments in the country. This work is of a grassroots nature, often helping with outreach to stigmatized populations at higher risk, HIV surveillance and counseling, and care and support.

With the support of international programs, information sharing and communication between social organizations active in HIV prevention and support was strengthened. For example, the China HIV/AIDS Information Network (CHAIN), an online platform for social organizations involved in HIV prevention to exchange information, ideas, experiences, and best practices, was launched as a result of an

international cooperation project. During the implementation of the China Global Fund AIDS Program Round Six (2010–2014), a number of more established CBOs that previously had only been involved as implementers in the initial stages of different projects were given more responsibility and were allowed to manage projects from start to finish (see Chap. 22 for more information).

20.2.3.2 Program Integration Support and Guidance

With the increasing severity of the HIV epidemic in China, the Chinese government has greatly increased funding, as has the international community. Financial resources also diversified during this period with funding from foreign and Chinese NGOs and enterprises becoming an important complement to help fund HIV/AIDS prevention and control efforts.

In 2007, the State Council AIDS Working Committee Office and UNAIDS launched the China-UN Joint HIV/AIDS Program (2007–2010). This program was the first in China explicitly aimed at following the UNAIDS "Three Ones" principles (i.e., one agreed AIDS action framework that provides the basis for coordinating the work of all partners, one national AIDS coordinating authority with a broad-based multisectoral mandate, and one agreed country level monitoring and evaluation system; UNAIDS 2005). National and international cooperation partners have altered their operational priorities to better complement China's HIV/AIDS prevention and control work and promote a strategic plan for a multisectoral response to HIV, enhance monitoring and coordinating capabilities, improve HIV awareness, drive anti-stigma and discrimination efforts, reduce high-risk behaviors, and improve care and treatment for PLWH.

At the same time, the response also underwent five major transitions that were described by Chinese government sources as from micro to macro, from local to global, from opaque to transparent, from passive to active, and from advocacy to implementation. Government leadership, sectoral responsibility, and broad societal involvement in the HIV/AIDS response was established.

Based on the high performance of the former rounds of the China Global Fund AIDS Program, the RCC was successfully established in China. This program was a 6-year, comprehensive, and fully integrated program (2010–2015). Its goal was to scale up HIV/AIDS prevention, treatment, and care in China to achieve universal access for high-risk populations and PLWH nationwide. The RCC program was one of the largest and most influential international cooperation AIDS prevention and control programs in China. Under the framework for national unity of AIDS prevention and control, the RCC program effectively and reasonably integrated AIDS prevention and control resources, including national, international, and local resources around local prevention and control plans and activities.

20.2.3.3 Monitoring and Evaluation

UNAIDS developed a set of core indicators that have strengthened China's AIDS prevention and control monitoring and evaluation systems. To better understand the implementation status of various programs in different provinces and their resource allocation, information exchange between international cooperation projects and

joint monitoring and evaluation has been carried out with related international program management staff and experts since 2006. The National HIV/AIDS Comprehensive Response Information Management System (CRIMS) was established in January 2008. UNAIDS, the US CDC GAP Program Office, and WHO provided vital support in the development of this support platform for AIDS comprehensive prevention and control (see Chap. 24 for more information).

20.2.4 The End of Many HIV/AIDS Cooperation Projects (2014–2015)

In recent years, with the improved economic stance of China, increased governmental funding for domestic HIV programs, and increased presence of the country in the international epidemic response, most international cooperation programs have ended and have not been continued or replaced by other programs from the same organizations. China has developed economically to where it is ineligible for some programs that support developing countries. The only major international funders with comprehensive programs in place that continued beyond 2015 were UNICEF and US CDC GAP (Fig. 20.1).

20.3 Management of International Cooperation Projects

In the early stages of cooperation, a number of different management models for international cooperation projects were used. Co-management has been the primary method. This model has joint management structures including the international organizations and China's national or county level institutions. Independent management, in which the international organization establishes an office at the project implementation site and independently runs the project, has also been used, particularly during the early stages. In a third model, contract management, the international organization either works directly with the project site or finds an appropriate institution to do so and sets up a binding and detailed agreement for how the project should be executed. In the later stages, two management models were used—one relied on the China project office to carry out daily operations of the program, while the other was set up and run independently by a foreign institution.

With the implementation of large-scale comprehensive intervention programs, more standardized forms of management were gradually developed, and required, in order to be integrated into the rest of the HIV response system. Eventually, regulations on the management of international cooperation projects were implemented by the National Health Commission. As an example, these regulations require the establishment of Project Management Offices (PMO) at all administrative levels, the creation of a project coordination committee, and the recruitment of full-time staff. Furthermore, to monitor international cooperation programs, databases were set up by the National Health Commission and the National Center for AIDS/STD Control and Prevention (NCAIDS) of the China CDC, and a biennial conference

was held to share experiences across the various international cooperation programs. This conference has become China's largest and most influential HIV-related conference.

20.4 Challenges and Lessons Learned

20.4.1 Sustainable Development

Due to the need to quickly generate demonstrable results, some projects were not implemented in a sustainable way—the long-term implementation was not optimized. Rather, the focus was on short-term, more dynamic metrics. For example, implementation decisions such as setting up separate program management and implementation teams and providing monetary incentives to mobilize people to participate in HIV testing were shortsighted and unsustainable. When these programs were completed, it was often not possible to integrate the approaches into long-term response work.

20.4.2 Continued Exploration of New Models

After the introduction of international cooperation projects, some program implementation sites overlooked the importance of these programs in introducing innovative ideas and access to improved technology. Instead, cooperation programs were at times seen as a way to compensate for inadequate funding for local routine HIV prevention and control in certain cases, resulting in failure to take full advantage of the potential gains from these programs. Moreover, China's HIV epidemic is characterized by complex and dynamic epidemiological factors, and thus, it is not useful to apply any one single response model to all geographic locations and all risk groups. Therefore, international cooperation projects needed to focus on setting priorities and tailoring strategies to address differing contexts. However, the increased requirements for international cooperation programs to be more closely integrated with national programs reduced the potential for introducing and exploring new models that did not fit easily into the national program structure.

20.4.3 CBO Participation and Service Delivery

While the Chinese government has committed to continuing to provide support for civil society participation in the HIV response and is exploring working mechanisms to facilitate such participation, many CBOs working with key affected populations are experiencing financial difficulties and may find it difficult to continue operations unless targeted funding is made available. This could have a clear negative impact on the HIV response, in particular among key affected populations. International collaboration programs have played an important role through the

provision of funds and advocacy to strengthen cooperation between the government and CBOs. With a reduced presence of international actors, the growth of CBO participation in China's HIV/AIDS response could stall. As international resources continue to dwindle, it is important for the government to safeguard resources for CBOs and ensure that they are able to play a key role in service delivery.

20.5 Conclusion

International cooperation programs have played an instrumental role in improving China's response to the HIV epidemic. These programs and program partners have helped bring funding to areas where financial support from the central government has been inadequate. In the process of making up for funding deficiencies, these programs helped China's HIV response via capacity building, infrastructure development, and support for applied HIV research. Most importantly, they helped advance methods of HIV prevention and control and introduce best practices and models, as well as influence the mindset of people involved in leading positions in the HIV prevention framework—a legacy that will continue to influence prevention work long after these programs have ended. China's HIV/AIDS response has developed, matured, and expanded and is now almost completely domestically funded, and China has begun providing support to other developing countries in their HIV responses. China's path to an HIV/AIDS response has come full circle, and it will be forever grateful for the support provided by the many international partners who came to its aid.

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The US CDC Global AIDS Program in China

21

Marc Bulterys

Abstract

The China-US Cooperation-Global AIDS Program (GAP) was a strategic technical collaboration program jointly implemented by the US Centers for Disease Control and Prevention and the Chinese Center for Disease Control and Prevention. This program developed, piloted, launched, and evaluated a broad range of projects supporting national and local HIV prevention and control programs; evidence-based decision-making; strengthening systems and capacity at national, provincial, and local levels; prioritizing high-risk geographic areas and populations; developing innovative approaches for scale-up; answering important scientific questions that can be most effectively answered in China but also with global implications for the HIV response; and increasing China's engagement with the global public health community and sharing critical lessons learned. A productive working relationship with well-conceived models, a results-based activity implementation plan, and proper linkage to the domestic policy process has made a significant contribution to HIV control and prevention in China.

21.1 Historical Perspective of the HIV Technical Cooperation

Infectious diseases remain a major cause of morbidity and mortality in China despite substantial public health progress in the past decades (Wang et al. 2008). Life expectancy at birth of the average Chinese person has increased from 35 years

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in 1949 to 72 years in 2005 and 76.4 years in 2017 (World Health Organization, 2018), and infant mortality has dropped from 200 per 1000 live births in 1949 to 23 per 1000 in 2005 (Wang et al. 2008). These impressive gains were due in large part to a reduction in infectious disease mortality. However, infectious diseases remain an important public health concern in China even as the government implements major health system reforms to increase access to quality healthcare and respond to the increasing burden of noncommunicable diseases (Yang et al. 2008).

As an example, the severe acute respiratory syndrome (SARS) epidemic hit in 2003, bringing the country to a virtual standstill. Amid the frantic response to this epidemic, many questioned the readiness and openness of China to confront a newly emerging infectious disease epidemic (The Lancet 2003; Wang et al. 2008). At the same time, China's rapidly evolving HIV/AIDS epidemic called for a dramatic expansion of both prevention and treatment services (Bulterys et al. 2009; Kaufman and Jing 2002; Wu et al. 2001, 2007). Initially, HIV-1 infection was confined primarily to certain high-risk populations such as people who inject drugs (PWID) along drug-trafficking routes, and former commercial plasma donors (FPD) in rural communities in east-central China (Dou et al. 2010; Lu et al. 2008a; Wu et al. 1995, 2001; Yap et al. 2002). However, by 2008, official state media reported for the first time that HIV/AIDS had become China's leading cause of death among infectious diseases and that sexual transmission had become the primary mode of HIV transmission (Lu et al. 2008a; Wang et al. 2009).

In June 2002, the Secretary of Health of the US Department of Health and Human Services (DHHS) and the Minister of Health of China (the Ministry of Health is now known as the National Health Commission) signed a Memorandum of Understanding (MOU) entitled "China–US Cooperation on HIV/AIDS Prevention and Control." This MOU led to the establishment of the China-US Cooperation-Global AIDS Program (GAP), implemented jointly by the US Centers for Disease Control and Prevention (US CDC) and the Chinese Center for Disease Control and Prevention (China CDC). The bilateral cooperation program was officially launched in Beijing in March 2004. The launch of the program coincided with the nationwide scale-up of China's National Free Antiretroviral Therapy (ART) Program (Zhang et al. 2007, 2009), which was originally initiated in 2002 in response to the significant iatrogenic epidemic in central China (Dou et al. 2010; Zhang et al. 2008a, b).

The principal implementation and coordination agency of this program was the China CDC under the leadership of the Chinese Ministry of Health (now National Health Commission). In 2006, the US-China collaboration was integrated into the President's Emergency Plan for AIDS Relief (PEPFAR), which provides an overarching framework for the US government's response to the global HIV/AIDS epidemic and remains the largest commitment by any nation to respond to a historic global health crisis (Fauci and Eisinger 2018). Under the PEPFAR umbrella, US-China collaboration on HIV/AIDS was expanded to include collaboration with the US Agency for International Development (USAID) in Yunnan province and Guangxi Zhuang Autonomous Region (hereafter Guangxi). The initial PEPFAR budget for activities in China for fiscal year 2006 was 9.8 million USD, with a funding peak of 10.3 million USD in fiscal year 2009. Although USAID ended its China-specific programming as

of 2012, strategic technical collaboration between the China CDC and the US CDC through the GAP has remained active until the present time.

The GAP has been an integral part of broader US-China cooperation on health, which has also included collaboration with the US National Institutes of Health through multiple research grants. Collaboration between the two countries' CDCs also expanded to include other communicable and noncommunicable diseases. The US CDC maintains a presence in China with several American staff assigned to the US Embassy in Beijing as technical advisors, as well as approximately 30 locally hired staff in the time period between 2010–2015 providing technical, program management, and administrative support to the collaboration. Staff focused on HIV/AIDS represented approximately one third of this complement of China-based experts, and the capabilities of these staff are complemented by US CDC Atlanta-based technical experts who travel to China to provide assistance in specific technical areas as requested by the Chinese government.

Within this historical, epidemiologic, and programmatic context, the US CDC has supported China in carrying out strategic activities in HIV surveillance, prevention, care, and treatment and other areas. These activities have been fully integrated into the Chinese national response and have led to measurable achievements within China's comprehensive HIV control and prevention program (Li et al. 2013; Lin et al. 2012; Wu et al. 2011). The collaboration continues to evolve and develop as the HIV epidemic in China and globally evolves as well. This chapter aims to review and highlight some of the progress made, with particular focus on the first decade of the bilateral HIV technical cooperation between the US and China CDCs, and to share relevant experiences in this dynamic context.

21.1.1 Programmatic Approach to Collaboration

Over its history, the joint vision of the US-China cooperation has been to assist the government of China to reduce HIV transmission and mitigate the impact of AIDS, within the context of specific national goals. For 2015, these national goals included maintaining the overall number of HIV cases to less than 1.2 million, reducing HIV incidence by 25%, and reducing mortality by 30%. These goals were to be achieved by ensuring that (a) 90% of those who were members of high-risk groups had access to effective prevention measures, (b) 70% of people living with HIV (PLWH) knew their status, (c) greater than 80% of those who were eligible for ART were receiving this lifesaving treatment, and (d) prevention of mother-to-child transmission (PMTCT) exceeded 80% coverage nationwide (Wu et al. 2011).

As the HIV epidemic and the national response evolved, the goals of the GAP collaboration evolved as well, although fundamentally the approach has always focused on epidemic control. Because China's HIV epidemic has been concentrated geographically in seven provinces, in addition to support at the national level, the GAP has maintained a technical and incentive-based collaboration with provincial-level health authorities based on need and potential for epidemic impact.

Over the history of the China-US collaboration, the provincial and programmatic focus has included a total of 15 provinces. Anhui and Henan provinces were at the

center of the iatrogenic epidemic driven by commercial plasma donation among rural farming communities in the early 1990s, and in these provinces, there has been a key emphasis on expanding access to, and improving the quality of, HIV treatment and care services. In Guangxi, Guizhou, Guangdong, and Yunnan provinces as well as Xinjiang Uyghur Autonomous Region (hereafter Xinjiang), where the epidemic was initially driven by injecting drug use, the key emphasis has been on counseling and testing, as well as active case-finding and targeted interventions, including harm reduction capacity-building and follow-up services for PLWH (Li et al. 2013). Beijing municipality, Heilongjiang, Jiangsu, and Shandong provinces, Inner Mongolia Autonomous Region (Inner Mongolia), Ningxia Hui Autonomous Region (Ningxia), and Tibet Autonomous Region (Tibet) have concentrated epidemics among key populations, particularly among men who have sex with men (MSM; Wu et al. 2013). In these provinces, the primary emphasis has been on studying the epidemic among key populations and supporting innovative, targeted prevention, care, and treatment activities and capacity building among the local implementing units. As the collaboration has progressed, direct support has increasingly focused on those provinces and prefectures with the highest HIV prevalence, and by 2014, the focus centered on Guangdong, Guangxi, Guizhou, Hunan, Yunnan, Xinjiang, and Sichuan's Liangshan prefecture.

GAP output-driven provincial collaborations have focused on ensuring that all cases found via HIV/AIDS surveillance, voluntary counseling and testing (VCT), provider-initiated testing and counseling (PITC), and other means received timely notification, follow-up, and referral services. As a result, all GAP-supported provinces have established sound and smooth linkage programs for case finding and case management. For instance, the CD4 testing rate among PLWH, the percentage of eligible HIV/AIDS patients on ART, and the viral load testing rate of patients on ART in the 15 GAP-supported provinces dramatically increased from 30%, 48%, and 27% in 2008 to 71%, 90%, and 80% in 2011, respectively. This is an overall measure of success for the collaboration and shows the productivity of this long-term engagement. A public health partnership has been built on a foundation of mutual trust, commitment, and dedication to shared goals.

21.1.2 Surveillance, Public Health and Clinical Systems, and Capacity Development

In response to key challenges within the national HIV/AIDS control and prevention program, GAP adopted a classical public health approach to its early strategic engagement in China. The strategy aimed to decrease the number of new infections by (a) targeting disease surveillance to enable evidence-based public health programming and decision-making, (b) linking PLWH to prevention support services to prevent secondary transmission, and (c) improving access to, and quality of, care and treatment services.

Specifically, GAP supported the establishment or strengthening of 649 national or provincial sentinel surveillance sites in 15 provinces and further ensured that these

sites were actively providing linkages for those individuals who were found to have HIV infection. As a result, the number of sentinel surveillance sites increased sixfold during the period from 2003 to 2008, and 18,820 PLWH received diagnoses at these sites. This activity increased the coverage and quality of surveillance information available for decision-making, while also increasing local capacity for developing referral systems, care linkages, and case management capacity (Wang et al. 2010). Over the subsequent years, these surveillance sites have been transitioned to local public health authorities and continue to function as an important tool for both local and national public health decision-making. GAP has also supported an external evaluation of the adequacy of the HIV surveillance system in China (Lin et al. 2012), and the findings of this evaluation have been used by national authorities for further system strengthening (see Chap. 2 for more information).

As the numbers of PLWH increased, there was a compelling public health need to establish a systematic approach that linked these individuals to appropriate follow-up testing and care and the prevention of secondary transmission. Again, the national program called for implementation of a public health approach based on increased rates of case finding, epidemiological investigation, CD4 testing, and follow-up services. As part of the China-US collaboration, pilot programs were established in Yunnan and Guangxi to increase the proportion of individuals who knew their status and increase the number of PLWH who completed at least two linked follow-up visits for care and support. These pilot efforts were carried out from 2006 to 2011, and the epidemiological investigation rate rose from 25% to 99% in Yunnan and 31% to 99% in Guangxi. Since 2009, these measures have served as national core indicators for all provinces, with similar improvements over time—a key contributor to program success at the national level (see Chap. 23 for more information).

As systematic public health efforts to identify PLWH and link them to appropriate services intensified, certain gaps within the clinical care systems also emerged. Particularly in the rural areas hardest hit by the iatrogenic, plasma donation-related epidemic of the 1990s, it became apparent that the healthcare providers did not have adequate training or clinical mentoring to provide quality HIV care and treatment to increasing numbers of patients on ART. In close collaboration with the NCAIDS Division of Treatment and Care at China CDC and the Clinton Foundation, the US CDC established China's first rural AIDS Clinical Training Center in 2004 in Lixin county, Anhui province. Its mission was to provide in-service AIDS clinical training to rural clinicians selected from local Anhui and other high epidemic provinces in China. These clinicians had little training or experience dealing with patients on ART, and the Center's intensive 10-week residential training program included classroom training, direct clinical mentoring, and outreach within the local area to township and local hospitals. This approach proved extremely successful. The model was replicated in two additional provinces in the later years of the GAP collaboration, and in 2011, leadership for the training center in Anhui was transitioned to the provincial government (see Chap. 27 for more information).

GAP also introduced state-of-the-art surveillance methodology to increase case finding. The program supported the drafting of the Protocol for Respondent Driven

Sampling (RDS) Surveys for Integrated Biological and Behavioral HIV Surveillance in MSM in China (Wu et al. 2013). Prior to protocol drafting, GAP supported pilots in Beijing, Shandong, Guangdong, and Ningxia using RDS to conduct surveys among MSM, female commercial sex workers (FSW), and PWID. Through these pilots, stakeholders developed a better understanding of field implementation methods, which proved invaluable in the national adoption of RDS. GAP supported time-location sampling among MSM in Shenzhen. This sampling method was introduced internationally and had never been applied in China (see Chap. 2 for more information).

An additional priority during this period was developing successful models for PMTCT of HIV, and the China-US collaboration expanded to include work within the maternal and child healthcare system. GAP helped to demonstrate that with conservative cost estimates, integrated nationwide HIV and syphilis testing of pregnant women in prenatal care in China was substantially more cost-effective than HIV screening alone (Owusu-Edusei et al. 2014). Comprehensive, integrated PMTCT efforts were highly effective in reducing mother-to-child HIV transmission to very low levels whether in rural or urban settings (Shan et al. 2014; Song et al. 2013). In 2007, GAP started to collaborate with the Guangxi Women and Community Health Bureau and the Guangxi Maternal and Child Health Hospital to pilot an integrated PMTCT program in 112 antenatal care clinics (ANCs). By fostering integration across China's three-tier health system, ANC, and ART services, this program successfully linked women with HIV infection and their children to HIV care and treatment. It was shown to be an effective model that was expanded first to the entirety of Guangxi where the approach continues to deliver results. From 2009 to 2011, 174,776 pregnant women (97%) were tested for HIV, with 728 (0.41%) diagnosed with HIV infection. HIV testing coverage during pregnancy significantly increased from 80% in 2009 to 87% in 2010 and to 91% in 2011. From 2009 to 2010, 12 out of 379 infants born to HIV-infected women tested HIV-positive, for a transmission rate of 3.2%. In part thanks to these early results, the National Center for Women and Children's Health (NCWCH) expanded coverage and implemented this program in all seven of the highest prevalence provinces in China. By 2015, the comprehensive, integrated PMTCT program was implemented nationwide by the Chinese government (see Chap. 15 for more information).

While the GAP remained closely integrated with the national response, the flexibility of the international cooperation model also allowed for some experimentation, and as a result, a number of innovative approaches were tested within the specific Chinese context. From an initial emphasis on controlling the iatrogenic epidemic, the Chinese response shifted quickly to addressing the challenge of injecting drug use, as a major contributor to the Chinese HIV/AIDS epidemic in the early years of the US-China collaboration (Wu et al. 2015).

Drug use has been an important driver of the HIV/AIDS epidemic in China. In 2003, there were 1.03 million registered drug users in China, 80% of whom were PWID (Wang et al. 2009; Wu et al. 2007). In 2003, 44% of PLWH in China contracted HIV via injecting drug use. To slow the dual epidemics of HIV and drug use, a methadone maintenance treatment (MMT) program was piloted in 2004 with

eight clinics in five provinces serving approximately 1000 clients (Lu et al. 2008b). Since then, the National MMT Program has scaled up rapidly. By the end of 2011, the National MMT Program was comprised of 738 clinics serving more than 340,000 clients cumulatively (Li et al. 2013; Liu et al. 2013). However, China faced a challenge in delivering methadone to PWID living in the rural and often remote border areas where the drug trade flourished.

In an innovative effort to address this challenge, in 2006, GAP supported the establishment of the first mobile MMT clinic in China in Dehong prefecture, Yunnan province, an area with high HIV prevalence and incidence at the border with Myanmar (Duan et al. 2010). The mobile unit covered 50 villages, and not only expanded coverage but also increased accessibility and maintenance on therapy reached 76%. As of the end of 2015, there were 785 full-service "brick-and-mortar" MMT clinics as well as 29 MMT mobile vans operating across China. These "sites" also supported a further 325 satellite MMT sites. Since 2011, this expanded network has been providing services to roughly 200,000 heroin users each year (Wu and Pisani 2017) (see Chap. 9 for more information).

21.1.3 Key Populations, Laboratory System Development, and Implementation Science

As the collaboration strengthened and deepened, it also adapted to respond to the evolving characteristics of the HIV epidemic in China and the needs of the national program. With a strong national surveillance system in place to guide program and policy decisions, the concentration of the epidemic among key populations became very apparent. While injecting drug use remained a key factor in HIV transmission, by 2008, sexual transmission had become the primary mode of HIV transmission (Wang et al. 2010). This necessitated new approaches to reach additional at-risk populations—not only PWID but also commercial male and female sex workers (and their clients) and MSM. As these groups are often vulnerable and stigmatized, interventions to address their public health needs must be carefully considered. GAP led the way in developing evidence-based approaches to these challenging issues.

21.1.3.1 Drug Users

The rapid scale-up of MMT has benefited thousands of drug users with decreased drug use and criminality, increased quality of life, and higher rates of employment (Li et al. 2013; Wu and Pisani 2017). However, one of the main challenges in the early years was the very high dropout rate. A relatively low dosage of methadone may have been a key reason behind this (average dose was only 48 mg in 2007), as well as low training coverage and high turnover among MMT providers. Although it has been shown in other settings that higher methadone doses can lead to higher retention and other favorable MMT outcomes, it is often not practiced in the field. In 2010, GAP received funding through PEPFAR to support the China CDC, Guangdong CDC, Guangxi CDC, and Guizhou CDC in a joint public health

evaluation (PHE) entitled "A Methadone Maintenance Treatment Outcome Study in Three Provinces in China. Comparative Evaluation of the Impact of an Intensive Health Care Provider Training Program Combined with Expanded Services on Treatment Retention, Heroin Use, Methadone Dosing and HIV Risk Practices."

The purpose of this study was to evaluate the impact of an intensive healthcare provider training program combined with expanded services targeting improving treatment retention, methadone dosing, and heroin use. The study aimed to determine reasons behind current dosing practices as well as reasons clients remain in and drop out of MMT. The study also aimed to evaluate the effectiveness of a tailored education program for MMT service providers via measurement of methadone dose levels prescribed to new patients. The effects of methadone dose, with and without the inclusion of additional psychosocial services, were measured as MMT retention and illicit opioid use. This study consisted of a qualitative, formative assessment followed by a three-arm cluster-randomized controlled trial. The qualitative study using key informant interviews was conducted on a sample of MMT clinic staff, clients, family members of clients, and opiate dependent persons in the community during 2011. The findings were presented at the 19th International AIDS Conference in Washington DC (Han et al. 2012).

At the end of 2011, the randomized community intervention trial was officially launched, and the first round of training was completed in three provinces. The trial was conducted in 54 MMT clinics, which were randomized into one of three study arms: arm 1 is control group (standard of care); arm 2 gives intensive healthcare provider training on prescribing methadone dosage; arm 3 gives intensive healthcare provider training on prescribing methadone dosage, plus onsite psychosocial counseling services and enhanced peer support to clients. The study has been enrolling patients in Guangdong, Guangxi, and Guizhou provinces for several years, and 12-month follow-up of all participants has been completed in 2017. Findings from the trial have been used by the national MMT program to seek further service delivery improvements, and the findings will be published soon in the peer-reviewed literature.

The challenges described here are not unique to China's MMT program—lessons learned may offer valuable guidance to harm reduction programs being developed in many other countries (Li et al. 2013; Wu et al. 2011). Lessons learned during the implementation of this study include the critical importance of implementation science in program quality improvement as well as the crucial role that training programs play in MMT clinic service quality and client outcomes improvement (see Chaps. 9 and 27 for more information).

21.1.3.2 Female Sex Workers (FSW)

Although commercial sex work is illegal in China, there are an enormous number of FSW working in China with estimates ranging from two to ten million (Flannery 2017; Lu et al. 2006; Pirkle et al. 2007; Shen and Csete 2017). Commercial sex work remains highly stigmatized in China and differs from other Asian countries. Fewer sex workers work in brothels, and as a result, epidemiologic studies are harder to conduct, and therefore, data about their health experiences remain

relatively sparse. A review published by staff associated with the GAP collaboration shows relatively high median rates of sexually transmitted infections (STIs) but a stable and relatively low rate of HIV (prevalence ranged from 0% to 10.3% in different settings, median 0.6%; Poon et al. 2011).

Because of the potential impact of this relatively hidden population, the GAP conducted intervention activities such as advocacy, training, peer education, and promotion of condoms. It also promoted friendly STI services, improved VCT services, HIV testing, care seeking at STI, gynecology, and tuberculosis (TB) clinics. The program also provided test results notification and counseling, as well as follow-up and referral services. In addition, GAP supported an intervention model pilot study focused on older male clients and low-fee FSW in Hunan and Guangxi. These pilot interventions provided information on the local epidemic and scientific evidence for further intervention strategies. GAP also conducted comprehensive HIV control and prevention among FSW working in China's border regions with Myanmar and Vietnam, with the goal of implementing a "treatment-as-prevention" (TasP) strategy.

Although the prevalence of HIV among FSW in China is relatively stable and below 1% overall at the national level, the prevalence of STIs appears to be increasing (Han et al. 2010; Poon et al. 2011; Wang et al. 2010). Studies have shown STIs that cause ulcers or inflammation may facilitate increased transmission efficiency of HIV and other STIs. Moreover, many HIV/STI prevalence studies, including surveillance efforts in China, are focused primarily on establishment-based FSW, which underestimates the true prevalence of HIV, other STIs, and high-risk behaviors among FSW (Lin et al. 2012). Studies have shown that low-tier FSW (i.e., FSW who are street-based and charge low fees) have higher rates of HIV and syphilis and lower rates of condom use (Chen et al. 2012, 2016).

With GAP financial and technical support, a survey was conducted in 2012 in five cities in Guangdong, Guizhou, and Shandong provinces and completed by the end of 2012. The primary objective of the survey was to better understand risk perceptions and behaviors of low- to medium-fee FSW in China as well as seroprevalence rates of HIV, syphilis, and herpes simplex virus type 2 (HSV-2) in this population. A total of 1487 eligible low-fee and medium-fee FSW were recruited in the study. Findings have been published in close collaboration with NCAIDS and show that low-fee FSW were more likely to have HSV-2 infection, but not more likely to have HIV or syphilis infection, compared with medium-fee FSW. The survey also demonstrated that low-fee FSW in China have unique risks for acquiring STIs, in part due to greater economic pressures (Han et al. 2016). Tailored interventions targeting low-fee FSW, in particular, that incorporate prevailing condom use negotiation challenges are urgently needed. The potential for prevention methods alternative to male condoms has received greater attention in recent years including pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP), and female condoms. Gaining knowledge on awareness and acceptability of these prevention methods among high-risk FSW in China will help inform the potential implementation of these prevention methods in China (see Chaps. 3 and 7 for more information).

21.1.3.3 Men Who Have Sex with Men (MSM)

In 2008, China launched a major initiative to address HIV/AIDS among MSM, including strong promotion of condom use, expanded prevention programs, increased counseling and testing, and improved access to treatment. The GAP mobilized to support this national effort. A number of the innovative approaches initially piloted with the support from GAP have become models for scale-up at the local, provincial, or national levels.

GAP recognized the critical role that communities and opinion leaders play in engaging with this vulnerable population and therefore supported a popular opinion leader (POL) intervention model. This model first started as a pilot program in Mianyang, Sichuan province, and expanded to Guizhou province. It is now a nationwide program and is the standard intervention model under the "National MSM Population Comprehensive Prevention and Control Pilots." The program expanded case follow-up mechanisms to include MSM peer groups.

Counseling and testing was critical to the success of the national initiative, so GAP piloted a number of new strategies, including a web-based VCT program in Heilongjiang province that included linked STI and HIV care services. This successful model was later scaled up by the Global Fund to Fight AIDS, Tuberculosis and Malaria in China. In addition, GAP led the way in piloting HIV rapid testing as a way to increase testing rates among MSM. Pilot programs in Jinan, Kunming, Mianyang, Harbin, Qiqihaer, Jiamusi, Daqing, and Mudanjiang suggested that this was a feasible and effective model for identifying and managing MSM with HIV infection. Similarly, a rapid HIV testing pilot in a gay bathhouse in Tianjin demonstrated this method's value for identifying many HIV cases among MSM in hard-to-reach places. This pilot was selected by China in 2011 as a model for best practices.

GAP also introduced the concept of couples counseling and testing within the MSM population in China. Working with MSM couples is a new challenge for counselors and requires different skills and approaches than traditional couples counseling. To ensure that counselors had these needed skills, GAP sponsored a training workshop, which was held in Chengdu, and collaborated on the development of a couples testing and counseling manual specifically for MSM. The results of a pilot showed that the new model was well accepted by MSM. The model was then replicated in Xinjiang and Beijing and then expanded further to other provinces.

In addition, GAP collaborated with the largest gay male dating website in China (www.bf99.com) and NCAIDS to analyze migration patterns of MSM in China. The dating website contained data on nearly 800,000 eligible MSM, of which 35% were migrants. De-identified data showed that MSM migration from southwestern China, which has the highest HIV prevalence in this population, to coastal cities with lower prevalence has implications for the spread of the HIV epidemic as well as the need for HIV care services (Mi et al. 2016).

GAP also collaborated with NCAIDS on a large-scale, national 61-city survey of HIV prevalence and risk behavior in MSM (Wu et al. 2013). These early efforts have paved the way for greater and deeper collaboration between the USA and China in order to reduce rates of HIV among MSM—a continuing challenge for both countries and for many other countries (see Chap. 8 for more information).

21.1.3.4 Treatment and Care

Since 2008, the program has provided technical assistance for data analysis and utilization of the National Free ART Program (NFATP) in order to improve patient outcomes (Cheng et al. 2015; Dou et al. 2010; Ma et al. 2010; Zhang et al. 2009, 2011, 2014; Zhu et al. 2014). It also supported implementation of the basic care package of services to PLWH such as VCT, condom use promotion, CD4 testing, opportunistic infection (OI) prophylaxis, TB/HIV coinfection treatment, ART, PMTCT, STI referral and relevant laboratory testing, medication adherence counseling, and PLWH self-help organizations. GAP also helped NCAIDS to conduct community advocacy, VCT, outreach, intervention, and advocacy events; explore care models that involved community-based organizations (CBOs) and nongovernmental organizations (NGOs); improve the case management system; support pilots to increase adherence and improve and expand treatment quality and coverage; improve coinfection treatment and management; and actively promote ART based in MMT settings.

GAP supported the Treatment and Care Division of NCAIDS to develop the first version of the National Free ART Manual (including Guidelines for Using Cotrimoxazole for the Prophylactic Treatment of Opportunistic Infections) and the National Guidelines for Second-line ARV treatment in 2008. Subsequently, GAP supported the second and third revisions of the National Free ART Manual, drawing from best practices of GAP-supported pilot programs, and supported the development and distribution of CDs of "Life Saving Drugs, Never Stop," Treatment and Care Service Handbook, and ARV pillboxes to improve adherence and patient follow-up services. GAP also supported NCAIDS and the National TB Center to develop the Implementing Guideline for HIV and TB Co-infection Pilots and the National Diagnosis and Treatment Guideline for HIV and TB Co-infection. The National TB Center and Global Fund Round 5 HIV/TB coinfection pilot program in six sites across four provinces was expanded to 134 counties. Technical support for data analysis and utilization was provided to TB/HIV programs. GAP also helped the National TB Center to conduct pilot programs for the use of isoniazid preventive treatment (IPT) among HIV/AIDS patients in Sichuan and Anhui.

In addition, pilot programs on community-based care service to improve treatment adherence, treatment service quality, treatment coverage, and coinfection treatment and management according to local situations were supported. This included cell phone adherence reminders for patients in Anhui; operational support to 15 village-level medical units in the most severely affected area in Anhui; treatment and care programs in Heihe, Qitaihe, and Boli in Heilongjiang; TasP among discordant couples in Guangxi and Xinjiang; and the HIV/TB, HIV/HCV/HBV coinfection programs in Hunan and Sichuan.

Critically, GAP supported NCAIDS, China CDC in their continuous improvement efforts for the national treatment information system, which was upgraded at the end of 2010. This completed the computerization of medical records and data reporting systems in all ART treatment sites, which greatly improved data quality and data reporting efficiency. Management and coordination of ART treatment at central and peripheral levels were also enhanced. Annual national data quality checks have been conducted beginning in 2009.

In 2011, US CDC experts collaborated with NCAIDS experts to analyze and evaluate overall antiretroviral drug resistance data, reported resistance sequencing quality, and reliability of resistance test results from national and provincial drug resistance laboratories. In addition, the level of ARV drug resistance in the Chinese population was analyzed, and development of a report on resistance was discussed. These activities had a significant impact on HIV drug resistance work in China (see Chaps. 4 and 13 for more information).

21.1.3.5 Rural Populations and Ethnic Minorities

As mentioned previously, GAP collaborated with the Clinton Foundation, China CDC, and the Anhui Provincial CDC to establish a rural clinical training center in Lixin County, and by 2011, that training center was transferred to the local health authority. Anhui's iatrogenic epidemic was under reasonable control, but the center continues to function as it provides an excellent opportunity for clinicians to gain familiarity with second-line treatment regimens as many of the patients on treatment there were diagnosed early in China's HIV epidemic.

However, new HIV infections continue to occur in large numbers in China's rural areas, especially in the southwest and among China's ethnic minority populations (Zhang et al. 2013). Although less than 10% of China's population belong to one of the 55 recognized ethnic minority groups in China, people with minority affiliation have a higher burden of HIV infection on aggregate (i.e., when all minorities are lumped together and compared to Han Chinese despite each individual minority group having greater or lesser odds of HIV when taken alone; Pan et al. 2016). Therefore, in 2010, GAP established a second rural clinical training center in Luzhai county, Guangxi, an area with a significant heterosexual and drug use-driven HIV epidemic. Then in 2012, collaborating with Merck Foundation, local CDC authorities, and NCAIDS, GAP established the Zhaojue training center in Zhaojue county, Sichuan province. This hard-hit area had a primarily injecting drug use-driven HIV epidemic among the Yi ethnic minority group. The training facility in Zhaojue (funded by GAP) provided ongoing mentoring to 20 local clinicians and helped treat over 200 additional PLWH from the Yi community between 2013 and 2014.

These rural clinical training centers continue to make significant contributions to the national HIV/AIDS response and complement the national urban training centers. By 2014, 259 graduates completed the rural HIV/AIDS clinical training program, 111 of them from Lixin center, 112 from Luzhai center, and 36 from Zhaojue center. Dual referral systems were established between county- and township-level health facilities at the Lixin and Luzhai county health systems, as part of the training activities. All rural clinical training centers have been transferred to the local health authority. Results of an evaluation conducted among graduates who attended a refresher training in December 2011 showed that 96% of them were still providing HIV/AIDS care and treatment; 80% of them became local AIDS clinical experts; and collectively, these trainees provided treatment and care services to at least 30,000 HIV/AIDS patients in China, many in remote or mountainous areas.

In order to meet the increasing need for quality, comprehensive HIV clinical care, GAP worked with I-TECH (International Training and Education Center for Health, University of Washington) in 2013 to design and develop a 2-week training curriculum on HIV/AIDS care for nurses working in rural areas of Liangshan prefecture in Sichuan province. This program is being implemented by Liangshan Infectious Diseases Hospital to cover all nurses working on HIV/AIDS treatment and clinical care across the entire prefecture. Merck Foundation, in cooperation with NCAIDS, continues to provide financial support for this program. This curriculum is intended to fill the gap in training for nurses of the national training program on HIV/AIDS treatment and care. Therefore, NCAIDS has scaled up this essential training for nurses to all 12 national training centers.

21.1.3.6 Strengthening the National HIV Laboratory System

In order to ensure an effective national HIV/AIDS response, a country's laboratory system must be strengthened. Since its inception, the GAP has focused on capacity building at the National HIV Reference Laboratory (NHRL). Goals included improving HIV/AIDS testing laboratory guidelines and operating procedures, expanding the number of HIV testing laboratories in China, introducing novel testing technologies, and strengthening the quality control system of the national laboratory network (Jiang et al. 2010). This has been a very productive area for collaboration, especially in the period from 2008 to 2013. GAP has helped NHRL as well as provincial and local laboratories to make remarkable progress.

A key area of support has been technical guideline development and national and provincial capacity and testing quality improvement, beginning with the National Guidelines for HIV Detection in 2004 and again in 2009, but also national guidelines for $CD4^+$ T Lymphocyte Enumeration and Quality Assurance, HIV-1 Viral Load Measurement and Quality Assurance, Hepatitis C Virus (HCV) Detection (2012), HIV-1 Rapid Tests, Drug Resistance Quality Assurance, and HIV Proficiency Testing. In addition, GAP supported the development of a training manual for early infant diagnosis (EID) technology and an HIV incidence testing protocol for use in 15 provinces.

In addition, GAP strengthened the capacity of NHRL through digitization and proficiency testing of an electronic report management system (v1.0, v2.0, v3.0, and v4.0) including an administration software system, workstations, and client software systems and assisted with internal quality control (QC) panels for HIV and HCV antibody testing and preparation of syphilis antibodies. GAP support enabled NHRL to expand proficiency testing (PT) activities nationwide and increase the national PT panel distribution from one to three times per year, as well as launch PT programs for antibody, CD4, viral load detection, and HIV-1 BED incidence testing (Jiang et al. 2010). Overall, the number of laboratories that participate in PT programs increased from 57 to 370.

In addition, the program assisted NHRL to annually monitor the quality of domestic and international HIV testing reagents available in the Chinese commercial market in order to assure national testing quality. Finally, and perhaps most significantly, GAP assisted NHRL to improve management and to obtain the

highest international laboratory accreditation offered by the American Society of Pathologists in 2011.

GAP provided support that built capacity below the national level as well, by supporting trainings and workshops to strengthen the capacity of local laboratory staff, including national training courses on PT and the electronic reporting and management system; national training courses and workshops on HIV-1 incident infection detection, surveillance, and data analysis; conferences on the PT program; a workshop on alternative HIV testing algorithm; a conference on laboratory HCV testing and quality assurance; and a conference on HCV testing reagent evaluation. Virtually all of the 15 GAP-supported provinces received some support and only a few examples are provided here.

With GAP support, Anhui held technical training for laboratory personnel, organized QC activities, strengthened supervision and inspection of the laboratory, and established a set of reasonable quality assessments for the HIV testing laboratory system. Every year, the province trained laboratory personnel and assessed HIV laboratories. The project accelerated laboratory establishment and standardization of work. In Beijing, with support from GAP, the laboratory network's capacity improved significantly. Technical skills for performing screening tests and HIV diagnosis technologies advanced dramatically through years of persistent training and evaluation. HIV infection was diagnosed in a timely manner, case finding was accurate, and prevention strategies were well developed. In Guangdong, GAP's efforts strengthened QC of HIV screening and confirmatory laboratories in the province and established a monitoring system for ARV drug resistance. A monitoring system for HIV incidence among high-risk groups was also established to evaluate the impact of the HIV/AIDS response. GAP supported Guangxi CDC to implement various advanced laboratory methods. In Heilongjiang, at the end of 2011, a laboratory detection network was established. The network was composed of one confirmation central laboratory, four confirmation laboratories, nine HIV screening central laboratories, 427 HIV screening laboratories, and 146 detection points. This ensured the network laboratory QC was standardized in the entire province.

NHRL's capacity to engage in innovation and to explore the potential of new laboratory technology made the GAP collaboration fertile ground for exciting new areas of collaboration. The work done in collaboration with China has the potential to significantly and positively contribute to the global response to HIV—not only to the Chinese national response. Some of the areas where collaboration was initiated with this goal in mind include evaluation of new point-of-care (POC) CD4 analyzers (Liang et al. 2015), development of dried blood spot (DBS)-based HIV-1 drug resistance testing, HIV-1 incidence assay including BED and limited antigen assays (Duan et al. 2010), use of RT-PCR on pooled specimens, establishment of molecular assays for HIV detection including DBS-based EID tests, alternative strategies of HIV antibody testing, HIV-2 detection, molecular epidemiologic investigation techniques of HIV infections, evaluation of HCV detection reagents and testing strategy assessment, and development of molecular testing and HCV genotyping (see Chap. 5 for more information).

21.1.4 Other Innovative Activities and Implementation Science Research

The GAP also provided technical support to innovative activities in the provinces and at national divisions at NCAIDS, including an MSM cohort study in Ningxia; a survey of MSM risk behaviors in Harbin; a survey of amphetamine use in different risk groups in Shandong; an MSM HIV-1 molecular epidemiological study; an MSM survey in Lhasa, Tibet; an exploration of comprehensive intervention models involving community health clinics and self-help organizations for key populations; psychological intervention on behavior change among HIV-infected MSM in Beijing; a study of HIV transmission risk, impact factors, and responses between couples in Yunnan, Henan, Sichuan, Guangxi, and Chongqing; a social network study of individuals newly diagnosed with HIV infection; a size estimation of FSW, drug users, and MSM; a cost analysis of cotrimoxazole's prophylaxis effect on reducing mortality; a survey of women from high epidemic areas marrying rural farmers in Shandong; and a pilot study of couples/partner notification.

These innovative activities, in close technical cooperation with NCAIDS, have provided scientific evidence and established operational mechanisms to improve the effectiveness of the HIV/AIDS response at provincial and national levels. After a decade of technical cooperation, the program has been successfully integrated into the national and provincial HIV/AIDS programs (Wu et al. 2011). These innovative pilot projects, with close linkage to the policy process, have made valuable contributions and helped generate better data to guide the development of more targeted and responsive national HIV/AIDS policies. Some of the pilots and models that the program successfully implemented have been promoted and replicated nationwide.

21.1.4.1 HIV PITC in Luzhai County, a High Epidemic Area

Luzhai county (population 413,200) is comprised of four towns and five villages and is located in the central northern region of Guangxi. There are five county health facilities, ten township (village) health clinics, and four screening test laboratories (i.e., at the County CDC, the County People's Hospital, the Chinese Traditional Medicine Hospital, and the County Women and Children's Hospital). All medical facilities in the county are capable of delivering related HIV counseling and rapid testing. There was also one MMT clinic, one extended MMT clinic, one ART site, and one extended ART site.

The first HIV-infected patient in Luzhai county was reported in 1998. By the end of 2010, the cumulative number of HIV/AIDS cases reported in Luzhai was 3241 (1411 of whom had already developed AIDS), and the cumulative total number of HIV/AIDS-related deaths reported was 1003. Overall adult HIV prevalence in the county was close to 1.0%. In 2011, there were a total of 956 AIDS patients who received ART in Luzhai County People's Hospital with 209 new enrollments. Objectives were to simplify routine HIV testing in the clinical setting, find more HIV cases as early as possible, and link PLWH to prevention, treatment, and care services to prevent secondary sexual transmission. With the support and technical

assistance from GAP, county government decided to include routine HIV testing into the government performance review system and included it in the annual review for all township and village leaders.

With GAP support, 86,569 HIV screening tests were performed in 2011 (accounting for 19% of the population of Luzhai), and 1174 new HIV-infected persons were found. HIV screening increased by nearly 300% and the number of cases found increased by 135% compared to 2010.

21.1.4.2 Couples HIV Testing and Counseling Among MSM in Chengdu

Originally developed and promoted by US CDC, couples HIV testing and counseling (CHTC) has been shown to be an effective strategy among heterosexual couples. As MSM couples differ from heterosexual couples, scaling up CHTC for MSM couples required piloting in China and careful evaluation. A pilot program was designed, in collaboration with faculty from Emory University, to examine the feasibility and effectiveness of CHCT among MSM couples. It aimed to train 30 MSM counselors, develop MSM-friendly promotional leaflets and posters on CHTC, and develop a CHTC working manual targeting MSM couples.

A workshop on CHTC for MSM couples was held in Chengdu in March 2011. A total of 36 trainees participated in this workshop, including staff from MSM CBOs, local CDCs, and community volunteers. Training covered the principles, procedure, and skills for CHTC. The CHTC site was developed with the Chengdu Gay Care Organization (CGCO). A program manager was appointed to oversee monitoring, QC, and data management. Four experienced counselors were chosen and trained to provide CHTC. Several doctors serving as volunteers were responsible for conducting HIV testing.

Multiple community mobilization strategies were undertaken to raise awareness of CHTC for MSM couples. CHCT was promoted in gay venues through social networking and gay websites. An electronic version of CHCT message was designed and disseminated in "QQ" instant messenger groups and chat rooms on the Internet. In total, 53 couples (106 people) participated in CHTC pilot from April to September 2011. Of these, 40 couples (75.5%) were concordant HIV-negative, three (5.6%) were concordant HIV-positive, and ten (18.9%) were serodiscordant. MSM couples received HTC together. More CHTC programs have been developed since, and they are contributing to increased coverage of HTC among MSM in China.

21.1.4.3 Tenofovir in Pregnancy (TIP) Study

The study entitled "Maternal Tenofovir-Containing Combination Drug Regimen during the Second and Third Trimesters of Pregnancy for Prevention of Mother-to-Child Transmission of HIV and HBV in HIV-HBV Co-Infected Mothers" was conducted in Guangxi between 2012 and 2015, in collaboration with the National Center for Women and Children's Health, the local health authorities, and NCAIDS. This phase II clinical trial was primarily supported by the Division of Reproductive Health at US CDC, as well as the Guangxi Bureau of Health and the Guangxi CDC. There was limited information on antiviral therapy for hepatitis B

virus (HBV) infection among pregnant women coinfected with HIV and HBV (Kourtis et al. 2012). Up to 90% of infants who acquire their HBV infection perinatally will develop chronic infection. Because HIV/HBV coinfection rates are relatively high among pregnant women in Guangxi province, this study was conducted to provide unique answers to an important research question around prevention of HBV-HIV perinatal transmission to their dually exposed infants (Kourtis et al. 2012; Wang et al. 2016).

21.1.4.4 Evaluation of POC CD4 Testing

CD4 count determination plays an important role in HIV treatment and management decisions. Most conventional CD4 instruments are centrally located in provincial- and prefecture-level facilities with adequate infrastructure and skilled technicians. However, more than 70% of HIV-infected persons in China live in remote rural areas (Wu et al. 2007). Blood specimens have to be transported to centralized laboratories in a timely and secure manner in order to maintain CD4 cellular integrity. These issues are more prominent in provinces in the West and Southwest of China (e.g., Guangxi, Sichuan, Tibet, Xinjiang, and Yunnan) where a large proportion of patients reside in hard-to-reach, rural, and/or mountainous areas.

A reliable, simple, low-cost, and robust POC device would help overcome these barriers. A joint study on the performance of the Alere PIMA™ POC CD4 instrument was carried out in 2012 by the NHRL, Yunnan CDC, Dehong prefecture CDC, and the GAP office in China. In this study, venous and finger-prick blood samples were collected from participants with HIV infection from two VCT sites in Yunnan. Both venous and finger-prick blood specimens were collected from HIV-infected participants. This feasibility study found the PIMA POC CD4 analyzer to be a reasonable alternative to the traditionally employed flow cytometry method (using, e.g., the BD Biosciences FACSCalibur™ instrument) to determine ART eligibility (Liang et al. 2015). This study found that the Alere PIMA analyzer provides satisfactory CD4 counting using venous blood but is less reliable when finger-prick blood is used. Given the frequent use of phlebotomy in rural China, the POC CD4 analyzer using venous blood could play an important role in improving HIV care in resource-limited settings in China.

21.2 Capacity Building

The program has aimed to enhance the national, provincial, and local capacity in response to HIV/AIDS, to strengthen case finding and case management systems.

In May 2004, NCAIDS of China CDC initiated the “Provincial Project Management Training Project (PPMTP)” with the support of GAP. They aimed to strengthen capacity of provincial (and autonomous region and municipality) HIV/AIDS prevention and control project management staff to improve local project design, implementation, and management. Project management staff responsible for HIV/AIDS prevention and control projects at the provincial level were trained to increase their capacity for project design, planning, implementation, monitoring

and evaluation, management, and on-the-spot problem-solving. They were also trained to build up knowledge and skills on HIV/AIDS prevention, intervention, treatment, and care. The PPMTP also established a communication platform between provincial CDCs and NCAIDS and a network among provincial CDCs.

This training program invited more than 50 well-known experts and professors on HIV/AIDS prevention and control from universities, NGOs, international organizations, China CDC, NCAIDS, New Century Women's and Children's Hospital (NCWCH) of Beijing, Military Medical Institute, provincial CDCs, infectious disease hospitals, and US CDC to give lectures to trainees. Trainings cover more than 50 topics such as global and China HIV/AIDS epidemics and response strategies, HIV/AIDS counseling, testing and intervention, AIDS clinical treatment and care, HIV virology basic research and testing, project management, and case studies. Post-training evaluation was conducted with the graduates every 2 years. Beginning in 2012, NCAIDS provided funding to support the program directly from the National HIV/AIDS Prevention and Control Fund.

From May 2004 until May 2013, 14 6-month training cohorts were conducted for 112 graduates from 30 provinces and Xinjiang Construction Region and some large cities with independent HIV planning such as Dalian, Qingdao, and Shenzhen. Some graduates have become backbone staff for HIV/AIDS prevention and control in high epidemic areas like Zhumadian prefecture of Henan, Dehong prefecture of Yunnan, Yili prefecture of Xinjiang, and Liuzhou prefecture of Guangxi. Through the training, the professional skills of most graduates increased remarkably. Some graduates were promoted to the position of director or deputy director of HIV/AIDS and other related divisions of their respective CDCs. An evaluation conducted in 2012 showed that 96% of trainees were satisfied with the program; 77% were working in planning and managing provincial, national, or international HIV/AIDS programs; 80% were supervising county-level HIV/AIDS programs; 67% provided training for others; and 87% conducted monitoring and evaluation activities.

21.3 Conclusion

The first dozen years of strategic technical collaboration of the US CDC GAP in China supported the following: integration with the national and local HIV prevention and control programs; evidence-based decision-making; strengthening systems and capacity at national, provincial, and local levels; prioritizing high-risk geographic areas and populations; developing innovative approaches for scale-up; answering important scientific questions that can be most effectively answered in China but also with global implications for the HIV response; and increasing China's engagement with the global public health community and sharing critical lessons learned.

Domestic funding of China's national HIV program has increased dramatically in recent years (Wu et al. 2011) and promotes more strategic use of scarce resources by targeting a core set of effective interventions (Schwartländer et al. 2011). By targeting key populations for HIV prevention and early initiation of treatment as key

strategies, new techniques and management concepts were introduced and adapted to the Chinese context. With valuable experiences and momentum, many of these models developed in the first decade of implementation of the GAP and NCAIDS technical collaboration were replicated and expanded nationwide. Chinese technical experts at the GAP office have a unique ability to market the evidence to key stakeholders and to build bridges at provincial and national levels. A productive working relationship with well-conceived models, a results-based activity implementation plan, and proper linkage to the domestic policy process have made significant contributions to further strengthening HIV control and prevention in China.

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Civil Society Involvement in National HIV/AIDS Programs

22

Joan Kaufman

Abstract

Globally, the AIDS response relies on active participation of nongovernmental organizations (NGOs) and civil society. In China, the government is the main provider of health and social services, and the role of NGOs is more limited than in other countries. Despite this, China has opened the door for NGO participation in its AIDS response, initially because of donor pressure but increasingly due to official acknowledgment of the important role these groups play in controlling the epidemic. Since the first AIDS NGOs were established in China in the 1990s, Chinese AIDS NGOs have made unique contributions to China's AIDS response in critical areas like access to drugs, support for treatment compliance, outreach to marginalized at-risk groups, and efforts to reduce stigma among marginalized populations. However, there has been a substantial drop-off in donor funding in recent years, and although the Chinese government has filled the funding gap, demonstrating its commitment to the sector, recent policy moves toward greater control over the work and funding of NGOs threatens their survival. Thus far, China's AIDS response has been noteworthy, but these new NGO funding and regulatory developments pose significant challenges to the next phase of outreach, prevention, treatment, and care.

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22.1 Introduction

In the last 15 years, China's AIDS response has gone from denial to global example. The combination of a strong national authority with resources and political will and a determination to apply evidence-based approaches has demonstrated the importance of both. In the years following the SARS epidemic in 2003, China's public health leaders have aggressively analyzed and addressed their HIV/AIDS epidemic, putting in place pragmatic new policies and programs like harm reduction for people who inject drugs (PWID) and test-and-treat programs for large numbers of previously unidentified people living with HIV (PLWH). In China, where government is the main actor for policy formulation and service provision, the role of nongovernmental organizations (NGOs) has historically been weak. Nevertheless, China's HIV/AIDS response has provided an opportunity for its fledgling NGO community to demonstrate its importance as an essential partner in achieving national goals, in this case the control of China's HIV epidemic. Globally the HIV/AIDS response relies on active participation of NGOs and civil society, and important progress has been made in the response due to their advocacy in critical areas like access to medicines, treatment compliance support, and outreach to marginalized at-risk groups. China has opened the door for NGO participation in the response, partly due to donor pressure, but also because of official acknowledgment of the important role these groups must play in controlling the epidemic. There is now strong policy support for the role of NGOs in China's HIV/AIDS response, but this role is under threat as the political space for NGOs shrinks. This may threaten future efforts to control China's HIV epidemic. In this chapter, the unique contributions of China's HIV/AIDS NGOs and the expansion of the political space for their role over the last 20 years are reviewed. Additionally, recent government moves to more closely control NGOs, and their work and funding through more restrictive legislation is discussed as this may undermine China's success in controlling the epidemic in the coming years.

22.2 Global Civil Society Engagement in HIV/AIDS

Since the beginning of the global AIDS epidemic, NGOs have played a decisive role in the response, both for advocacy and for services. Groups representing PLWH have a mandated role in most international and national AIDS policy, program, and funding bodies. Advocacy groups representing gay men and AIDS patients in the "global south" have put pressure on governments and industry to increase funding and access for treatment and prevention programs. This led to new norms about ensuring access to essential medicines and lifesaving drugs in poor countries. Services provided by AIDS NGOs, for outreach to gay men and other men who have sex with men (MSM), condom distribution and promotion for sex workers, syringe exchange for PWID, youth sex education programs, sex worker legal protection services, treatment and support to AIDS patients, AIDS orphans support programs, and many other critical parts of global and national AIDS programs, have been a key feature of successful AIDS responses in many countries. These groups have been able to reach and represent hidden and underrepresented groups with essential risk-reduction education,

recruitment for HIV testing and treatment, and assistance in accessing care and support. These NGOs have also played an important role in representing the needs and perspectives of marginalized groups in policy and program formulation.

Once effective AIDS treatment became available in the 1990s, community groups and local NGOs became the backbone of AIDS treatment support in rural communities where trained medical personnel are scarce (Farmer et al. 2001). Many of the important advances in the AIDS response have come through NGO organizing and advocacy. For example, ACT UP in the United States (US) pushed for fast tracking approvals for AIDS medications. The Treatment Access Campaign in South Africa spearheaded a global movement for affordable AIDS drugs (Heywood 2009). And finally, Sonagachi in India demonstrated that protecting sex workers' rights increased their condom use and found that in project cities, HIV prevalence among sex workers was 11% compared to other Indian cities where it exceeded 50% (Jana et al. 1999). These examples and many others attest to the effectiveness of both peer group approaches and prevention services provided by NGOs and their value for supporting treatment programs in their communities.

The participation of NGOs in the AIDS response is mandated in numerous international agreements from global agencies. The Joint United Nations Programme on HIV/AIDS (UNAIDS) and the United Nations (UN) General Assembly (GA) both support the essential role of civil society in responding to the epidemic, and UNAIDS includes NGO representatives on its board. The Global Fund to Fight AIDS, Tuberculosis, and Malaria (hereafter the Global Fund) requires civil society participation in its governance board, the CCM (country coordinating mechanism), for proposal submission and execution. Furthermore, the "GIPA" principle ("Greater Involvement of People Living with HIV/AIDS") is promoted by UNAIDS and calls for the greater participation in the response of people infected and affected by HIV. This has become an important mechanism for patient groups to form and participate in policy and program decision-making as well as service delivery. These global norms have secured a novel and secure political space for NGOs in the global AIDS response (Sidibé et al. 2010).

22.3 China NGOs

While NGOs are fully part of the architecture for service provision, governance, and advocacy in many countries, they have a more restricted and different role in China. There has been rapid growth of the civil society sector in China in the last 20 years. As of 2016, there were approximately 7000 foreign NGOs in China and many times more domestic NGOs—roughly 675,000 that were registered and perhaps as many as three million unregistered (Hsu et al. 2016). In other countries NGOs often deliver direct services, but in China, the government system is the main provider of health and other social services to its vast population. As the number of Chinese NGOs has expanded, some have assumed roles in service delivery in partnership with government, but most operate as research organizations and as advocacy groups on issues like the environment, energy policy, HIV/AIDS, consumer rights, legal reform, and other issues of social and political concern. Many of these

organizations are linked to global and transnational networks, which have provided important support both financially and on strategy development, often in collaboration with global agencies and bilateral and multilateral donors.

Unique to China is the GONGO sector—government-sponsored NGOs. These parastatal agencies operate under the leadership of respective technical ministries or Party-led organizations, and they are often led by former government officials. Many receive government funding to carry out community-based or donor-funded initiatives through their networks at province and local levels.

The NGO sector in China is highly restricted and governed by laws and regulations aimed at preventing anti-government political actions. The registration process for independent Chinese NGOs has involved registration with the Ministry of Civil Affairs, which has included identification of a sponsoring government agency and a minimum amount of operating capital. Requirements for social organizations include having an office, professional employees, and funds of 30,000 RMB, while requirements for "people-run non-enterprise" organizations include having an office, professional employees, and funds of 30,000–50,000 RMB. Many NGOs do not bother to officially register with the Ministry of Civil Affairs and operate either without any registration or register as a company, a much easier path to legal status. Some service-providing NGOs work closely with government agencies or with GONGOs either through direct contract work or as members of advisory and governance boards, like the Global Fund's CCM. But other NGOs, especially those doing advocacy or research, can be viewed with suspicion by government leaders, especially at the local level, who see them as outside government supervision and authority structures. There are restrictions on establishing nationwide networks (except for GONGOs).

A new law, which went into effect at the start of 2017, has shifted oversight of foreign NGOs from the Ministry of Civil Affairs to the Public Security Bureau, a move that will likely increase local mistrust. Under the new law, foreign NGOs are subjected to close scrutiny by the government and by police who have been given the right to question workers, inspect and close offices, review documents, and seize assets. Only a fraction of foreign NGOs in China has yet re-registered under the new law, and it is expected that some will instead pull out of the country (Gan 2017).

22.4 The Evolving Political Acceptance for AIDS NGOs in China

In China as elsewhere, the highest-risk groups for HIV infection are often among the most highly stigmatized groups in society (e.g., gay men, drug users, sex workers). The necessity of reaching these groups with HIV prevention services has contributed to limited societal acceptance and to a more sympathetic attitude to the NGOs representing them. The HIV/AIDS response has often been cited as an example of how the policy environment has expanded for NGOs in China. The combination of internal recognition of the essential roles that such NGOs have played in the global response and external pressures and advocacy through funding mandates and

global norms promoted by international partners has pushed forward a more embracing policy environment (Kaufman 2012).

The first time a government program involving NGOs became involved in China's AIDS response was in 1997 and happened somewhat accidentally. This represented a milestone event in the history of NGO participation in China's response to HIV/AIDS. Australia's foreign aid agency, AusAID, provided 2 million Australian dollars as a supplemental grant to a 100 million US dollar World Bank Project in China on Disease Prevention, known as Health 7. Health 7 worked with the Ministry of Health and the Chinese Academy of Preventive Medicine, which was the predecessor of the Chinese Center for Disease Control and Prevention (China CDC). The initiative targeted 17 provinces and cities. The AusAID funds were exclusively to support NGO participation in HIV/AIDS programs. At that time, China had limited funding in the health sector and government institutes had little funding for HIV/AIDS programs. Even while government partners were surprised and a bit shocked by the AusAID mandate, China's government felt obliged to follow the donor's requirement. But China AIDS NGOs at that time had limited capacity and were unable to write project proposals or draft work plans. Thus, the government worked with the NGOs, wrote work plans for them, and gradually helped them increase their capacity. Following the example of Health 7, the United Kingdom's Department for International Development (DFID) provided support for NGOs for the World Bank's Basic Health Services Project (Health 8), which began in 1998.

In China, real action often only happens in response to political will demonstrated via public endorsement by political leaders. The importance of such endorsements cannot be overstated. Beginning in 2003, Chinese government leaders have increasingly endorsed the role of NGOs in the HIV/AIDS response. At the end of 2003, Wu Yi, who served as the Vice-Premier of the State Council from 2003 to 2008 and as the Minister of Health from 2003 to 2008, clearly announced her support for a greater role for NGOs in China's AIDS response and endorsed efforts to build a framework for government and NGO cooperation to effectively control and prevent the spread of HIV (CCTV International, 2004). Her statements were echoed by many other high-ranking government officials including the then-Party secretary to the Ministry of Health, Gao Qiang. Officials in China's Ministry of Health stated that they hoped to further promote cooperation between government and NGOs in HIV/AIDS control and prevention by way of public bidding and purchase of services.

A new policy entitled "Regulation on the Prevention and Treatment of HIV/AIDS," drafted by the Ministry of Health and issued by the State Council in 2006, provided an official endorsement and framework for promoting NGO participation in HIV/AIDS prevention and control. This was further elaborated in the State Council's "Decree No. 48" in 2010 (State Council 2010), which contained language endorsing the purchase and contracting of services from NGOs, as follows:

> *Mobilize social participation in HIV/AIDS response. People's organizations (e.g. trade unions, Youth League branches, the All-China Women's Federation, Red Cross and Association of Industry and Commerce), social groups, foundations, civil sector non-enterprise units and grassroots organizations (e.g. residents' committees and villagers'*

committees) shall be fully mobilized to participate in the HIV/AIDS response. The purchasing of services can be adopted as a means to encourage their involvement in outreach and communications (IEC), preventive interventions, care and support. Enterprises and volunteers shall also be inspired to participate in the HIV/AIDS response. Guidance and management shall be strengthened to promote social participation in HIV/AIDS response. The civil affairs departments shall facilitate legal registration of social organizations, and relevant government departments shall fulfill their responsibilities as sponsoring agencies.

Reflecting this change in attitude, top leaders now regularly express their support for HIV/AIDS NGOs and include NGOs in important relevant meetings. Former Premier Wen Jiabao invited NGO leaders to participate in a panel discussion and Premier Li Keqiang has done so as well. In November 2012, ahead of December 1, International AIDS Day, China's then newly designated Prime Minister Li Keqiang promised to offer greater support to NGOs tackling HIV/AIDS in China and has kept this promise with a special fund to support their work.

These changes indicate the large government change in attitude toward AIDS NGOs and their important role in supporting the formal health system. As noted above, the initial inclusion of NGOs in China's HIV/AIDS response was driven by external forces (bilateral donors), even with little confidence among Chinese officials that they had any real role to play. Now, government officials and health sectors, even at local levels, recognize the important roles that NGO and community organizations play in the HIV/AIDS response in China and that without their active participation and critical contributions, it would be impossible to achieve national goals.

Support for AIDS NGOs was enshrined in China's 12th Five-Year Plan (2011–2015) and again in its 13th Five-Year Plan (2015–2020). The HIV/AIDS action plan portions of these policies and related monitoring and evaluation frameworks contain clear language about the roles of NGOs and include specific indicators for measuring it.

At the local government level, support for NGOs can vastly differ. Some local governments have had long-term cooperation with NGOs through work in poverty alleviation and social welfare and have had good experiences. For those, cooperation with HIV/AIDS NGOs has been easier. In many instances they have been able to establish effective models for shared service provision and have provided funding for NGO partners. For example, in Sichuan Province in 2008, the provincial government declared its intention "to promote social forces to participate in AIDS prevention and treatment" and passed China's first local legislation to this effect. Item 14 of the legislation states that "non-profit organizations held by social forces (including enterprise, public unit, village/community committee, civil organization and other related organization and individuals) and aiming at HIV/AIDS prevention and control, after being examined and approved by their local health administration, civil affair departments should approve their registration in accordance with related regulations." This provided professional authority for NGO participation in local HIV/AIDS programs. But in most places, local officials prefer to work with GONGOs, such as the labor union, communist youth league, and women's federation, rather than independent NGOs. They are concerned about the political risk of

engaging with independent NGOs, a concern that has grown in recent years. Although HIV/AIDS prevention and control efforts by GONGOs may be valuable, they rarely represent local communities.

22.5 The Main Chinese NGOs Working on HIV/AIDS

China has two main GONGOs working on HIV/AIDS, the Chinese Association for HIV/AIDS and STD Prevention and Control (CASPAC) and the China Preventive Medicine Association (CMPA), both with provincial and local branches, as well as many independent NGOs operating at the national and local levels. Both GONGOs are led by former government officials from the China CDC or Ministry of Health. Both have been active and valuable players in China's AIDS response, serving as implementing agencies for government-supported and donor programs, especially the Global Fund and the Bill and Melinda Gates Foundation. In both instances they have served as pass-through organizations for many independent NGOs and provided capacity building training and assistance in operations and management of funds. The independent NGOs, however, are more legitimate representatives of their communities and to some degree have suffered in their own growth and funding by the concentration of funding to GONGOs instead of to them directly.

The number of independent Chinese AIDS NGOs has grown rapidly in the last 20 years and peaked during the years in which the Global Fund provided funding from 2003 to 2012. The earliest groups operated online newsletters, networking activities, and education and outreach efforts. As funding increased for HIV prevention and care, many of the volunteer groups working with marginalized populations and PLWH evolved and professionalized.

22.5.1 The Early Days of China's HIV/AIDS Response (1999 and Prior)

China only openly acknowledged the extent of its AIDS epidemic in 2003 following the SARS crisis. Prior to that, the epidemic was played down, the government's response was weak, and policy was poorly organized (Kaufman and Jing 2002). The epidemic was represented as mainly limited to China's southwest border areas and mostly among PWID. There were few independent Chinese NGOs working on HIV/AIDS.

The China–UK HIV/AIDS Prevention and Care Project funded by the United Kingdom's Department for International Development (DFID) was the first bilateral project to tackle China's growing AIDS epidemic, even before official acknowledgment of the seriousness of the epidemic in 2003. Launched in 1999 and working in Yunnan and Sichuan Provinces in China's southwest, the China–UK HIV/AIDS Prevention and Care Project provided important early funding to NGO outreach activities among MSM, commercial sex workers, and PWID and helped foster good working relations with local government. Groups like the Chengdu Community Cares group (working with gay men) and Daytop in Yunnan (working

with drug users) received funding and technical assistance to work with marginalized groups at risk for HIV. The program replicated best practices from neighboring countries like Thailand for HIV prevention among sex workers and aimed to promote 100% condom use (Yip 2014).

From the early 1990s, the Ford Foundation's China Office also provided support for independent AIDS NGOs in Yunnan, Beijing, and elsewhere. This funding built a backbone of technically strong, independent NGOs working on HIV prevention for MSM, sex workers, and youth and representing PLWH. Groups like Yiteng, based in Hong Kong, worked to educate and protect the legal rights of Chinese sex workers in Hong Kong and on the Guangdong–Hong Kong border. Aizhi Action, an online platform started by Chinese AIDS activist Yanhai Wan, documented the emerging and unacknowledged epidemic among paid plasma donors in Henan Province and profiled the work of Dr. Yaojie Gao, an outspoken doctor on the frontlines of the epidemic calling for government accountability and action. It was one of the earliest accurate sources of information on the AIDS epidemic among paid plasma donors in central China and has remained an important advocacy group for the villagers in Henan Province who were inadvertently infected. Positive Art, a Beijing-based art collective, and Mangrove Group at Ditan Hospital were two of the earliest support groups for PLWH. Finally, the Chinese Alliance of People Living with HIV/AIDS (CAP+), launched in the early 2000s, formed a larger coalition for grassroots groups, bringing together diverse groups such as rural women and young men living with HIV and linking them to the Global Network of People Living with AIDS (GNP+) and other global and regional networks of PLWH (Kaufman et al. 2014).

One important group, Friends Exchange (with modest support by Ford Foundation, then Barry and Martin Trust, and later UNAIDS), played a critical role in mobilizing HIV prevention among MSM in China. HIV infection among MSM continues to grow in China. While now an acknowledged problem, at that time it was still a hidden issue. As of the end of 2015, 28.3% of all newly diagnosed HIV cases in China were acquired via male-male sexual contact. It was up more than tenfold since 2006 from 2.5% (Pisani and Wu 2017). In the words of China's top AIDS prevention official, Dr. Zunyou Wu, "the expanding epidemic among MSM is undoubtedly the gravest of these new challenges regarding transmission of HIV." In the late 1990s, it was nearly impossible to find an entry point for work with MSM in China. Homosexuality and homosexual behavior were a hidden reality, highly stigmatized, and not acknowledged by the government, and there were no obvious groups with which to engage.

Friend Exchange, an underground magazine that was providing information on safe sexual practices for homosexual men in China, was the exception, with each issue passed hand to hand so that it reached a wide audience. The magazine played a unique role in providing AIDS education to MSM and also gave voice to a stigmatized and isolated community. The magazine eventually became official and began formal publication. The magazine's editor, Beichuan Zhang, a professor at Qingdao Medical University, also gave voice to the community's perspectives. The increasing tolerance and understanding of homosexuality in China is in no small

way due to the influence of Friend Exchange and Beichuan Zhang's tireless efforts to humanize individual stories of stigma, the power of family expectations and roles in Chinese society, and the journey and progress of sexual rights in China. At the same time, the publication opened political space for engagement and work on sexual rights and AIDS prevention, in part by challenging social conventions and forcing the Chinese Psychiatry Association to remove homosexuality from its list of mental diseases (Zhang and Kaufman 2005). Published for 11 years, Friend Exchange reached countless homosexual, bisexual, and transgender men and women in China with lifesaving information about AIDS prevention as well as psychological support and understanding for lifestyles and sexual orientations that are still highly stigmatized in China. It became the most respected and authoritative source of information on homosexuality and LGBT (lesbian, gay, bisexual, transgender) issues in China, conducting countless surveys among its extensive readership and thereby generating information from the community itself on critical issues (e.g., condom use, numbers of sexual partners, attitudes toward safe sexual practices) for the understanding of the HIV epidemic among this key, vulnerable population.

22.5.2 China Responds in Earnest (2003–2012)

After 2003, donor funding for HIV/AIDS programs in China increased substantially and more funds were directed to the NGO sector. The Global Fund contributed over 400 million US dollars, the Bill and Melinda Gates Foundation provided 50 million US dollars, and USAID supported work in China's southwest provinces, all three with funding going directly to NGOs.

In China, the Global Fund entered the scene in the early 2000s and between 2003 and 2012, with six rounds of funding for AIDS programs, worked closely with the Chinese government on numerous projects aimed at supporting government and NGO efforts to prevent and treat HIV, with specific funding earmarked to support organizations within civil society (Huang and Ping 2014; Kaufman 2012). As part of the Global Fund mandate, a Country Coordinating Mechanism (CCM) was established with NGO representatives. This normalization of NGO participation in governance opened the door for the Chinese AIDS NGO community to really demonstrate their value and build effective partnerships with national and local government agencies. Empowered by donor engagement and funding, many groups professionalized and moved from volunteer organizations to organizations with greater capacity both technically and managerially. Government and donor funding supported this process with trainings and capacity building workshops. When the Global Fund was established in 2002, its own mandated governance mechanism required establishment of a "Country Coordinating Mechanism" (CCM) with civil society representatives to review, approve, and submit applications. China established a CCM, but initially it worked more as a "rubber stamp" for applications developed and executed by China's Ministry of Health and the China CDC. Domestic AIDS NGOs had a limited voice in the process.

In 2006, the first NGO election was held to elect an NGO representative to the CCM. However, it was disputed, which precipitated a thorough review by the Global Fund and UNAIDS. The result was a new election that was uniquely transparent, participatory, and accountable. The election, facilitated by the International Republican Institute (IRI), a US NGO that has worked around the world to promote democratic elections, provided an opportunity for Internet discussions and networked disparate groups around the country. Several widely attended local meetings brought groups together often for the first time, with IRI, UNAIDS, and donor representatives to teach them how to conduct the elections. The election resulted in two elected representatives and two NGO committees, each constituted with 11 elected representatives from groups representing people with hemophilia, MSM, former blood plasma donors (FBPD), and migrant workers (Zhang and Kaufman 2012).

The Global Fund election controversy and resolution served as a door opener for NGO participation in the AIDS response in China and established a mechanism, albeit still limited, for input by NGOs into China's AIDS response. The Global Fund's Round 6 was seen by many as a further mechanism to institutionalize the role of AIDS NGOs in China's AIDS response because all of the Fund's contributions were to be dispersed by NGOs rather than by the government. However, its intended implementing agency (principal recipient) was switched at the last moment from a GONGO, the China Association for STD and AIDS Prevention and Control, to the government's AIDS agency, the National Center for AIDS/STD Control and Prevention (NCAIDS) of the China CDC. After a negative review of the China program, China's Global Fund program was suspended in 2011. Conditions tied to lifting the suspension of Global Fund moneys included the creation of a new sub-recipient that truly represented NGOs and a commitment to channel 25% of funding to NGO groups (Wong 2011). However, before that happened, the Global Fund's Round 11 grant to China was cancelled amid pressure from some donor countries to deploy Global Fund resources to Africa instead of middle-income countries like China.

The Chinese government then announced that it would use domestic resources to substitute for cancelled Global Fund moneys and accelerated a process to contract directly with local NGOs for program implementation, indicating the government's recognition of the essential role that NGOs play. The acknowledgment of the need for NGO implementation resulted partly from the initial pressure and requirement from the Global Fund and partly from networking and advocacy by the groups themselves aided by external partners like IRI, the HIV/AIDS Alliance, ICASO, PACT, and other international NGOs.

China Global Fund Watch, established around 2004, was an NGO that monitored compliance with Global Fund rules and published a regular online newsletter, modelled on a similar global watchdog organization (AIDSPAN, which publishes the "Global Fund Observer" online newsletter). China Global Fund Watch played a leading role in publicizing the suspension of AIDS funding to China by the Global Fund and in representing the position of China's grassroots NGOs in calls for reform of the governance mechanism of the China Global Fund grants (Wong 2011). China Global Fund Watch played a watchdog role in raising and publicizing many issues

and developments with China's own substantial Global Fund grants. The organization formed close alliances with similar groups in the region and the world and served as a forum for raising other important issues related to access to essential AIDS medicines, laws compensating PLWH who were accidentally infected through medical procedures, and other sensitive issues.

An important group working on the frontlines of stigma against PLWH has been AIDS Care China. This group, started by a Guangzhou man who became infected with HIV and was evicted from his apartment when his HIV status became known, has gone on to become one of China's most well-established AIDS NGOs, receiving funding from both the Chinese government and international donors. Originally focused on addressing stigma and providing shelter for PLWH who were evicted from their homes, the group received substantial funding from donors and developed and expanded into a professional organization working in four provinces with counseling and treatment education centers known as Red Ribbon Centers. These centers focused on improving treatment outcomes and adherence to medication by working with healthcare providers and hospital officials. AIDS Care China and its founder and leader, Thomas Cai, received the Red Ribbon Award from the UN for work supporting care and treatment of PLWH.

Funding for civil society from the Global Fund was critically important for the growth and development of China's AIDS NGO sector. Many volunteer MSM and PLWH groups in many cities developed during this period and played a major role in China, reaching out to their communities with information and support often through contracted work to local CDCs. NGOs working with AIDS orphans in central China (e.g., Chi Heng, AIDS Orphan Salvation Association, and China Orchid) emerged and began working closely with government agencies. All had designated representatives of their communities on the Global Fund's civil society board, the CCM.

The Bill and Melinda Gates Foundation also provided substantial funding for HIV prevention during this period, mainly focused on testing for MSM and prevention and treatment for PLWH (Yip 2014). While most funding was channeled through the Ministry of Health and China's two main AIDS GONGOs (China Preventive Medicine Association and China Association for STD and AIDS prevention and Control), money passed through to local branches of these organizations, which engaged with local MSM NGOs to reach their communities with HIV testing. The testing program was controversial because those who chose to test were paid. However, the effort was important for helping to demonstrate the effectiveness of new, internationally recognized "test-and-treat" strategies, which are now a major thrust of China's national HIV/AIDS program.

22.5.3 China's HIV/AIDS Response Matures: 2012 to Present

The last several years have seen a substantial drop-off in international funding for HIV/AIDS programs in China as China's economy has grown. Today, its own resources and technical capabilities are the primary driver of its HIV/AIDS response,

and global donors have called for a re-direction of funding to countries in greater financial need (Chow 2010). The Global Fund cancelled Round 11 and ended its new funding to China. The Bill and Melinda Gates Foundation, USAID, and other donors have shifted their focus from supporting China's own response to HIV/AIDS to a "China in the World" orientation, focused on how to work with China as a development partner or source for lower-cost drugs in Africa and elsewhere. An unfortunate consequence of the drop-off in funding has been the drying up of support for China's NGO sector working on HIV/AIDS. After the Global Fund's Round 11 program to China was cancelled, the Chinese government announced that it would use domestic resources to substitute for cancelled Global Fund moneys and accelerated a process to contract directly with local NGOs for program implementation. But while some organizations have continued to operate with Chinese government support contracted locally by local CDCs who depend on them for outreach, many others, especially those working on advocacy rather than service delivery, have struggled to continue their missions. As an indication of how valued the NGO service contribution to the AIDS response now is in China, the Chinese government set up a special fund in 2015, exclusively for the support of NGOs to ensure their continued input. The Ministry of Finance allocated 30 million RMB, but Premier Li Keqiang felt this was insufficient, so he used his Premier Funds to add another 20 million RMB, for a total of 50 million RMB in 2015. The fund supports NGOs to do outreach work with the MSM, sex worker, drug user, and PLWH communities.

While the space afforded civil society organizations and NGOs has expanded greatly over the past two decades, it appears to again be contracting. The Foreign NGO law, which was passed in April 2016 and took effect in January 2017, shifted responsibility for foreign NGO oversight to the Ministry of Public Security from the Ministry of Civil Affairs and significantly increased the bureaucratic and regulatory requirements for all not-for-profit foreign organizations that work in China or provide funding to China-based organizations. Restricting foreign funding to Chinese NGOs has adversely affected the operations of the domestic advocacy NGOs even further. And, in light of the reductions in foreign donor funding in recent years, this could have serious negative consequences for China's HIV/AIDS response. Many of the organizations highlighted in this chapter that have played a critical role in advocacy and research had already felt the impact of the draft law, which was issued in 2015. In many cases, their foreign funders retreated for fear of being out of legal compliance. Yirenping, an NGO that has worked on employment discrimination against HIV and hepatitis B virus patients, had already been targeted by those tasked with enforcing this new law, most likely because of the foreign donor that supported its efforts. This law is one of a suite of new State Security-oriented legislation recently passed. The NGO law, while primarily aimed at preventing foreign-funded civil society groups from organizing political movements that might challenge the authority of the current regime, has spilled over into work in the social sectors, even in areas like HIV/AIDS which is fully supported by the government. The type of donor-supported efforts that led to the development of NGOs and the expansion of their roles in China's AIDS response for stigmatized groups like MSM and criminalized populations like commercial sex workers and PWID is threatened at a time when access to these marginalized populations is essential for achieving national goals.

22.6 Conclusion

Global experience demonstrates, that it is nearly impossible to achieve success in AIDS prevention without actively involving the communities themselves in efforts to reach their members. In China, government is the almost exclusive provider of public services, and since 2002, the China CDC has done an admirable job of tackling many sensitive AIDS prevention challenges and achieved many successes in controlling and responding to the epidemic. The government frequently contracts with NGOs for service provision for marginalized groups, especially MSM and PLWH, and has helped to begin normalizing the sector and formalizing the partnerships. However, although government effort is necessary, it is not sufficient to achieve success in HIV prevention among MSM and other marginalized and stigmatized groups. NGOs representing these groups are becoming less able to play the roles required of them because of the tightening political situation for Chinese NGOs accompanying the new Foreign NGO law and reductions in overseas funding. These organizations, which are critical for reaching communities throughout China, are plagued by the lack of core financing (as opposed to project funding) especially in recent years and often depend too much on volunteers rather than staff. Many groups have struggled to grow beyond their original vision and leadership and often compete for the more limited donor and government funds that trickle down to groups on the frontline of the epidemic. This situation is likely to worsen and may lead to the demise of some important groups that are unable to secure funding. To some degree, financial competition contributes to a lack of cohesion in the sector, further constrained by a regulatory environment that prohibits establishment of branches in different places (except for the GONGO sector) or transnational networking. However, competition and poor capacity among China's NGOs should not be used as an excuse to dismiss their value and necessity. Without genuine capacity, core funding, networking, and better governance, these organizations are unable to play their much-needed role. True partnership of these NGOs with government, the main service provider, architect, and enabler of policies and programs in China, is essential. Without active engagement of China's AIDS NGOs in China's HIV/AIDS response, the Chinese government's effort to control the AIDS epidemic will be only partially successful. China's HIV/AIDS epidemic response has been noteworthy, but these significant challenges to the next phase of prevention must be taken seriously.

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Quantitative Performance Monitoring of China's HIV Response

23

Yufen Liu, Scottie Bussell, and Guodong Mi

Abstract

China has made tremendous progress in advancing its national HIV program. Key to this progress was setting targets to motivate implementers to work effectively. Indicators were established using an iterative process with national stakeholders while also meeting international pressures. A plethora of demands may have distracted from ownership of the initial national program but, in the end, strengthened a focus on marginalized groups. China gradually relied less on donors and developed a uniquely Chinese HIV control program. The result was remarkable enlargement of prevention and treatment services that led to a reduction in mortality. Setting targets, and measuring performance against those targets, was vital to gauge continued progress and identify gaps in programing and implementation.

23.1 Background: Monitoring and Evaluation of HIV/AIDS Programs

Continuous monitoring and evaluation (M&E) is an important component of any health system. Setting meaningful targets is a first step toward improving the effectiveness of an HIV/AIDS response, including the health system itself, as well as new interventions and programs. A crucial second step is establishing indicators, also sometimes called metrics or benchmarks, for the purpose of assessing progress (or lack thereof) toward the selected targets. Best practice is to construct these indicators within the so-called "SMART" format (Doran 1981), ensuring the indicators are:

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- **Specific**: detailed and explicit, avoiding overly general aspects, and logically linked with the given objective
- **Measurable**: capable of objective assessment in a manner that is consistently repeatable, comparable, and auditable
- **Attainable**: achievable in the sense that the target can be met, but difficult enough such that the indicator is meaningful
- **Relevant**: logically linked to the objective as well as resulting in information that is actionable
- **Time-bound**: having predictable, repeated timelines for assessment

Health system indicators may assess broad, and sometimes overlapping, program aspects including availability, coverage, quality, and impact (World Health Organization et al. 2009). Availability indicators primarily examine health service or intervention delivery or offering to target populations and must be tailored to the unique context of each delivery modality. For example, availability of condoms in vending machines, at pharmacies, at community-based organizations, or from outreach workers must be measured differently. Coverage indicators measure the extent to which a target population is actually provided with a particular health service or intervention. These kinds of indicators can prove challenging, since an accurate measure requires a carefully estimated total target population for its denominator. Furthermore, frequency of contact—either successfully reaching a target individual or a target individual successfully accessing a service—is an important factor in assessing coverage for some types of health services. Quality indicators cover a broad range of measures including the scope and completeness of interventions or programs, their effectiveness and efficiency, and their safety profile. Although often challenging to measure, best practice for quality indicators is measurement of performance in these categories against standards set by independent, international organizations. Impact indicators primarily include disease incidence and prevalence, measurable by traditional epidemiological tools and mathematical modelling, but may also include prevalence of disease risk behaviors (e.g., sharing of drug-injecting equipment, consistent condom use; World Health Organization et al. 2009).

There has been growing recognition that monitoring the success of programs should be performance-based rather than resource-based (i.e., measures of success should consider the differing levels of resources in different settings). Increasingly, international donors have been monitoring indicators for performance and requiring evidence of progress as a part of the application process for extended or renewed funding. For example, the Global Fund to Fight AIDS, Tuberculosis and Malaria (hereafter the Global Fund) began requiring information on progress toward achieving performance-based indicators in order to drive accountability and transparency by grant recipients and to inform future funding decisions.

In September 2003, at the International Conference on AIDS and STIs in Africa, representatives from Joint United Nations Programme on HIV/AIDS (UNAIDS), the Global Fund, attending African nations, and a variety of NGOs, funding agencies, and other organizations came to an agreement on three core principles for country-level HIV/AIDS responses. Called the “Three Ones,” these principles were

one, agreed-upon framework for coordinating all partners, one national coordinating authority with support from multiple sectors, and one comprehensive, country-level monitoring and evaluation system (Joint United Nations Programme on HIV/AIDS 2004). Achievement of the third of the "Three Ones" principles was expected, at the time, to be a significant challenge—countries' HIV M&E systems needed to meet the needs of the global community engaged in fighting HIV/AIDS, national and subnational stakeholders from multiple sectors, public health workers coordinating efforts "on the ground," and funding agencies, both domestic and international, looking to examine the returns on their investments. Furthermore, these M&E systems needed to be built, tested, and launched quickly, yet be robust enough to achieve their purpose, and at the same time be flexible, scalable, and adjustable so that they could meet the needs of the future as well. It was in this context that China embarked on its journey toward developing an M&E system for its HIV response.

23.2 China Begins to Develop an M&E System for Its HIV Response

In November 2003, China sent a contingent from the Chinese Center for Disease Control and Prevention (China CDC) to Bangkok, Thailand, to attend a workshop entitled "Strengthening Monitoring and Evaluation of National AIDS Programs in Asia," presented by UNAIDS, the US Agency for International Development (USAID), the World Health Organization (WHO), the World Bank, the Global Fund, the US Centers for Disease Control and Prevention (US CDC), and others. One of the primary objectives of the workshop was to get country representatives together with multiple international funding agencies to discuss coordination of the HIV response across the Asia region and to grow M&E capacity through the sharing of experiences, challenges, and plans. Although these workshops had already been held several times in Africa, leaders stressed that M&E systems needed to be tailored to the local context in order to successfully achieve their purpose and that there was no one-size-fits-all set of targets and indicators.

Although already halfway through two major initiatives, the China's Medium- and Long-Term Plan for AIDS Prevention and Control (1998–2010; Ministry of Health et al. 1998) and the First Five-Year Action Plan for the Containment and Control of HIV/AIDS (2001–2005; State Council 2001), China had announced its new "Four Frees and One Care" policy just a few months before this meeting, in September 2003 (State Council 2004) (see Chap. 18 for more information).

Furthermore, several international aid projects were underway already, and more were already on the horizon. Hence, while it was recognized that there was a need for detailed and high-quality information on the HIV response, China's HIV response itself was still in its infancy. As noted in a 2003 assessment of prevention, treatment, and care for HIV/AIDS in China jointly prepared by the Ministry of Health and the United Nations Theme Group on HIV/AIDS in China, there was yet "no overall plan for the gathering, storage and usage of HIV/AIDS information"

(Ministry of Health and the United Nations Theme Group on HIV/AIDS in China 2003). Thus, a strategy for the development of an HIV M&E system that would standardize data collection, storage, audit, analysis, and exchange and that would simultaneously be tailored to the unique needs of China as well as meet the needs of the international community had become a high priority (see Chap. 20 for more information).

At the Bangkok workshop, China CDC representatives sought to operationalize an M&E system based on five core principles: (1) the system needed to be practical, realistic, and simple; (2) each province was responsible for quality assurance with higher-level, centralized verification; (3) focus needed to be placed on prioritization of indicators; (4) epidemic areas needed to be identified; and, finally, (5) multiple sectors needed to be involved. At the start of the workshop, attendees from China CDC had a draft of 10 core, and 14 additional, indicators to share with the group, seek feedback on, and further evaluate based on learning from the workshop (Fig. 23.1).

At the conclusion of the Bangkok workshop, attendees from the China CDC had created a 12-month action plan that included six high-level activities: (1) formation of M&E teams to do the work of M&E plan development and coordination, (2) development of an M&E information management system, (3) strengthening of case reporting activities and sentinel surveillance systems, (4) initiation of

Draft "Core" Indicators	
1	Making and implementing policy, planning, law, and regulation, etc.
2	Leading and organizing for AIDS control
3	Government funding
4	Media campaigns on prevention and voluntary blood donation
5	Awareness of HIV/AIDS and HIV/AIDS prevention knowledge
6	Information, education, communication, and intervention
7	Construction and monitoring mechanism for blood collection and supply facilities
8	HIV screening
9	Treatment and care capacity for people living with HIV (PLWH)
10	Surveillance and testing capacity

Draft "Additional" Indicators	
1	Voluntary blood donation rate
2	Condom use among commercial sex workers in entertainment establishments
3	Needle sharing and condom use among people who inject drugs (PWID)
4	Sample collection in provincial sentinel surveillance sites
5	Timely reporting from provincial sentinel surveillance sites
6	Number of communities carrying out comprehensive treatment and care
7	Surveillance of disinfection in medical institutions
8	Reporting mechanism for "crackdowns" on illegal blood collection and supply
9	Filing of case management forms for PLWH
10	Measures for prevention of mother-to-child transmission (PMTCT)
11	Medical staff training on common and professional knowledge
12	Standard STI treatment
13	HIV screening laboratories
14	Acceptability of community environment to PLWH

Fig. 23.1 Draft core and additional indicators presented by the China CDC at the "Strengthening Monitoring and Evaluation of National AIDS Programs in Asia" workshop in Bangkok, Thailand, in November 2003

behavioral surveillance among key populations, (5) implementation of M&E training and capacity building, and (6) encouragement of community participation as well as participation by PLWH.

By the end of 2003, the M&E plan was not completely centralized—program cites still developed their own plans with assistance from expert groups, monthly and quarterly reports were generated, and progress toward targets was generally self-assessed. Furthermore, the importance of tying indicators to performance was not mentioned among official China CDC documents, perhaps because China's efforts toward curbing the HIV epidemic were too new to detect change. However, there were subtle hints that China's HIV programs would be judged by their impact and that stakeholders would be held accountable for generating success. For example, in a directive on HIV/AIDS in 2003, Premier Wen Jiabao stated (Shen and Yu 2005):

> *A responsibility system, strategic planning, monitoring and supervision, capacity building of professional teams, technical measures and management by laws must be strengthened. Meanwhile, successful experiences should be summarized. Only in this way can we realize the true objective of HIV prevention and control, which is relevant to the fundamental interests of the people.*

Furthermore, State Council documents that described national HIV response policy at that time explicitly stated that those leading HIV response efforts would be held accountable for their actions through annual evaluations of their job performance and that those who engaged in irresponsible conduct would be punished (Shen and Yu 2005) (see Chap. 18 for more information).

23.3 International Donors Influence Performance-Based M&E in China

In 2004, several international agencies launched efforts aimed at increasing the capacity of the Chinese Government's HIV response. Principal among these was the Global Fund, and the China CDC was the largest recipient of grant moneys worldwide in the 2000s. Over a 10-year engagement, from 2004 to 2014, the Global Fund appropriated over 320 million USD to HIV response activities in China. Although the Global Fund was ready to begin deploying funds as early as 2002, China was not ready, both politically and ideologically, to meet the Global Fund's requirements for transparency, inclusiveness, destigmatization, and community (i.e., civil society) participation (Huang and Ping 2014). Before 2003, China was largely in denial of its HIV epidemic, and societal stigma and discrimination against PLWH and their families was common and severe (Huang 2005). Participation of civil society in the fight against HIV/AIDS was minimal at this time, and Chinese Government power was substantial and focused on suppressing behaviors deemed undesirable. Not surprisingly, harm reduction was still very controversial in China during this time—giving condoms to sex workers or offering clean needles to drug users was viewed as supporting illegal activity. Thus, China CDC's first application to the Global

Fund in 2002, for grants to support HIV prevention programs for drug users, was rejected partly because it lacked a harm reduction component (Huang and Ping 2014).

However, beginning in late 2003, sweeping political changes occurred at the highest levels of China's government, and national HIV response policy took a major turn for the better with the announcement in December of that year of the "Four Frees and One Care" policy. Additionally, China tackled the outbreak of severe acute respiratory syndrome (SARS) virus quickly and effectively in 2003, which gave the international community new confidence in China's public health response capabilities. And finally, China's eagerness to compete for, and win, Global Fund grants to help with the costs associated with implementing and scaling up a range of initiatives also contributed to major changes in the way it was willing to conduct its HIV response efforts (Minghui et al. 2015). China adapted to global norms and included harm reduction objectives when applying for the fourth round of Global Fund grants in 2004. Hence, the Global Fund's involvement in HIV/AIDS programs in China began in September 2004, with a first phase that boosted the China CARES program, which was just getting off the ground at that time (see Chap. 25 for more information).

This first award of 11 million USD from the Global Fund to finance the China CARES program helped to shape many of China's HIV/AIDS program indicators. Pre-Global Fund China CARES targets and indicators differed from Global Fund targets and indicators (Table 23.1). As an example of how targets and indicators changed with Global Fund involvement, in the area of prevention and treatment, a pre-Global Fund target of 90% of PLWH receiving free antiretroviral therapy (ART) measured by an indicator of the rate of ART coverage for eligible AIDS patients evolved into a post-Global Fund target of universal access measured by an indicator of the proportion of adults and children with HIV still alive 12 months after ART initiation.

Minghui and colleagues described the important, yet difficult-to-quantify, effect of the Global Fund's involvement in China's HIV response (Minghui et al. 2015):

> *The way China's leaders think about development has progressed, making the public health system more transparent, open, and accountable. This quantum advance in governance derived partly from procedural and reporting requirements that came with China's alliance to the Global Fund.*

However, the influence of international donors on target setting and monitoring of performance against those targets did have some drawbacks. Projects often collected similar information, but the information could not be shared because of different definitions and coding used by different funding agencies. Staff were inundated with paperwork. And, with an increasingly fragmented system attempting to meet the needs of so many different M&E requirements, it was difficult to grasp the true, overall performance of China's HIV programs. In this way, the national HIV response was weakened and slowed by the involvement of so many international donors (Wu et al. 2011).

Table 23.1 Comparison of targets and indicators used by the China CARES program beginning in 2003 and targets and indicators decided on for the Global Fund grants supporting the China CARES program beginning in 2004

	China CARES (beginning in 2003)		The Global Fund (beginning in 2004)	
Area	Target	Indicator	Target	Indicator
Social care and support	100% of AIDS orphans receive free education	Proportion of AIDS orphans who received free education (%)	Care and support for families and communities affected	Number of PLWH and their families receiving care and support and on social welfare (*N*)
Awareness, education, and community involvement	Increase health education among general population and those at risk for HIV	Rate of accurate HIV knowledge among PWID, female sex workers (FSW), and men who have sex with men (MSM) (%)	Promote awareness, acceptance, commitment, and involvement regarding HIV/AIDS among political leaders at all levels, the public, and affected communities	(1) Number of project activities with active involvement of nongovernmental organizations (NGOs)/multi-sector institutions and departments (*N*) (2) Number of middle schools with at least one teacher who has been trained in participatory life skills-based HIV/AIDS education who taught it during the last academic year (*N*)
HIV prevention and treatment	(1) 90% of PLWH receive free ART (2) Free voluntary counseling and testing (VCT) nationwide (3) At least one methadone maintenance treatment (MMT) clinic or needle-exchange site established where HIV is prevalent among drug users	Rate of ART coverage for AIDS patients who are ART eligible (%)	Enlarging universal access to HIV/AIDS prevention, treatment, and care to achieve universal access to high-risk populations and PLWH	(1) Proportion of FSW living with HIV (%) (2) Proportion of PWID living with HIV (%) (3) Proportion of MSM living with HIV (%) (4) Proportion of adults and children with HIV still alive 12 months after ART initiation (%) (5) Proportion of PWID reporting using sterile injecting equipment in the last month (%) (6) Proportion of men reporting the use of condoms the last time they had anal sex with a male partner (%)

23.4 China's Second Five-Year Action Plan Helps Launch HIV M&E

In early 2006, China launched its Second Five-Year Action Plan for the Containment and Control of HIV/AIDS (2006–2010; State Council 2006). The plan, as described by Rou and colleagues, "called for multi-sectorial cooperation in the HIV response, including all of society, and emphasized the importance of prevention programmes and their monitoring and evaluation" and included "specific work goals and indicators according to practical measurements" (Rou et al. 2010) (see Chap. 18 for more information).

To assess the impact of this increased government support, specific targets were developed. The aim was to create a performance-based approach to monitor the progress of large-scale, government-driven HIV programs. Setting targets and determining indicators to measure progress against those targets was viewed as means to make national HIV/AIDS program spending more efficient on two levels. First, on a national level, it would provide evidence for key policy and budgetary decision-making processes. Second, on a local level, it would facilitate the internal performance management of health agencies. Initially, indicators served as a tool for assessing the progress of program implementation. Performance assessment against these targets was also especially helpful in setting goals and determining indicators for the following year.

23.4.1 Piloting M&E

The next step toward M&E for China's HIV response was to conduct a pilot. Therefore, in 2006, the National Center for AIDS/STD Control and Prevention (NCAIDS) of the China CDC selected two indicators—open 300 community-based MMT clinics and enroll a cumulative total of at least 30,000 PLWH in the National Free ART Program by the end of 2006 (Liu et al. 2010). Both these targets were met. This quick, early success demonstrated to authorities that setting targets and collecting data to measure performance against those targets could effectively promote the implementation of HIV/AIDS programs. They were convinced. And, since the beginning of 2007, NCAIDS has annually set incremental, realistic, quantitative targets for performance and used those targets to hold implementers of China's national HIV/AIDS programs accountable for their work (Liu et al. 2010).

23.4.2 Accountability for M&E

NCAIDS, China CDC, was leading the way for HIV M&E, and thus, it made sense that accountability was assigned to leaders within this organization. So, for ease and convenience, the different indicators were quickly categorized and assigned based on the organizational structure of NCAIDS—the directors of each technical

division were held accountable for indicators that fell within their department. Early each year, specific indicators and targets for each division were written into a contract, which was then signed by the director of NCAIDS and the directors of each of the technical divisions. At the end of year, an external review panel, consisting of NCAIDS retirees (emeritus professors), China CDC experts, and academics from the School of Public Health at Beijing University, and clinicians from Peking Union Hospital, was invited to judge the performance of each division against their agreed-upon targets (Liu et al. 2010).

Accountability for achieving each target was also assigned to each province. At the beginning of each year, representatives from all provincial-level administrative regions attended a national annual working meeting to review the prior year's performance and to set new targets for the current year. A ranking system was used—the top five provinces were awarded a National AIDS Program Quality Performance Medal, while the bottom several provinces were required to improve their performance for the next year (Liu et al. 2010). For the following year, provincial and local leaders aimed to implement the best practices of top-performing provinces. This innovative approach helped enabled the staff responsible for program implementation to carry out their daily missions in a way that made their targets more achievable.

Additionally, NCAIDS carries out regular field visits and supervision activities, which serve to remind local CDC staff of their accountability for the year's targets. These visits and activities are usually led by the NCAIDS technical directors, but occasionally the responsible chief of HIV/AIDS Division at the National Health Commission is invited to facilitate coordination for HIV/AIDS programs across different sectors. In August and September of each year, NCAIDS also organizes monitoring activities to supervise the data quality assurance activities of at least three provinces. This monitoring aims to guarantee the authenticity of field work and reliability of the data it generates.

23.4.3 Data Collection to Support M&E

Early in this process of building an M&E system for China's HIV response, data collection, storage, extraction, and use were a very laborious process. Among a myriad of issues, systems were fragmented, data collection forms had both gaps and overlaps, and data fields were not standardized, making it difficult to use existing data with confidence. However, in 2008, China's National HIV/AIDS Comprehensive Response Information Management System (CRIMS) was launched. This system integrated eight previously existing systems and one new system; standardized data collection; moved it to a real-time, web-based platform; and provided a user-friendly interface where data entry and extraction were simple and fast. This new tool dramatically changed the information landscape for China's HIV response and helped the HIV epidemic and response M&E effort to take a huge leap forward (Mao et al. 2010) (see Chap. 24 for more information).

23.5 Scale-Up and Continuous Improvement of China's HIV M&E System

Scaling up M&E after successfully piloting the targets and indicators for MMT and ART programs in 2006 meant selecting additional targets and indicators to include for 2007. However, the selection of targets and indicators for 2007 and onward actually took place over a several-year time frame based on using a continuous improvement approach. National guidelines such as the Framework for Monitoring and Evaluation of China's National AIDS Program (State Council AIDS Working Committee 2007) as well as international guidelines and indicators developed by the United Nations General Assembly Special Session on HIV/AIDS (UNGASS; United Nations General Assembly Special Session on HIV/AIDS 2005; Warner-Smith et al. 2009), the Global Fund (the Global Fund to Fight AIDS, Tuberculosis and Malaria 2009), and WHO (World Health Organization et al. 2009) were considered. The selection of indicators also took into account input from NCAIDS technical directors and experts from other technical agencies, as well as comments made during presentations and discussions of the prior year's performance during the external panel's review of performance. Furthermore, indicators and targets were directly linked to the strategic objectives assigned to different levels of health agencies.

23.5.1 M&E from 2007 Through 2009

Old core indicators were carried forward into 2007, and new core indicators were introduced (Table 23.2; Liu et al. 2010). All targets and indicators fell into categories of availability, coverage, quality, and impact.

23.5.2 M&E from 2010 Onward

Over time, China's indicators became more consistent, sensitive to the changing epidemic, and more mature. The data required to measure performance against them also improved over time as CRIMS, which was launched in 2008, began to contain more and better-quality data covering a more comprehensive expanse of information required (Mao et al. 2010). Targets also became more ambitious. As China's national HIV response program matured, technical expertise grew, and consistent and adequate funding continued to be applied, NCAIDS leaders and technical directors became more focused and confident in what the health system, the public health system, the CDC network, and partnering NGOs and community-based organizations (CBOs) could achieve. Thus, annual achievements against those ever-more-ambitious targets were able to keep pace.

One example is the scale-up of the National Free ART Program. Annual indicators related to improvement of ART coverage included, for example, the cumulative number of PLWH on ART, the total number of PLWH currently on ART, and the

Table 23.2 Core indicators used from 2007 through 2009

	Year indicator used		
Core indicator	2007	2008	2009
Proportion of newly identified HIV/AIDS cases investigated epidemiologically	●	●	●
Proportion of newly identified HIV/AIDS cases reported in a time manner	●	●	
Proportion of newly screened HIV cases being notified and counseled in a timely manner (no waiting for confirmation)		●	
Proportion of PLWH (not including AIDS cases) who received regular visits by public health workers and intervention at least once per year	●	●	●
Proportion of spouses/regular sex partners of newly reported HIV/AIDS cases tested for HIV		●	●
Proportion of spouses/regular sex partners of previously reported HIV/AIDS cases tested for HIV		●	●
Proportion of people living with AIDS who received regular visits by public health workers and intervention at least once		●	●
Proportion of PLWH (not including AIDS cases) whose CD4 counts were monitored at least once a year to determine ART eligibility	●	●	●
Proportion of patients receiving ART who were monitored for CD4 count at least once a year to determine treatment effectiveness		●	●
Total number of the patients who received ART	●	●	●
Total number of the patients currently receiving ART	●	●	●
Proportion of patients on ART who survived and remained in treatment for 12 months	●	●	●
Proportion of children with AIDS receiving ART	●		
Proportion of patients receiving ART who were monitored for viral load (VL) at least once a year to monitor treatment failure		●	●
Proportion of ART-naïve patients whose VL has been inhibited during the first 6–12 months of treatment		●	
Total number of patients who have received MMT	●	●	●
Total number of patients currently receiving MMT	●	●	●
Annual retention rate of patients in MMT	●	●	●
Proportion of FSW receiving HIV/STI intervention measures	●	●	●
Proportion of MSM receiving intervention measures		●	●

Table adapted with permission from Liu et al. (2010)

proportion of PLWH on ART who remained on ART and survived 12 months. As ART coverage (i.e., the proportion of ART-eligible PLWH who were on ART) grew, mortality among PLWH fell (Fig. 23.2; Pisani and Wu 2017).

Another example of how indicators have changed over time and of how targets have become more ambitious is the UNAIDS 90-90-90 targets, which were set out in 2014. These targets were meant to cause a refocusing of efforts and a swell of momentum for the further expansion of treatment on a global scale. The targets are 90% of all PLWH know their status, 90% of all diagnosed PLWH are on treatment, and 90% of all PLWH on treatment achieve viral suppression by 2020 (Joint United Nations Programme on HIV/AIDS 2014). China retrospectively examined its performance against these targets (Fig. 23.3; Ma et al. 2018) and decided to incorporate

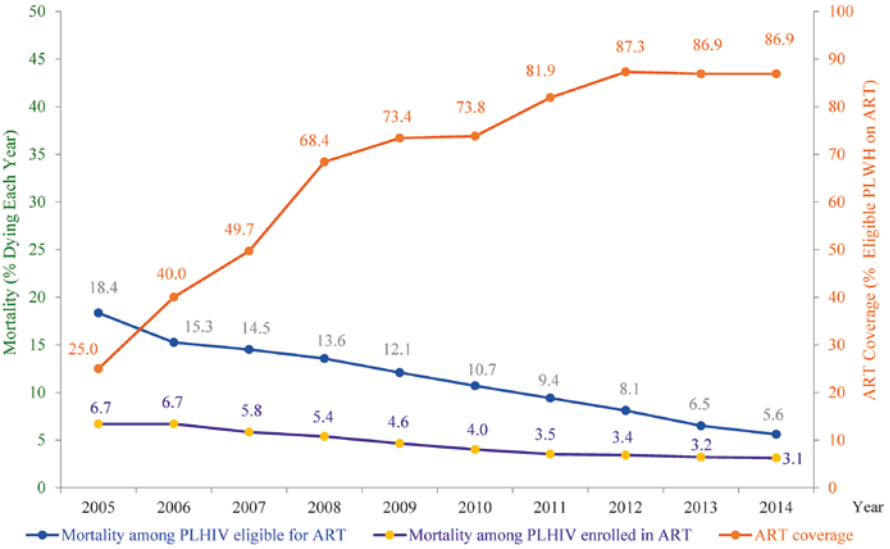

Fig. 23.2 ART coverage compared with mortality rates among PLWH in China, 2005–2014. Figure adapted from Pisani and Wu (2017)

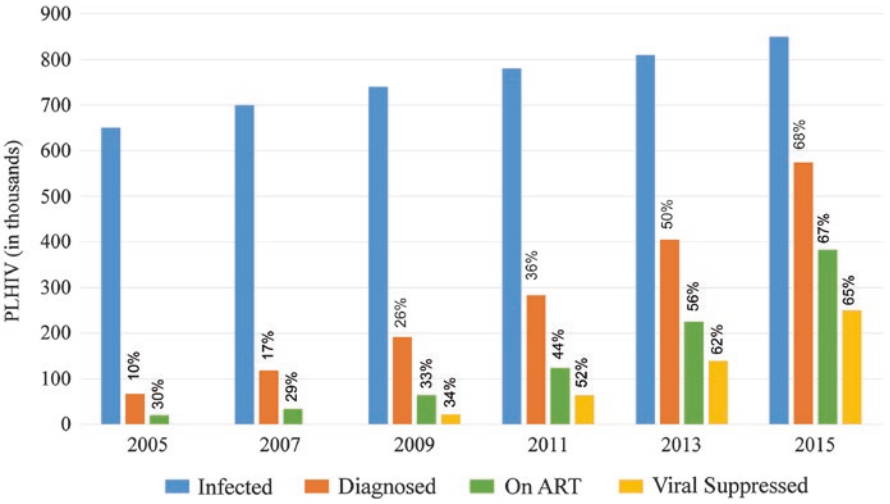

Fig. 23.3 Biennial performance of China's HIV care cascade, 2005–2014. Bars denote the number of PLWH infected (estimated), diagnosed, on ART, and virally suppressed. Percentages were calculated as the number achieving the step (numerator) divided by the number in the previous step (denominator). Figure adapted from Ma et al. (2018)

the 90-90-90 targets, as a national strategy, into its 13th Five-Year Action Plan for the Containment and Control of HIV/AIDS (2016–2020; State Council 2017).

23.6 Conclusion

Developing meaningful indicators and setting annual targets for performance against those indicators has been crucial for motivating implementers to do the work of scaling up massive HIV response programs at local levels nationwide. The monitoring and accountability framework built around this M&E system has rigorously and successfully tracked HIV response program inputs, processes, outputs, outcomes, and impacts. Monitoring progress against priorities has emphasized the need to focus tactical work at the local level on national strategic objectives. More importantly, annual activities around HIV response M&E have become institutionalized—it is now routine work accepted as the norm in China's public health institutions. This supports China's goal of eventual elimination of HIV/AIDS and sets the nation up for success into the future, when the next major public health challenge appears.

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The Comprehensive Response Information Management System

24

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Abstract

Early in China's HIV/AIDS response, many separate data collection and information management systems arose to meet the needs of different programs and stakeholders. The data were not standardized across systems, and there were both gaps and redundancies between systems, limiting the value of the information. Meanwhile, inefficiencies were rapidly growing. Thus, a massive project was undertaken to create China's National HIV/AIDS Comprehensive Response Information Management System (CRIMS), the largest HIV information system in the world. CRIMS is an integrated, web-based system for real-time collection and reporting that facilitates timely monitoring and evaluation of all aspects of China's HIV epidemic. CRIMS, through its automatic alert functionality, real-time updates, database integrity controls, and easy accessibility of both raw data and summary statistics, has made a major contribution to the prevention and control of HIV in China. Data generated from the system have been used to support the implementation of large-scale national-level HIV prevention programs and modification of testing and treatment protocols nationwide. It has provided scientific evidence for HIV-related policy decisions at all levels, national, provincial, and even down to individual counties, towns, and villages. Furthermore, CRIMS has contributed immensely to the conduct of critical HIV research.

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24.1 Introduction

It is not possible to plan an effective epidemic response, or to measure the success of that response, without knowing who is infected, who is likely to be at risk for infection, and which services they are receiving. Thus, infectious disease information management systems are essential to disease prevention and control initiatives. In the face of a complicated, changing, and poorly understood epidemic, China's health and public health officials, research community, and government policymakers increasingly sought more, and more credible, information upon which they could develop pragmatic approaches to a comprehensive HIV/AIDS response. However, by 2005, the somewhat chaotic and certainly uncoordinated collection of epidemic-related data that were not standardized and often delayed had become untenable. The development of a nationwide comprehensive information management system that provides timely data and supports disease detection and management was a pivotal step in helping China plan the response to HIV/AIDS more effectively (Mao et al. 2010). Here, we describe in greater detail the development and use of China's National HIV/AIDS Comprehensive Response Information Management System (CRIMS).

24.2 Developing CRIMS

24.2.1 Creating Order from Unstructured Data

Due to the complex and dynamic nature of China's HIV epidemic, the demand for data has been enormous. Timely and accurate data that is properly analyzed to yield important and actionable information is crucial for government agencies to better understand and monitor the epidemic and make decisions and formulate policy regarding HIV prevention, testing, treatment, and care. International aid organizations also requested, and often required, data to monitor and evaluate the programs they were funding. Finally, a myriad of other stakeholders including nongovernmental organizations (NGOs), private companies, and research institutions were both generating and using data (Mao et al. 2010).

The voracious appetite for data of all these different stakeholders led to the establishment of multiple, separate systems for collecting HIV-related information. China CARES, the Global Fund's China AIDS Project, the China–UK AIDS Project, and the World Bank's 9th Health Loan Project, as well as the National Center for AIDS/STD Control and Prevention (NCAIDS) at the Chinese Center for Disease Control and Prevention (China CDC), were just a few of the main actors who were collecting, maintaining, and using HIV epidemic data in China. For example, the following eight different national routine data collection systems were co-managed by multiple technical divisions just within NCAIDS:

- The HIV/AIDS case reporting system
- The HIV testing and counseling system
- The HIV sentinel surveillance system
- The HIV behavioral surveillance system
- The antiretroviral therapy (ART) for adults system
- The ART for children system
- The behavioral interventions for high-risk groups system
- The methadone maintenance treatment (MMT) system

These and the many other systems were simultaneously overlapping and incomplete in data between systems—some data were redundantly collected and stored in multiple systems, and some important data were not collected at all by any system. Duplicate requests for data and submission of data on different forms to different systems created heavy workloads for field staff. The diversity of data sources and data collection methodologies across subsystems led to problems in comparing the data over time, across geographical areas, and between systems. Substantial amounts of data were collected but seldom analyzed and rarely shared. More importantly, there was no mechanism in place to provide data quality assurance. Thus, the quality, timelines, and usefulness of the data were declining, and the inefficiencies of redundantly collecting, entering, and maintaining in multiple systems were growing fast (Mao et al. 2010).

For example, demographic and health data on individuals who tested positive for HIV, along with follow-up information on confirmed cases, were completed by hand and faxed or mailed up the hierarchical reporting chain. Local HIV sentinel and behavioral surveillance sites had to send encrypted sentinel surveillance data and behavioral surveillance survey information separately by email to NCAIDS. Local health and public health workers had to fill out one counseling questionnaire and a separate testing questionnaire for each individual who accessed voluntary counseling and testing (VCT) services and complete paper quarterly reporting forms that were submitted via mail or email to provincial CDCs. Provincial aggregated forms were then submitted to the central CDC. Each county submitted behavioral intervention information via email on a quarterly basis using spreadsheets. Data were aggregated at the provincial level, and aggregated provincial forms were then eventually sent to NCAIDS.

By 2005, the need for an integrated system was finally recognized, and the creation of what is now CRIMS was made a top priority.

24.2.2 Stepwise Unification of Multiple Databases

The difficult task of integrating all eight databases into a single system that would comprehensively meet the needs of all stakeholders (internal and external) and multiple user groups began in January 2006 and proceeded in four phases over the course of more than 2 years (Mao et al. 2010).

24.2.2.1 Phase 1: Identifying Information to Be Included in the Integrated System

This important phase of the project—deciding what data to collect and what data not to collect—began in January 2006. A large team of technical professionals from NCAIDS and from the China offices of the Joint United Nations Programme on HIV/AIDS (UNAIDS), the World Health Organization (WHO), and the US CDC Global AIDS Program (GAP) worked together to evaluate all questionnaires and forms used by the eight above-listed existing national routine reporting systems as well as those from all major bilateral and international HIV/AIDS programs. Also evaluated during this phase were all indicators established by the United Nations General Assembly Special Session on HIV/AIDS (UNGASS), the WHO Strategic Information Framework, and the Chinese Central Government's national framework for HIV/AIDS monitoring and evaluation (M&E). The technical team needed to ensure that the new system would collect all data required to evaluate China's HIV/AIDS response against these indicators so that international and domestic reporting commitments would be met (Mao et al. 2010).

Once this first exercise was completed, draft forms were evaluated field by field to ensure all data collected were necessary (i.e., no redundancies) and that the dataset the forms would generate would be sufficient (i.e., no gaps). Furthermore, the team considered the reasonableness of the volume of data to be collected and the workload this data collection effort would place on public health staff to further ensure all fields in the draft forms had value and the collection of data for those fields was feasible. Finally, labels or identifiers for each data field were reviewed to ensure relevance, usability, and clarity (Mao et al. 2010).

24.2.2.2 Phase 2: Usability Testing of Data Collection Forms

Draft data collection forms were pilot tested in provinces with substantial HIV/AIDS burden (i.e., Yunnan, Henan, and Anhui). Firstly, forms were evaluated for user-friendliness. The team sought to understand from user groups how easy/difficult the forms were to use and were they simple and intuitive enough. Secondly, the team aimed to evaluate the accuracy of data provided by users of the forms as a means of understanding their ability to use them properly. Thirdly, the team sought to understand the operational feasibility of the forms, meaning how well do the data collection forms function to collect the data that is actually required. Finally, the team elicited feedback on the appropriateness of the formatting of data collection forms. User groups involved in these pilot usability tests included local health and public health workers and CDC staff at county, provincial, and national levels (Mao et al. 2010).

The technical team as well as public health specialists from the China CDC and officials from the Ministry of Health reviewed the results of the studies, and data collection forms were revised based on findings. The revised forms were then compiled into a guidance document entitled "Information Management for Comprehensive HIV/AIDS Prevention and Control." The document included all forms, definitions of variables and key terms, and descriptions of data required in each form field. Reporting frequencies and accountable reporting organizations for

each form were decided and also included in the guidance document. This project phase was completed by December 2006 (Mao et al. 2010).

24.2.2.3 Phase 3: Creating Software to Facilitate Web-Based Data Entry and Management

NCAIDS subcontracted the software development work for the integrated information system to Sinosoft, Inc., and beginning in January 2007, NCAIDS and Sinosoft worked together to create an Internet-based platform to host the new system. The new, unified, web-based system integrated the eight existing systems into CRIMS. Two of these eight original systems were combined—the sentinel surveillance system and the behavioral surveillance system became the sentinel and behavioral surveillance subsystem. Also, one new subsystem was created—the demographic information subsystem contained contextual information at the county level including population demographic data, infrastructure information, and estimated sizes of high-risk groups and numbers of venues that may be of interest for HIV prevention work. Thus, CRIMS contained a total of eight subsystems when integration and software development were completed in October 2007 (Fig. 24.1; Mao et al. 2010).

Aside from basic structuring of the information management system and the functioning of data entry via forms, several other features were designed into the CRIMS software. For example, layered authorization levels were created to ensure data security (i.e., handling of raw data may only be performed by authorized individuals, and these individuals may only handle raw data under their jurisdiction). As another example, summary statistical functions were created to allow both real-time and scheduled periodic reports to be generated from the data contained within the system, facilitating the continuous monitoring of system indicators (e.g., data collection, system function) as well as HIV epidemic indicators (e.g., new cases, new treatment starts; Mao et al. 2010).

24.2.2.4 Phase 4: Pilot Testing the New Software

Pilot testing began in November 2007 among user groups similar to those involved in usability testing of data entry forms. Test cases were created by trained personnel from the software company and executed systematically, and automated statistical reports were also verified via separate analysis using SPSS and SAS statistical software packages and validated via review by report user groups (e.g., public health researchers, specialists, and officials). All results were summarized in a final system validation report.

Several upgrades were made because of findings from pilot testing. Firstly, the user interface was optimized to improve user experience, particularly with respect to speed, ease, and convenience of data entry. Secondly, automated checks were added to ensure logical relationships between data entered in different fields. For example, entry of a date of confirmation of HIV infection that is prior to the date of initial HIV screening caused an error that was required to be corrected. Thirdly, automated skip patterns were included to effectively hide fields that could be skipped by the user based on data entered in prior fields, and connections between

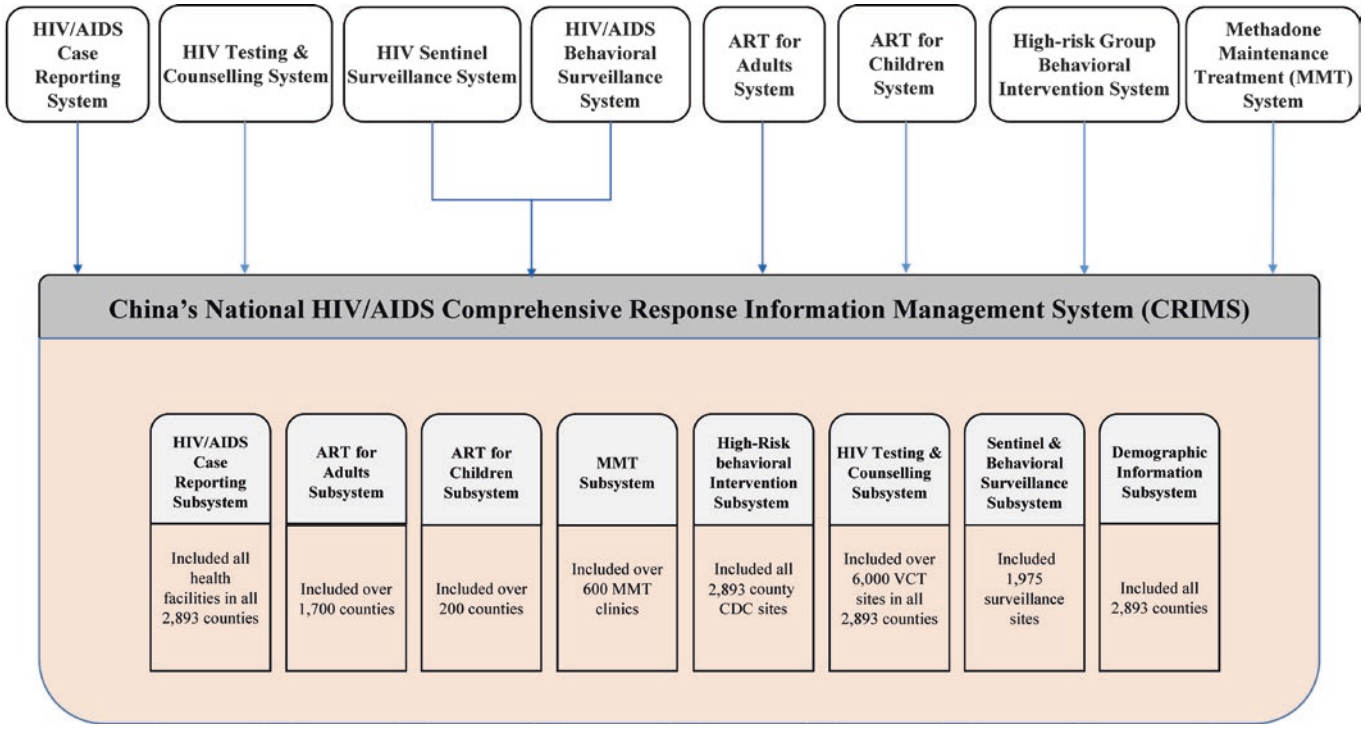

Fig. 24.1 The structure of CRIMS, China's National HIV/AIDS Comprehensive Response Information Management System. The schematic shows the original eight independent information systems that were co-managed by different NCAIDS departments prior to 2007 and integrated into CRIMS in 2007. Six of the original systems became subsystems within CRIMS, while two of the original systems (sentinel surveillance and behavioral surveillance) were combined to form a single subsystem (sentinel and behavioral surveillance), and one new subsystem was created (demographic information). Figure adapted with permission from Mao et al. (2010)

subsystems were made more obvious, faster, and more robust. For example, entering a positive HIV test result in the HIV testing and counseling subsystem elicits a notification telling the user that they must then also input additional required data in the HIV/AIDS case reporting subsystem. Finally, software enhancements allowing the off-line entry of data into five of the eight subsystems (i.e., ART for adults, ART for children, MMT, HIV testing and counseling, and sentinel and behavioral surveillance) were added to mitigate risk of Internet outages that were still periodically being experienced in some Chinese regions.

24.2.3 Launch and Early Evaluation

CRIMS was launched on January 1, 2008. In its first year of operation alone, 45,572 new HIV case records were created. Additionally, more than 260,000 case follow-up records were created, over 15,000 new adult ART and over 300 pediatric ART patient records were created, more than 81,000 new MMT client records were created, and over 1.7 million visits to VCT sites were recorded. The dramatically streamlined processes for data entry, management, analysis, searching/querying, quality checking, and security that CRIMS facilitated completely revolutionized China's HIV/AIDS response and the day-to-day work of health and public health workers in China (Mao et al. 2010).

Once CRIMS had been in operation for approximately 2 years, an informal evaluation was conducted based on US CDC guidelines for evaluation of surveillance systems (German et al. 2001). Ten system attributes were targeted: simplicity, flexibility, data quality, acceptability, sensitivity (both case reporting and outbreak detection), representativeness, timeliness, stability, and security. The main finding was that the development and use of CRIMS met expectations for all these core attributes (Mao et al. 2010).

24.3 Reporting Structure

On launch of CRIMS, the reporting structure for HIV-related information changed significantly (Fig. 24.2).

Although county-level medical facilities and CDC sites remained the primary source of HIV epidemiological information, all confirmed cases of HIV infection diagnosed by hospitals and CDCs were required to be reported through CRIMS to NCAIDS. Improving upon the previous hierarchical reporting framework, the web-based reporting system provided functionality for direct reporting of new HIV cases to the centralized database. Once a case is entered into the system, personnel at all levels of the CDC system, in accordance with their assigned access privileges, can acquire that data. For example, an authorized provincial-level health official from Yunnan can inspect data from every county and prefecture in Yunnan, but not see data from Sichuan, while an official from Yunnan's Ruili county is only able to see data from Ruili. At the national level, properly authorized personnel have

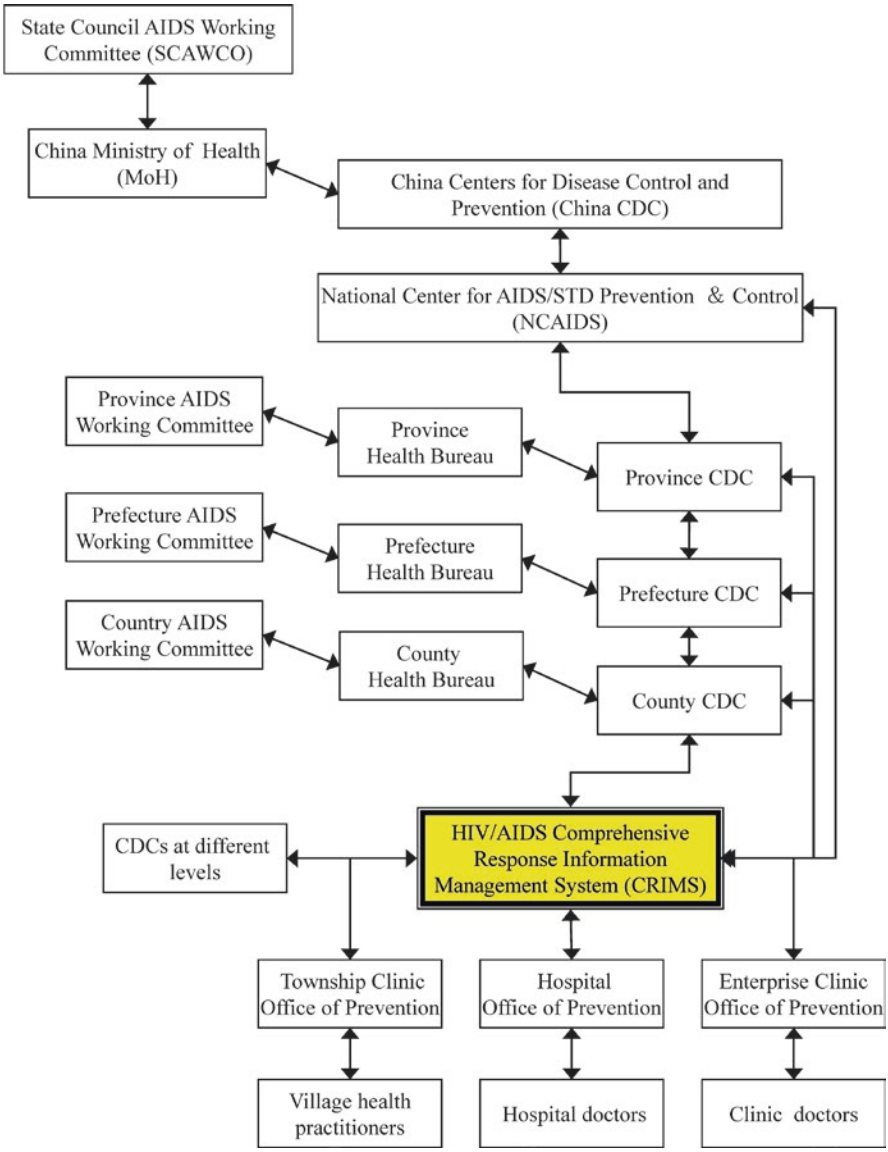

Fig. 24.2 Reporting structure of CRIMS. Figure reproduced with permission from Mao et al. (2010)

immediate access to data entered at every level—they no longer wait for data to pass through the lengthy reporting hierarchy, which substantially reduced reporting delays.

In addition to their responsibility to authenticate disease information in their administrative regions, municipal and provincial CDCs are required to report to their corresponding health authorities. At the top of the hierarchy, NCAIDS is

responsible for overseeing the extraction and analysis of all relevant HIV disease information and presenting it to the Chinese Ministry of Health (now called the National Health Commission). The National Health Commission remains the only office permitted to disseminate official HIV/AIDS-related statistics to the public. It also designs prevention guidelines and intervention strategies based on surveillance reports provided by NCAIDS and enacts health policies.

24.4 Data Quality Assurance

Since CRIMS was designed to provide evidence for national-level decision-making relative to China's HIV/AIDS response and for evaluation of large-scale prevention and intervention programs, the quality of the data it contained needed to be maintained at a high level. Thus, statistical measures of reliability were strictly implemented and results periodically reported to ensure that data are of high enough quality to meet the needs of its users.

There are also automated controls over data entered into CRIMS to ensure a high level of data entry accuracy. For example, each subsystem was designed to identify and eliminate duplicate records, and record linkages were put in place to create unique identifiers for each case file. This all occurs as an automatic function of CRIMS that cannot be overridden or interfered with by users. Furthermore, the most important sources of data entry errors were identified up front during the design phase, and systems were then put in place within the CRIMS software to minimize these errors. To further minimize data entry errors, automated checks identify and flag out-of-range values at entry, prompting staff to immediately verify the values. For example, the system will flag an entry for a male patient identified during antenatal screening and will ask for verification of data entered for patients with active sexually transmitted infections who report consistent condom use. To avoid errors being introduced during data transfer or analysis, data retrieval methods are standardized and, where possible, automated.

Logical checks for internal consistency have been developed throughout the entire information management system. Data collected under separate subsystems that produce similar results—for example, levels of needle sharing among people who inject drugs collected in the sentinel and behavioral surveillance subsystem and in the high-risk behavioral intervention subsystem—are compared against each other for data validation. While some of these checks are automated, many are performed by specially trained data managers at NCAIDS.

Data managers provide detailed training in data analysis and interpretation to staff responsible for providing HIV care or for overseeing HIV-related prevention at all levels. They also monitor outliers and unexpected trends in the data and regularly review data queries from the field, ensuring that analyses are appropriate and identifying areas where additional training in data management or use is necessary.

In some cases, the results of rigorous data quality checking have signaled a need for urgent action. For example, in the early years of CRIMS implementation, data from a VCT site in Liangshan Prefecture, Sichuan province, indicated that over one-third of all attendees were testing HIV positive. Staff in Beijing quickly checked

other data from the same area and found that HIV prevalence among pregnant women was also unexpectedly high. This led to a site visit and the identification of an HIV outbreak linked to drug injection in the area. Extra prevention and care resources were quickly deployed in an attempt to reduce further transmission and to meet the needs of those infected. More rarely, routine cross-checks to ensure data quality and consistency within CRIMS have identified misreporting and other intentional errors. For example, CRIMS data managers regularly monitor the average consumption of methadone per client across close to 800 MMT clinics. On at least one occasion, they have identified a clinic reporting consumption many times the national average. When outliers such as this cannot be easily explained by local officials, onsite audits (including monitoring source records) will be carried out. In the specific case mentioned, the audit established illegal diversion of methadone by clinic staff, and appropriate action was quickly taken.

A detailed and comprehensive operation manual containing policies and procedures has been developed and is updated annually, and data managers and coordinators nationwide are regularly trained on its content. Their knowledge and practice are tested annually to ensure ongoing competence and compliance with database requirements. Whenever changes in system policies and procedures are implemented, training is provided.

24.5 Data Security

Patient confidentiality is a central concern in any health information system, and never more so than when dealing with socially stigmatized conditions such as HIV and drug use and when data are collected in small community settings. The confidentiality and security of data was a top priority when developing CRIMS. The system security plan, developed in compliance with the National Health Security Act, consists of documented policies and standards that relate to administrative procedures, physical safeguards, technical security mechanisms (including the use of data encryption and virtual private network tunnels for secure data transfer), electronic signatures, and detailed audit trails which allow all access to system data to be tracked. Individual records are de-identified, and case management and follow-up data are entered using a streamlined data entry template including a unique identifier for each patient. At each level, there is a single system manager authorized to provide new accounts for those authorized to access the system. Individual security clearances determine the level of access and the permitted actions for every authorized user. Most authorized staff can only access summary statistics, rather than individual patient data. No user can access the system without an encrypted digital certificate stored on a password-protected USB token, and all system use is carefully audited. The rules also detail the consequences associated with noncompliance. Intrusion detection and firewalls have been employed in healthcare facilities, with appropriate controls and rules in place to limit access to authorized users. Desktop systems are equipped with antivirus software, and servers run the most recent security patches.

24.6 Advantages and Limitations

24.6.1 Simplicity and Flexibility

One key advantage of CRIMS lies in its simplicity for those reporting data. Each reporting unit has clearly defined tasks and responsibilities. Data entry forms are auto-populated with site and other identifiers, reducing potential for user error and improving efficiency. Forms are standardized and consistent and displayed within an optimized user interface, making data entry fast, easy, and convenient. Data management has been simplified as well, with a robust search function available for many fields available to help retrieve desired data. Data sharing has been improved and made simple, which helps ensure that mobile or migrant patients can receive services from different locations. Data analysis has also been simplified as automated descriptive statistical reports are available within each subsystem. CRIMS was designed to have some flexibility to accommodate changes in priorities relative to information needs. For example, authorized provincial-level administrators can add data collection forms for specific projects (e.g., for new behavioral intervention programs). The software developer who helped design CRIMS can also support more substantial modifications to the operation of current subsystems as needed (Mao et al. 2010).

However, there is a trade-off or a balance that must be struck between simple and complex, flexible and rigid. CRIMS has some limitations as a result. With 2893 different counties (i.e., reporting units) inputting data, creating and updating hundreds of records on a daily basis in at least seven of the eight subsystems, the volume of data handled is astonishing. Furthermore, although data entry forms for some subsystems are simple (e.g., the HIV/AIDS case reporting system), others are more complex (e.g., ART for adults, ART for children, MMT). Similarly, in order to protect data quality and security, the system is quite rigid, creating limited system flexibility in many respects (Mao et al. 2010).

24.6.2 Timeliness

With the launch of CRIMS came huge improvements in the timeliness of data reporting, analysis, and use (Mao et al. 2010). China's HIV epidemic can now be monitored in real time, which has been a major advantage in the recent decade as HIV has spread to new risk groups, as sexual contact has become the primary mode of transmission, and as the milestone of one million infections is approaching.

24.6.3 Data Quality

Despite considerable controls and checks designed into the system, data quality was a major challenge in the early years after CRIMS was launched. For example, an internal investigation found that more than 12% of people diagnosed with HIV

infection had been lost to follow-up as of the end of 2008 because of incomplete case reporting records. These limitations in data quality have been recognized at the highest level and prioritized for improvement. Today, record completeness and data quality and validity are much improved over the early days of CRIMS. However, these old gaps in the CRIMS dataset continue to plague retrospective study of populations who received services, limiting the power of the wealth of information CRIMS contains (Mao et al. 2010).

24.6.4 System Stability

CRIMS is a very highly stable system, especially considering the volume of data it contains and the rate at which that dataset is expanding daily. Nevertheless, rare outages and a few occasions when too many authorized users were accessing data at the same time to meet reporting deadlines in the early days of CRIMS have kept focus and priority on ensuring system stability is maintained and even improved over time. For example, new backup and high-capacity servers have been added to ensure ongoing system stability (Mao et al. 2010).

24.6.5 Human Capacity

As the power of CRIMS became fully realized, the more limiting factor became human capacity. Identifying and following HIV cases must occur at the community level, yet community health and public health personnel are overburdened and under-trained. Given China's enormous population, there is a lack of skilled and experienced personnel at all levels of the public health system, which has become limiting. China's leaders must prioritize the training and deployment of more health and public health workers to improve coverage, particularly in remote and rural regions (Mao et al. 2010).

24.6.6 Limited Interoperability

Although the HIV/AIDS case reporting subsystem within CRIMS is connected to China's broader and much larger infectious disease monitoring system, the Chinese Disease Surveillance System (CDSS), CRIMS remains largely vertically integrated system. Linkages have not yet been made with other related infectious disease monitoring systems, such as those that monitor tuberculosis and hepatitis. This limitation is unfortunate as individuals with such co-infections need intensive follow-up and specialized care, and it remains difficult to ascertain who is and is not receiving these services (Mao et al. 2010).

24.7 Conclusion

From early 2006 to late 2007, NCAIDS, China CDC, and its partners undertook a massive effort to integrate eight different databases into a single, streamlined, interconnected, and secure information system called CRIMS. CRIMS was launched in January 2008 and immediately revolutionized data collection, management, analysis, and use in support of China's national HIV/AIDS epidemic response. Its power to support the monitoring and evaluation, in real time, of case reporting, surveillance, testing and counseling, treatment, harm reduction, and behavioral intervention, all in the context of local-level demographic and other contextual information, has changed the way China operates in response to infectious disease outbreaks and changes in existing epidemics. It has furthermore paved the way for more in-depth, powerful research, enabling development of informed policy and decision-making. While CRIMS will certainly serve as a model for future epidemic response data management solutions within China, it may also be used as a model for other countries.

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China's Comprehensive AIDS Response (China CARES)

25

Jiangping Sun and Marc Bulterys

Abstract

To explore effective HIV/AIDS prevention methods and expand coverage of HIV/AIDS prevention and control initiatives, the Chinese Central Government launched the China CARES program in 2003. China CARES was tasked with implementing national HIV/AIDS policy at the local community level but was given the freedom to work within a very flexible framework so that interventions and services could be tailored to meet the unique needs of the communities the China CARES sites served. Due to its success in bringing relevant prevention, testing, treatment, care, and support services to local communities, China CARES underwent three rounds of expansion, from 2003 to 2008, from 2009 to 2013, and then again from 2014 to 2018. Its impact has at the same time been measurable and immeasurable. Its success has been foundational to China's HIV/AIDS response, and it has become a model for China and the world.

25.1 Background

From the first case of HIV reported on the mainland in 1985 (Zeng et al. 1986), to the outbreak identified in 1989 among people who inject drugs (PWID) in Rural South Western Yunnan Province (Ma et al. 1990), to the much larger outbreak discovered in 1995 among poor plasma sellers in rural central China (Wu et al. 1995,

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2001), HIV came to China and spread quickly and stealthily (Wu et al. 2004; Wang 2007). By the time the millennium was coming to a close, these early cases of HIV infection were progressing into clinical AIDS. The very high rate of occurrence of AIDS-related illnesses and AIDS-related deaths in geographically concentrated areas caused panic among local people and caught the attention of the local and international media.

Meanwhile, HIV incidence began to increase among PWID, female sex workers (FSW), and men who have sex with men (MSM), and the proportion of all newly reported HIV cases acquired via sexual contact transmission routes increased from 5.5% in 1997 to 11% in 2002. By the end of June 2003, the cumulative number of HIV case reports had reached 45,092. Among them were 3532 AIDS cases and 1800 individuals who had died from HIV/AIDS-related causes (China Ministry of Health and UN Theme Group on HIV/AIDS in China 2003). Although still concentrated geographically in the southwest, HIV had spread to all 31 provincial-level administrative areas (i.e., provinces, autonomous regions, and municipalities) (see Chap. 1 for more information).

No treatment for HIV infection existed globally until 1996 and in China until 1999. However, when imported antiretroviral (ARV) drugs first came on the market in China, they were in very low supply and extremely expensive. Furthermore, very few Chinese physicians were familiar with how to use them, and hence, antiretroviral therapy (ART) got a very slow start in China. Before 2002, there was no organized ART program, and coverage was almost zero. People living with HIV (PLWH) had to seek out treatment mainly at large communicable disease hospitals in big cities. These patients had to pay full price for their ARV medications since they were not covered by Chinese Government medical benefits—a staggering 8000–10,000 RMB per person per year. Most with HIV infection at this time could not afford to travel much less the treatment (see Chap. 13 for more information).

The Chinese Government created a special fund for the HIV/AIDS response in 1996, with a first installment of 5 million RMB. By 2001, this special fund had increased to 100 million RMB. Then, the China State Council issued the "China's Mid- and Long-Term Plan for HIV/AIDS Prevention and Control (1998–2010)," which required that HIV/AIDS prevention work be led by the government with multi-sector cooperation and participation of the whole of society (State Council 1998). In 2001, the State Council organized related sectors to develop the "China's Action Plan for Containment and Prevention of HIV/AIDS (2001–2005)," which clarified the responsibilities and tasks of the different levels of government and relevant sectors (Office of the State Council 2001). These plans directed HIV/AIDS prevention and control work and provided a policy basis, working objectives, and an outline of prevention measures needed for HIV/AIDS control in China.

In October 2002, China launched a pilot treatment project in Shangcai county, Henan province. Medical personnel involved in the project were given a short but intense training on HIV/AIDS, case management, and use of ARV medications, and ART was provided for free to 100 AIDS patients (Zhang et al. 2005). Based on experience acquired from the pilot, ART was gradually scaled up to the whole country (Zhang et al. 2007). However, the professional capacity among providers

was weak—knowledge and training on HIV/AIDS risk factors, testing, treatment, prevention, and control was insufficient, and service quality suffered. Furthermore, PLWH experienced stigma and discrimination from medical workers who were supposed to be caring for them. This also was rooted in poor awareness and knowledge on the part of providers. Unfortunately, at that time, there were no mature comprehensive treatment and prevention programs in existence internationally that could serve as a model suitable for adaptation to the Chinese setting. Therefore, all aspects of the treatment program had to be created from nothing, and problems had to be explored and understood and solutions implemented and evaluated in real time.

25.2 China CARES

Early in 2003, the Ministry of Health (MOH) issued the "Working Guideline of China CARES." This new policy prioritized areas in central China with serious HIV epidemics primarily driven via unsafe blood collection practices and directed the establishment of China CARES sites for the provision of ART treatment and care combined with health education, behavioral intervention, prevention of mother-to-child transmission (PMTCT) services, and voluntary counseling and testing (VCT) services.

In September 2003, Gao Qiang, the Vice Executive Minister of the MOH, made a commitment to strengthen the development of AIDS care and the provision of free ART to AIDS patients with financial needs. Then, on World AIDS Day, December 1, 2003, Premier Wen Jiabao and Vice Premier Wu Yi visited Beijing Ditan Hospital, talked and shook hands with AIDS patients, and unveiled the new, foundational "Four Free and One Care" policy. This policy marked the start of a new chapter in China's HIV/AIDS response—one in which China much more aggressively addressed its HIV epidemic via pragmatic and evidence-based policy decisions, rapidly increased domestic funding, and very public, official support at the highest levels of government.

25.2.1 The First Round (2003–2008)

25.2.1.1 Sites

Early in 2003, the first 51 China CARES sites were established. Then in 2004, based on experience acquired over roughly 1 year at the 51 sites and according to the "State Council Notice on Strengthening the AIDS Response" (State Council 2004), the MOH selected additional areas with even more severe AIDS epidemics to launch another batch of China CARES sites, a further 76. Thus, the combined 127 China CARES sites established in the first round became the platform upon which the "Four Free and One Care" policy was implemented (Han et al. 2010).

The first 51 sites were established in each of 51 counties spread across 11 provinces—Henan, Hebei, Shandong, Shanxi, Hubei, Anhui, Guizhou, Hunan, Liaoning, Heilongjiang, and Shanxi. The subsequent 76 sites covered a further 76 counties

spread across 24 provinces. In total 127 China CARES sites covered 127 counties in 28 provinces (not including Xinjiang, Beijing, Tianjin, and Shanghai). Sites were selected for their being a relatively high concentration of high-risk populations, focused mainly on areas with greater numbers of paid blood donors, PWID, and commercial sex workers.

From 2003 to 2008, with the support of government at all levels as well as relevant sectors, this first round of China CARES sites actively implemented national AIDS prevention policies, explored working models for suitability to the local situation, and accumulated crucial practical experience.

25.2.1.2 Objectives

The overall aim of the first round of China CARES was to explore effective mechanisms for AIDS prevention and control that would be suitable for the Chinese setting and that would successfully contain HIV from further spread. Furthermore, China CARES sites were meant to establish community-level HIV/AIDS response organizational and management structures and mechanisms that were tailored to the local communities.

Specifically, in this 2003–2008 period, the program's tactical objectives were:

- To establish one to two population surveillance sites and conduct timely epidemiological surveys
- To improve general health and AIDS-related knowledge
- To reach all AIDS patients in the local areas where China CARES sites were established to ensure they can receive free ART and subsidized or free treatment of opportunistic infections
- To enroll 90% of these AIDS patients in care at China CARES sites and ensure 100% of AIDS orphans get life assistance and completely free compulsory education
- To provide free HIV VCT services to high-risk and vulnerable populations
- To promote condom use among PLWH and their partners and among other high-risk populations
- To establish a sexually transmitted infection (STI) diagnosis and treatment network, providing accessible and standardized diagnosis and treatment services
- To establish methadone maintenance treatment (MMT) and/or needle- and syringe-exchange program (NSEP) sites in areas with large numbers of PWID
- To provide 100% coverage of PMTCT services
- To stop HIV transmission through unsafe blood collection and donation practices

25.2.1.3 Implementation Strategy

China CARES sites conducted HIV/AIDS prevention work in 12 specific areas: (1) organization and leadership, (2) capacity building, (3) medical treatment, (4) care and rescue, (5) health education, (6) PMTCT, (7) harm reduction for PWID (i.e., MMT and needle and syringe exchange), (8) elimination of transmission via blood collection/donation, (9) HIV VCT, (10) surveillance, (11) patient management, and (12) prevention of iatrogenic HIV infection.

The types of work performed in these areas included strengthening the capacity of personnel and building of organization structures and reporting annually on program implementation progress and achievement relative to program participant-level targets. Moreover, enormous efforts were made to fully understand and consider local social, cultural, and economic factors affecting the local community as well as epidemiological characteristics of PLWH and those at high risk of acquiring HIV so that services could be appropriately tailored. It was extremely important that comprehensive prevention models were practical, feasible, and suitable for local situation. Considerable work was done to promote participation by different sectors of government and by social organizations. Experience and lessons learned were collected and used to extend the model, starting from key areas and priority districts (townships) and expanding from site to site as the model matured and improved.

Each China CARES site also conducted propaganda campaigns to raise awareness among the local population as well as local officials and leaders. China CARES sites furthermore actively lobbied local-level policymakers in order to not only improve their HIV/AIDS awareness and knowledge but also to ensure their continued support for China CARES sites and the work the program was doing in their communities.

25.2.2 The Second Round (2009–2013)

25.2.2.1 Sites

In 2009, the MOH authorized a second-round expansion of China CARES in order to fully meet the requirements of the "State Council Notice on Further Strengthening the AIDS Response" and the "12th Five-Year Action Plan on HIV/AIDS Containment and Prevention (2011–2015)." China CARES had received recognition for having played an important role in China's response to AIDS—long-term continuous prevention efforts had reduced rates of new HIV infections and HIV-related deaths. Thus, to maintain the progress, the number of China CARES sites was nearly doubled.

The second round of China CARES, during the period from 2009 to 2013, covered an additional 309 areas. It included China CARES sites established by the Central Government and jointly by the Central Government and provincial governments. Central Government-run China CARES sites covered 51 counties in all provincial-level administrative areas except for Beijing, Tianjin, and Shanghai. Jointly established sites covered 258 counties in all provincial-level administrative areas except for Tibet.

All China CARES sites received support from the Global Fund to Fight AIDS, Tuberculosis and Malaria (The Global Fund) or other international aid programs.

25.2.2.2 Objectives and Targets

The objectives of the second round of China CARES were to lead the implementation of national AIDS response policies, explore solutions to problems encountered during AIDS response, reduce new HIV infections, control the prevalence of STIs,

reduce AIDS-related deaths, improve the quality of life of PLWH, and curtail the impact of HIV/AIDS and STIs.

To meet these objectives by 2013, the following China CARES program targets were established:

- HIV/AIDS awareness/knowledge rate—85% among rural residents, 90% among urban residents, 95% among school youth, 80% among youth outside of school, 80% among migrants, and 90% among other high-risk populations
- HIV incidence—less than 1% among MMT clients
- Needle/syringe-sharing rate—3% or less among PWID participating NSEP
- Condom use rate—85% or greater during last sexual contact among FSW, MSM, and PWID
- HIV mother-to-child transmission (MTCT) rate—5% or less
- Proportion of patients retained on ART and alive at 12 months—85% or above
- All-cause mortality rate—less than 3 per 100 person-years among AIDS patients
- Syphilis incidence—less than 10% overall
- Proportion of AIDS orphans receiving free compulsory education—95% or greater

25.2.2.3 Implementation Strategy

During this second round, from 2009 to 2013, China CARES mainly focused on five areas: (1) surveillance and testing, (2) education and policy advocacy, (3) prevention and intervention, (4) treatment management and care for PLWH, and (5) social mobilization.

For surveillance and testing, one of the most important tasks undertaken was the estimation of the sizes of the various high-risk populations (e.g., PWID, FSW, MSM). This work was crucial to ensuring accurate evaluation of the epidemic via surveillance data. China CARES sites supported surveillance efforts themselves as well. HIV screening laboratories were established, and HIV VCT clinics were set up also as a part of the third-round China CARES effort to ensure testing and counseling could be delivered with higher quality and faster services (see Chaps. 2 and 12 for more information).

Education and policy advocacy for education were important components of the second round. Raising awareness of HIV/AIDS, risks and prevention, and testing and treatment have been crucial primary prevention measures throughout China's HIV/AIDS response. Multichannel delivery of HIV/AIDS messaging and educational campaigns targeting the general public as well as high-risk groups (e.g., adolescents, women of childbearing age, PWID, FSW, MSM) is important for reducing risk behavior, promoting prevention and harm reduction measures, driving testing uptake, and combatting stigma and discrimination (see Chap. 11 for more information).

Second-round China CARES implementation work also focused on prevention and intervention among key affected populations to prevent HIV transmission via sharing of drug-injecting equipment, commercial and noncommercial heterosexual and homosexual contact, blood product donation or receipt, and perinatal exposure of infants.

Special focus on HIV treatment and care for PLWH was prioritized for the second-round implementation of China CARES. Individual case management was a

priority area for the China CARES second-round implementation, including, for instance, ensuring all testing important for following patients on ART is conducted in a timely and standardized fashion (see Chap. 13 and 26 for more information).

Social mobilization was an important area of emphasis in the China CARES second-round implementation strategy. Increasingly, China's public health officials were realizing that government agencies, even cooperating well across sectors, could not handle all the work that needed to be performed for a comprehensive HIV/AIDS epidemic response. Civil society needed to be involved and, in some cases, needed to lead. Nongovernmental organizations (NGOs) and community-based organizations (CBOs) were also uniquely positioned for some work (e.g., outreach to hidden, stigmatized, and/or criminalized groups). Even individual citizen volunteers were recruited and welcomed as there was much work to be done (see Chap. 22 for more information).

Similar to the first round, implementation work for the China CARES second round from 2009 to 2013 actively explored methods to solve difficult problems at the local level while maintaining continuity at the national level.

25.2.3 The Third Round (2014–2018)

Feedback on China CARES programming, combined with known needs and gaps, stimulated further action by the MOH to organize a third-round expansion of China CARES from 2014 to 2018.

25.2.3.1 Sites

The third round of China CARES consisted of an additional 241 areas to be covered, including 62 prefecture-level areas and 179 county-level areas. Prefecture-level areas include prefectural cities, sub-provincial cities, and municipalities directly under central government. After three rounds of implementation over 15 years spanning from 2003 to 2018, China CARES covers 472 counties in 31 provinces.

25.2.3.2 Objectives

The primary objective of the China CARES third-round expansion was to further implement national HIV/STI prevention policies and enable the realization of the goals set out in China's 12th Five-Year Action Plan on Containing and Preventing AIDS. The epidemic was evolving, and observational studies had provided important new insight into China's current epidemic. It was important that this third round take new evidence into account when developing and selecting targeted and pragmatic solutions to priority problems and challenging situations that had arisen during the prior first and second rounds of expansion.

25.2.3.3 Implementation Strategy

The third round of China CARES mainly introduced best practices and models learned from the first two rounds of China CARES and through international cooperation programs. In this round, again, there was strong emphasis on ensuring

implementation strategies at each new site were tailored to the needs of the local communities and their sociocultural contexts. To help facilitate this, the third round of China CARES was divided into categories such that different areas were to prioritize prevention efforts based on risk of different HIV transmission routes. For example, prefecture-level areas were to mainly focus on HIV sexual transmission. Thus, these China CARES sites focused more heavily on populations at risk for sexually transmitted HIV infection, including MSM and FSW (particularly low-fee FSW). County-level areas were to focus more broadly on three primary transmission routes: sexual contact (i.e., heterosexual and male-male), sharing drug-injecting equipment, and donation/receipt of blood products. Additionally, as in previous rounds, China CARES implementation work focused on seven areas: (1) organizational security, (2) surveillance and testing, (3) education and policy advocacy, (4) prevention and intervention, (5) follow-up treatment and care, (6) social organization participation, and (7) revising the care model.

25.3 Management Model

25.3.1 The Leadership Structure

China CARES was previously led and coordinated by the MOH and the Office of the State Council Working Committee to Combat AIDS. Today, the national China CARES management office (national program office) is located within the Chinese Center for Disease Control and Prevention (China CDC). It is responsible for routine management, standards and evaluation, provision of need-based technical assistance and training, organization and supervision of program expansion and implementation, annual examination, and coordination of the exchange of experiences, lessons learned, and best practices.

Each provincial-level health administrative department has also set up local China CARES management offices, which are responsible for management and coordination of all China CARES sites in the provincial jurisdiction. This unified management provides resources and overall staffing plans for each provincial-level China CARES management office. Personnel were responsible for organizing the development of provincial working plans, annual plans, and working protocols, summarizing and reporting working information, providing field technical assistance, and conducting monitoring and supervision.

At the individual city level, a coordinator is assigned and responsible for coordinating related sectors to support China CARES at that level, conducting monitoring and supervision of their China CARES site, and performing timely reporting on the progress of their China CARES site to the provincial-level management office. At the individual site level, each China CARES site was headed by a chief local government leader. This person is responsible for providing program leadership and ensuring multi-sector participation such that each sector has accountability for its tasks. Local governance of each China CARES site starts with development of its local AIDS prevention and control plans and annual work plans. As the first two

rounds of China CARES were based on county-level administrative zones, China CARES site management offices were established in their county-level health administrative departments. The third round of China CARES sites set up their management offices in the prefecture- and county-level government offices.

Individual China CARES sites' working offices (mostly county-level program offices) develop work plans each year, which are meant to be pragmatic and tailored to the local situation. These work plans are then submitted for review and approval to higher-level China CARES management offices (i.e., provincial level, national level). Once the individual sites' work plans are approved, then they may be implemented.

25.3.2 Financial Assurance

China CARES was partially funded by the Chinese Central Government. Local governments were required to provide "counterpart funds," which were paid jointly by province, prefecture, and county governments. In the first round of China CARES, counterpart funds paid by the local governments were required to be no less than 50%, with the exception of a few poverty-stricken counties for which the counterpart funds were provided wholly by the provincial governments.

In 2003, the Central Government provided 250,000–300,000 RMB for each of the first 51 China CARES sites. In 2004, central funding increased to 600,000 RMB for each of the first 51 sites and 300,000 RMB for each of the 76 China CARES sites that followed. In 2005, all 127 China CARES sites received 600,000 RMB. The total Central Government expenditure for the first 5 years (2003–2008) of the China CARES program was 2.7 billion RMB.

Starting in 2009, the Central Government provided 200,000–400,000 RMB per site in the second round for a total expenditure of 3.8 billion RMB over the 5-year (2009–2013), second-round China CARES expansion.

The third round of China CARES cost the Central Government nearly 4 billion RMB over 5 years (2014–2018). According to the size of each prefecture, 500,000 to 1.2 million RMB was provided. The counterpart fund for economically developed cities was 100%, while the counterpart fund in less economically developed cities was 50%. County-level China CARES sites received 200,000–300,000 RMB depending on the severity of their HIV epidemics. Again, the counterpart fund was 100% for economically developed counties and 50% for economically less-developed counties.

25.3.3 Monitoring and Evaluation

25.3.3.1 Monitoring

China CARES program monitoring is performed via three methods: routine monitoring, self-examination, and field supervision.

For routine monitoring, a routine work report system was established in the first round of China CARES. It included level-by-level monthly and quarterly working reports on the status of program implementation specific to each individual China CARES site. This laborious, manually written paper report method was abandoned with the second round of China CARES expansion and replaced with use of the national AIDS prevention and control information system, which collected data and information electronically from each China CARES site in order to track the implementation status and progress of the China CARES program.

Each China CARES site also conducts self-examination on the status of tasks outlined in its annual work plan. This audit of the site's implementing status is conducted ideally every quarter, but at least every 6 months. Self-examination reports from each China CARES site are submitted to provincial-level China CARES management offices for review.

Field supervision of China CARES sites is conducted by provincial China CARES management office personnel at least one time each year. Each provincial-level China CARES management office is responsible for annual field supervision of all China CARES sites in their administrative regions. Field supervision reports are submitted to the national management office. Additionally, national-level China CARES management office personnel randomly sample China CARES sites for additional field supervision each year.

25.3.3.2 Evaluation

China CARES sites are evaluated using four systems: the objective responsibility system, the work notification system, the annual ranking system, and the elimination system. The work notification system and annual ranking system were mainly used during the implementation of the second round of China CARES. Today, evaluation is performed via the objective responsibility and elimination systems.

The Offices of the AIDS Working Committee are responsible for evaluating the performance of the China CARES program via the "objective responsibility system." This is a system by which the Central Government dictates strict administrative direction to lower levels of government via a signed performance contract. This contract contains specific, objectively measurable targets for performance that the local government must achieve. In this way, the performance evaluation of the China CARES program was integrated into the routine evaluation of all local government work.

The work notification system of performance evaluation was tied directly to the routine monitoring system in which work reports were generated quarterly, semi-annually, and annually. These reports contributed to this form of evaluation via examination of implementation status indicators. The quarterly work notifications would be issued in two ways—as an internal communication kept within the China CARES program network called the "Quarterly Report of the National AIDS/STI Comprehensive Prevention Data and Information" and as an external communication issued to health administration departments at different levels called the "Bulletin of China CARES." Semi-annual and annual notifications were issued as documents by the national China CARES office.

For the annual ranking system, the national China CARES office developed an annual examination protocol at the beginning of each year. It typically included objective measures of strategy implementation, tactical execution, and performance against other prescribed indicators. Additionally, creativity in response and prevention measures undertaken would be judged through a best practices selection process. At the end of each year, this evaluation was performed, and all China CARES sites would be ranked by their final scores. The ranking result was then announced to provincial-level health administrative departments and China CARES management offices.

China CARES also uses a warning-elimination mechanism. Any China CARES site that has not completed their work requirements and achieved acceptable progress toward performance targets is warned and required to course-correct within a specified time. If performance is still substandard, then their qualification as a China CARES site is eliminated. Any China CARES site that fails to follow acceptable financial management principles, misappropriates funds, or commits fraud is subjected to a one-vote veto action which nullifies its China CARES qualification, and is eliminated.

25.4 Achievements of China CARES

25.4.1 Increased Awareness of HIV/AIDS Prevention and Control

25.4.1.1 Attention and Support from Party and Government Leaders

Premier Wen Jiabao broadly announced the establishment of the China CARES program in priority areas with severe epidemics. This announcement marked a critical turning point in China's HIV/AIDS response and was an important official recognition of China's HIV epidemic. Vice Premier Wu Yi visited China CARES sites and highlighted the good work the program was already doing to implement national AIDS policies. He praised the program for exploring practical solutions to challenging problems encountered during the implementation of the "Four Frees and One Care" policy.

Vice Executive Minister of Health, Gao Qiang, made a special trip to the China CARES site in Bazhou city, Hebei province, just ahead of World AIDS Day 2004. There, he listened to the work report and visited AIDS patients. Premier Wen Jiabao visited the China CARES site in Shangcai county, Henan province, ahead of Spring Festival in 2005 to visit AIDS orphans. In 2010, Dr. Chen Zhu, the Minister of Health, went to Sichuan province to advocate for AIDS response policies. He specifically pointed out the need to strengthen efforts in priority areas and key populations and to take advantage of the results achieved through China CARES.

Over the years, many such public appearances and official endorsements by individuals in high-ranking offices in the Central Government were important for drawing much needed attention to the HIV/AIDS response overall and specifically to the China CARES program. But, it was not just high-level officials. Local-level

government officials were included via their leadership of the individual China CARES sites established in their jurisdictions. Although the data are incomplete, main government leaders had participated in or led public HIV/AIDS-related activities nearly 4000 times up to March 2008. These were not just leaders in the health and public health sectors. During the implementation of the first two rounds of China CARES, many sectors conducted a great deal of work to ensure the China CARES program would be successful. For example, the Ministry of Health, the Public Security Bureau, and the Drug Administration Bureau cooperated in the scale-up of MMT as a harm reduction measure for people who use drugs.

This increased awareness of HIV/AIDS prevention and control among party and government leaders at all levels increased support for China's AIDS response not just among government leaders but also among the people through repeated public endorsement, involvement, and ongoing supportive messaging.

25.4.1.2 Mobilization of Social Organizations

Many NGOs and social organizations were mobilized via China CARES to help with the HIV/AIDS response. For example, the Women's Federation conducted face-to-face education activities in the first two rounds of China CARES. Based on the local situation, Women's Federations at different levels had conducted HIV prevention work in cooperation with China CARES and local CDC sites. In one such initiative, the Women's Federation in Yongding district, Zhangjiajie city, Hunan province, implemented a "ten home visits" intervention. This was composed of ten components: (1) visit homes of migrant women and distribute an education letter, (2) visit homes of newly married couples and distribute AIDS knowledge leaflets, (3) visit homes of returning migrant women and encourage them to receive HIV testing, (4) visit homes of pregnant women and advise them to seek care in maternal and child health (MCH) hospitals, (5) visit homes of postpartum women and distribute calendars containing health information, (6) visit homes of children affected by AIDS and offer care and support, (7) visit homes of PLWH and raise awareness of the "Four Frees and One Care" policy, (8) visit homes of middle-aged and senior women and make them aware and improve their knowledge of HIV/AIDS, (9) visit homes of single women and teach them about disease prevention measures, and (10) visit homes of women with disabilities or other difficulties to provide help and support.

25.4.1.3 Cultivation and Support of Local Community-Based Organizations

China CARES sites provide help and support to local HIV/AIDS CBOs to improve their capacity, mobilize them, and facilitate their autonomous participation in AIDS response activities, such as campaigns to raise awareness and increase knowledge of HIV/AIDS, risk behavior, prevention measures, and testing, treatment, and care. China CARES also helps increase CBO capacity to conduct behavioral intervention work and deliver care and support for PLWH. Local-level CBOs involved in HIV/AIDS activities are becoming stronger and more numerous. By the end of the

second round of China CARES, each China CARES site had cultivated and supported at least one HIV/AIDS-focused CBO in their area.

25.4.2 Leadership of China's HIV/AIDS Response

Through the implementation of the China CARES, national policy was translated to real, meaningful action at the community level. County-level AIDS prevention committees and teams were first established in China via the China CARES program. Together, these groups worked to lead the implementation of comprehensive AIDS response efforts at the local level. They clarified multi-sector responsibilities, set up special funds, and assigned professional teams. They established and improved processes that facilitated government leadership, multi-sector responsibility and accountability, and civil society participation. China CARES explored many different strategies and models for the delivery of HIV/AIDS prevention interventions, working diligently to ensure they were relevant and effective within the Chinese sociocultural context and tailored to the unique needs of individual communities. By taking a leadership role, China CARES set the course for both concurrent and future HIV/AIDS response efforts, built institutional and had human resource capacity, and placed emphasis on coordination, communication, learning, and continuous improvement in all aspects of service delivery for PLWH and their communities.

25.4.3 Strengthened Capacity of HIV/AIDS Prevention Teams

25.4.3.1 Management and Working Teams Assembled

All China CARES working offices have arranged for special staff to be responsible for the routine work of the program. During the implementation period of the second round of China CARES, departments of AIDS prevention and control were also established in all local CDCs in China CARES areas, and these departments were assigned professional technical staff. By the end of 2013, the 309 China CARES sites in the second round had all established HIV screening laboratories and some had also set up HIV confirmatory laboratories. A total of 1546 VCT sites had been opened, 547 ART delivery clinics had been established, and 158 MMT clinics had been launched.

25.4.3.2 Technical Teams Established

The national China CARES office has established pools of experts to support individual China CARES sites in all aspects of their mission. Five working groups of these experts were established during the first round of China CARES to provide technical support to the initial 127 China CARES sites. Technical support services include guiding the development of work plans, records management, treatment delivery, and development and delivery of intervention and care activities. While

providing these technical services, the experts learned about the progress being made at individual China CARES sites, as well as the site's financial status, staff work experience, and current challenges and areas where further technical support would be needed.

In the second round of the China CARES, this practice of assigning technical experts to individual sites was no longer used. Instead, technical assistance was coordinated by the national China CARES management office. Each year, ten experts from the pool would also be selected to participate in examination and approval of annual work plans. Experts would also participate in field supervision, training, and technical support activities, which are organized by the national China CARES office.

25.4.3.3 Communication and Learning Mechanisms Created

The national China CARES office and lower-level offices have conducted technical and management training each year. Training topics have included program management, surveillance and testing, network direct reporting, treatment and care, PMTCT, behavioral intervention, occupational exposure, health education, evaluation indicators, and data handling and statistical analysis. The national China CARES office has held experience-sharing meetings for China CARES leaders and key personnel. The national office has also supported provincial-level offices in holding these types of events. Inter-provincial exchange study tours have been organized, and formal and informal lines of communication between provinces for sharing problems, solutions, and other experiences have been created.

25.4.3.4 Established Effective Project Management

The first two rounds of the China CARES established four tiers of management including the national China CARES office, provincial program offices, prefecture program coordinators, and county China CARES offices. The national China CARES office is responsible for the development of the overall China CARES plan and its implementation and associated M&E, training, experience sharing, and expansion. Provincial health administrative departments are responsible for the coordination of China CARES in their region, establishment of China CARES management offices, and program management. The prefecture-level health administrative departments assign program coordinators who are responsible for coordination with prefecture governments and other sectors. The county-level health administrative departments are responsible for establishment of county program working offices and are chaired by the directors or executive directors of health bureaus or directors of local CDC sites. At least three to five special staff members are assigned responsibility for the organization, management, and monitoring of China CARES. This project management structure made the implementation of national policy at the community level possible.

25.4.3.5 Produced Best Practices

Through the implementation of the first two rounds of China CARES, best practices and optimized service models were created, refined, shared, and propagated from site to site, expanding to cover wider areas. These working models and processes are now playing important roles in China's national HIV/AIDS response in the areas of education and policy advocacy, surveillance and monitoring, prevention intervention, and the management of treatment, care, and comprehensive prevention for PLWH.

25.4.4 Expanded Coverage and Improved Quality

China CARES has played important roles and achieved good results in leading the implementation of the "Four Frees and One Care" policy and other national-level HIV/AIDS policies, helping to realize national AIDS response objectives of reducing HIV incidence and the AIDS death rate.

25.4.4.1 Toward Elimination of Stigma and Discrimination

China CARES sites have consistently placed strong emphasis on the reduction, and eventual elimination, of stigma and discrimination against PLWH and their family members. To help achieve this goal, many China CARES sites implemented a "one-to-one" support system whereby personalized help and support is provided by an assigned, responsible institute and person for every person living with HIV and their family.

For example, in Shangcai county, Henan province, 52 villages in need of help and support were prioritized during the first round of China CARES. Among these, 22 villages with severe AIDS epidemics were directly assigned to provincial leaders, and working teams were sent from related provincial departments; 13 villages with medium AIDS epidemics were assigned to prefecture-level leaders, and working teams were sent from related prefecture departments; and 17 villages with minor epidemics were assigned to county-level leaders, and work teams were sent from related county departments. Hundreds of people have been sent to live and work in these villages, providing ongoing, routine, daily care and support for PLWH and their families over a span of years. In key villages with relatively serious epidemics, these people also helped improve medical care, education, transportation, water, and electricity infrastructure, stimulated the local economy, created jobs, and further supported PLWH and their families. This level of focus on PLWH, their families, and their communities served a dual purpose—to help and support them in their care and treatment and to humanize them and model respectful and inclusive attitudes and behaviors to combat stigma and discrimination.

25.4.4.2 Reducing the Cost of Treatment

China CARES sites developed a series of help and support policies, tailored to the local situation, that were then integrated into existing medical and social welfare

insurances for Chinese citizens. For example, in Zhongjiang county, Sichuan province, the new rural medical cooperation scheme stipulated that PLWH receive special infectious disease subsidy policy coverage, which meant that in addition to routine HIV medication being provided for free, each patient would receive 1200 RMB per year for the treatment of opportunistic infections. As another example, at the beginning of each year in Shangcai county, Henan province, the government uses cards to pay the fees associated with the rural medical cooperation scheme for PLWH. This provides them an exemption not only for the cost of HIV treatment but also for all other basic medical services.

25.4.4.3 Comprehensive Prevention and Control

In order to improve the efficiency of case management, China CARES explored the "three-in-one" management model that is employed by the China CDC—treatment is provided by the designated hospital, and follow-up is conducted in the community either by local community clinics or local CDC sites. Through clarifying the responsibilities of the designated hospital, the clinics, and the CDC site in the local community with a standardized flow chart, it was possible to realize no gaps in case management.

For example, in Xiuzhou district, Jiaxing city, Zhejiang province, the China CARES site clarified the responsibilities of the designated hospital, the community health centers, and the CDC relative to PLWH case management. In response, the designated hospital strengthened comprehensive treatment, and hospital doctors took full responsibility for treatment, treatment-related testing, and timely reporting. Community doctors fully participated in testing, diagnosis, and follow-up of PLWH (including results notification, partner testing, and TB screening), and timely reporting. In addition to routine case management and follow-up of PLWH, CDC staff took responsibility for training doctors from the designated hospital and community health centers on treatment and follow-up, as well as general case management, and providing regular guidance, supervision, and evaluation. This model strengthened the comprehensive case management of PLWH, strengthened the coordination between relevant institutes, and increased treatment adherence and retention.

Meanwhile, the China CARES sites also led multi-sector cooperation efforts focused on community health center delivery of behavioral interventions. For example, the China CARES of Xicheng district, Beijing, led an initiative to decentralize the regular interventions ongoing in entertainment settings to seven community health centers. Intervention teams from community health centers were established and assigned to individual entertainment venues. Trainings were provided by CDC staff on HIV intervention work and skills, and intervention team members who received training were responsible for field work that included, for example, HIV screening test mobilization. This responsibility for outreach and intervention work was integrated into community health centers' annual performance evaluations. CDC staff also conducted field supervision of intervention teams each month, working together with intervention team members and providing assistance in solving problems and overcoming difficulties

encountered during the intervention work. Intervention team leaders from community health centers built relationships with local police responsible for the local areas surrounding the venues to further facilitate their HIV/AIDS outreach and intervention work.

China CARES also set up HIV rapid test sites in community health centers and township hospitals. The scale-up of HIV rapid screening test sites grew quickly because of China CARES, which greatly increased the accessibility of HIV testing.

25.4.4.4 Active Promotion of CBO Participation

China CARES actively mobilized CBOs to participate in interventions targeting different high-risk populations through government contracting services. This effectively enlarged the coverage of intervention and surveillance among high-risk populations and created a service model that was more scalable. For example, the China CARES site in Putuo district, Shanghai, established a community intervention model targeting PWID based upon the work already being done by social workers on drug abuse in that community. A self-improvement service club was established and worked with the local CDC to conduct education, surveillance, and intervention (e.g., counseling, condom use promotion, HIV and syphilis testing, MMT enrollment) among PWID. Similarly, the China CARES site in Pingjiang district, Suzhou city, Jiangsu province, set up a "Rainbow Health House" in a community health center for the purpose of engaging the MSM community in health counseling, peer education, and VCT. Referrals to treatment were also provided. The district CDC provided training and capacity building for Rainbow Health House volunteers and staff. Furthermore, district CDC staff went to the Rainbow Health House twice every month to conduct HIV testing.

China CARES also mobilized volunteers and social organizations through government contracting services for PLWH. For example, the China CARES in Pingxiang, Guangxi, established a comprehensive service system that included enhanced case finding and intensive follow-up. This service was conducted by PLWH volunteers in the community. They were trained and then helped with testing mobilization in the community and counseling of newly diagnosed PLWH and their families to raise awareness, improve HIV/AIDS knowledge, combat stigma and discrimination, promote treatment uptake and retention, and provide support. As another example, in Fengtai district, Beijing, and in Linxiang district, Yunnan province, the CDCs, designated ART hospitals, and HIV/AIDS-focused social organizations worked together to coordinate more effective case management—the social organizations cooperated with designated hospitals to ensure complete patient information was communicated to the CDC and assisted CDCs and designated hospitals in PLWH follow-up.

25.4.4.5 Strengthened Cooperation Between Sectors

China CARES successfully improved both service coverage and service quality for people at risk for HIV as well as for PLWH through improved cooperation between sectors. For example, China CARES increased MMT coverage and compliance through close cooperation between health and public security departments. For

example, in Chengmai county, Hainan province, China CARES worked to facilitate cooperation between public health and public security departments to increase MMT coverage and compliance among drug user clients in the community. China CARES staff coordinated the sharing of information between the local MMT clinic and the community rehabilitation center. The MMT clinics established a mechanism for regularly notifying anti-drug police teams and for anti-drug police teams to notify the MMT clinic regarding the status of drug users in the community to help track and support their follow-up, education, employment, and support.

As another example, the China CARES of Hongta district, Yuxi city, Yunnan province, in cooperation with the Women's Federation and the Public Security Bureau, worked to standardize interventions for migrant populations and FSW. In this area migrant women and low-fee FSW usually lived in locally rented houses, and community residents depended heavily on rental income from their houses. Therefore, China CARES, the Women's Federation, and the Public Security Bureau together worked to mobilize hosts (i.e., landlords) to participate in HIV/AIDS prevention and education interventions and to standardize the management of these rental houses. This support of the migrant women and low-fee FSW communities in Hongta has become standard routine work and continues to successfully reach these vulnerable, high-risk populations.

25.4.4.6 MMT Extension Sites Set-Up and Piloted

To increase the convenience of MMT services, thereby increasing MMT retention and adherence, as well as to expand MMT coverage, China CARES actively explored a three-level (i.e., county-township-village) extension model for MMT service delivery. For example, in Lianghe county, in Yunnan province, China CARES coordinated the establishment of MMT clinics within township hospitals. Doctors are responsible for routine diagnosis and treatment work, pharmacy personnel are responsible for methadone dispensing, and prevention division personnel were responsible for counseling, education, and behavioral intervention. At the village level, MMT sites were established, and the routine work in this village MMT clinic was coordinated by the township hospital, and CDC extension sites were responsible for distributing methadone and providing technical assistance.

25.4.4.7 Intervention for HIV-Serodiscordant Couples Developed

China CARES actively developed different kinds of service models and interventions to legally ensure partner notification and strengthen management of serodiscordant couples. For example, in Yining city, Yili prefecture, Xinjiang, China, CARES worked with the local government to develop and implement a new 100% partner notification policy. It required that all newly diagnosed PLWH notify their partners of their HIV infection status within 10 days. Failure to comply with this policy resulted in township public health workers notifying their partners and providing HIV counseling and testing to the notified partners. Yining city China CARES also established a long-term incentive program for HIV-discordant couples, whereby HIV counseling and testing is provided every 3 months and a 30 RMB prize is awarded to

those HIV-negative partners who remain HIV-negative at 3 months and a 500 RMB prize is awarded to those who remain HIV-negative for a year.

25.4.4.8 Integration of HIV Prevention and Treatment into Routine Health Services

Some China CARES sites have worked to integrate HIV/AIDS prevention and treatment into the provision of routine health services. With the local CDC sites providing technical guidance and support, community health centers and township hospitals, for example, in Longquanyi district, Chengdu city, Sichuan province, took on HIV prevention and control work, which included, for example, intervention work among FSW (e.g., screening, comprehensive health education, and prevention awareness training). Medical staff received training on control and prevention, treatment and follow-up, and monitoring and reporting. China CARES sites conducted evaluations of community health centers and township hospitals twice each year, and the results of these evaluations were integrated into the broader performance evaluation systems for basic health and public health services, which impacts funding as well as rewards and punishment at the institutional and individual level. The intent was that this system would fully mobilize HIV/AIDS prevention workers at grassroots level.

25.4.5 Sharing of Experiences

Experiences and service models developed during the first two rounds of China CARES have been exchanged between China CARES sites and spread over provinces and nationwide via a variety of mechanisms.

The national China CARES management office created the "Work News of China CARES" in 2004, which was later changed to "Bulletin of China CARES" during the second round. This report contains information on work performed and experiences acquired and is distributed to provincial AIDS working offices, health administrative departments, CDCs, China CARES management offices, county governments, county health administrative departments, China CARES working offices, and other relevant institutions and departments. By the end of 2013, 49 issues had been published, and a web page specific to China CARES was created within the website of the National Center for AIDS/STD Control and Prevention (NCAIDS), China CDC. Additionally, provincial- and county-level China CARES offices developed a China CARES newsletter for sharing news and experiences across the China CARES network of sites and with leaders of relevant government departments at different levels.

Several other independent articles were also published. For instance, a special issue on the China CARES program was published in the *Chinese Journal of AIDS & STD* in 2007. Researchers and health and public health workers involved in China CARES have also published more than 100 papers in Chinese and in English in academic journals since 2003.

25.5 Challenges and a Look to the Future

25.5.1 The End of International Cooperation Projects

By the end of 2013, large international cooperation programs such as those funded and led by the Global Fund and the Bill and Melinda Gates Foundation ended. Other international cooperation programs have steadily decreased their funding of HIV/AIDS response work in China. Thus, China's HIV/AIDS response has transformed from being heavily funded by international aid organizations to being nearly 100% domestically funded. Simultaneously, the combined annual funding from international and domestic sources has soared from under 0.5 million RMB prior to 2003 to well over 4 billion RMB today. China CARES represents a major investment by the Chinese Government—it has not only helped to directly benefit China's citizens who are infected or affected by HIV/AIDS but also protect those who are not. It furthermore was instrumental in helping China to transition toward a fully domestically funded HIV/AIDS response.

25.5.2 The Changing Epidemic

Over the course of the 15-year China CARES program (2003 to today), China's HIV/AIDS epidemic has changed dramatically. Originally concentrated among small numbers of PWID in the remote southwest, to tens of thousands of blood plasma sellers in rural central China, the epidemic today is expanding rapidly and almost exclusively through sexual contact (see Chap. 1 for more information).

China's HIV/AIDS response must evolve with it. Priorities need to be iterated, new barriers need to be overcome, and new problems urgently need to be solved. For example, new ways of approaching MSM, older adults, low-tier FSW, migrants, and youth and adolescents need to be developed. New care models that more rapidly move PLWH through diagnosis and treatment initiation to viral suppression are required. New methods for retaining PLWH in care and improving their adherence to treatment regimens are urgently needed. Furthermore, integrated care for those with co-infections (e.g., tuberculosis, STIs, and hepatitis C virus) must be implemented to help improve outcomes for these especially vulnerable groups. Additional work is required in the area of policy development, NGO and CBO engagement, and integration of new technology (e.g., point-of-care testing platforms, HIV self-testing, social networking).

25.5.3 China CARES Must Live On

Evidence from the first two rounds of China CARES showed that the program has promoted and standardized HIV/AIDS prevention work in China and successfully translated national-level policy into community-level action. The local governments covered by China CARES sites have prioritized HIV/AIDS work and helped to

legitimize, fund, and staff these efforts as well as encourage multi-sector cooperation. It is clear that this model works. China CARES must live on and continue to be leveraged in the future to further advance China's goal of eventually eliminating HIV/AIDS.

25.5.4 A Model for China and the World

China CARES is an innovation, and for China, it was a revolution. It has made a measurable and immeasurable impact on China and its citizens and has become a model of how to implement national-level policy in individual communities. China will most certainly use this model if a future epidemic like this one occurs on the mainland again, but China CARES can also be a model for other low- and middle-income countries and for high-income settings as well.

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National HIV/AIDS Case Management

26

Zunyou Wu, Yurong Mao, and Jennifer M. McGoogan

Abstract

China's approach to HIV case management has evolved from little to none before the "Four Frees and One Care" policy was issued in 2004 to a complex two-stage system whereby people with diagnosed HIV infection were managed differently depending on whether they were or were not eligible for antiretroviral therapy (ART). Those in the pre-ART period were followed by local epidemiologists, while those who had initiated ART were followed by ART doctors. Unfortunately, many PLWH were lost to follow-up in the pre-ART period. However, after CD4 count-based ART eligibility requirements were abolished in 2016, HIV case management could be integrated into ART service delivery. This evolution reflects China's consistent, pragmatic approach to evidence-based policymaking that allows new findings and innovative strategies to be quickly adopted in order to benefit as many PLWH as possible.

26.1 Case Finding and Case Management: 2003 and Prior

Medical case management is a relatively broad term with a range of definitions but generally is meant to be a collaborative process by which a treatment plan is developed to ensure a person receives appropriate care in a timely fashion to facilitate their attainment of desirable outcomes. For people living with HIV (PLWH), case management focuses on identification of unmet medical needs, linkage to health

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services, and regular follow-up to promote retention in care and adherence to treatment so that positive outcomes can be achieved.

Despite the fact that the first HIV/AIDS outbreak in China was identified in 1989, case management for PLWH did not exist in China until 2004, when the "Four Frees and One Care" policy began to be implemented. By this time, the total number of PLWH in China was feared to be nearing one million. Although data were scarce, and data quality was questionable, Chinese officials did their best to produce a reasonably accurate estimate of 840,000 PLWH as of the end of 2003 (Wang et al. 2010). However, with no treatment available, neither case finding nor case management had been priority issues. The focus had instead been primarily on monitoring the epidemic (see Chap. 1 for more information).

Epidemic monitoring was primarily performed via HIV sentinel surveillance, which began in 1995 among high-risk groups such as people who inject drugs (PWID) and female sex workers (FSW). However, in the context of sentinel surveillance, HIV testing was performed anonymously—no personal identification or contact information was collected. After all, the testing was not being done for the purpose of diagnosing PLWH; it was being done to generate estimates of HIV prevalence among the different key, high-risk populations in geographic areas where the surveillance sites were located. These prevalence estimates, and changes in these prevalence estimates over time, were mainly used to inform public health policy. Since individual PLWH who screened HIV-reactive during a survey could not be contacted, they could not be informed, and therefore could not receive confirmed diagnoses, thereby precluding any possibility of case management for them (see Chap. 2 for more information).

After the HIV outbreak among former plasma donors (FPD) was discovered in 1995, screening for HIV infection became mandatory among blood and plasma donors, transfusion recipients, and patients undergoing surgery. Although the number of identifiable HIV cases found in hospital settings and blood donation station settings began to increase because of this mandatory HIV testing (MHT) policy, the primary objective of this testing was to protect blood product recipients and to protect doctors and other providers in the hospitals. It was not for diagnosis of HIV for patients. HIV testing for the purpose of diagnosing PLWH was a fairly sensitive and controversial issue at this time. On the one hand, further testing and scale-up of testing services could better inform HIV policy and health services planning, but on the other hand, without any treatment available, PLWH would benefit very little from receiving a diagnosis, and individuals, their families, and communities could suffer from harsh societal stigma and discrimination were there to be a breach in confidentiality (Wu et al. 2017) (see Chap. 19 for more information).

Nevertheless, HIV voluntary counseling and testing (VCT) services were launched, albeit in a relatively limited manner. However, this testing format was not successful initially because, as an "opt-in" strategy, PLWH must first have some HIV/AIDS knowledge, then they must perceive themselves to have some risk of being infected, they must find some value in knowing their status, and finally, they

must pay for the testing service. Very few people came for testing, and even fewer were actually diagnosed in this setting (Wu et al. 2017) (see Chap. 12 for more information).

There was recognition at this time that PLWH, whether diagnosed or not, were infectious and represented a "transmission reservoir." Therefore, counseling aimed at reducing risk behavior was provided, and condoms were distributed to those who were diagnosed and could be contacted in the hope of preventing onward secondary transmission. However, this very limited type of public health case management was only provided in some remote, rural areas where there is generally almost no privacy.

PLWH with clinical manifestations who sought out care at hospitals, clinics, or other medical settings were treated based upon their symptoms and, in this way, were able to receive some routine case management help. However, there was no $CD4^+$ T lymphocyte enumeration or viral load testing available for the purposes of clinical staging or monitoring of HIV disease progression, and there was no antiretroviral therapy (ART). These methods and medicines had become available internationally, but not yet in China. Combination antiretroviral (ARV) drugs, for example, initially became available in the United States in 1996. However, the high cost associated with a severely limited supply of imported brand name ARV drugs meant that ART was prohibitively expensive to Chinese PLWH. Only perhaps roughly 100 PLWH were on ART by the end of 2003 (see Chap. 13 for more information).

26.2 Case Finding and Case Management: 2004 and After

After the Chinese Central Government announced its new "Four Frees and One Care" policy, case management became realistic. This ground-breaking policy became foundational to the HIV response in China and marked a change in the Chinese Central Government's overall attitude toward its HIV epidemic. This policy announcement, late in 2003, marked the launch of a vigorous, but pragmatic, comprehensive response. Specifically, in the "Four Frees and One Care" policy, the Chinese Central Government promised to provide:

1. Free HIV screening tests for all those who wanted them
2. Free ART for all those diagnosed with HIV who lived in rural areas or in urban areas but below the poverty line
3. Free prevention of mother-to-child transmission (PMTCT) services, which included free HIV testing for all pregnant women, ART for mothers living with HIV and their exposed children, and infant formula
4. Free education for children infected with HIV or affected by HIV (parent or caretaker infected)
5. Monetary support to families with members infected or affected by HIV

26.2.1 The Demise of Anonymous Testing

However, very early in 2004, this proved to be no easy task when the Xinjiang Health Department sent a request to the Ministry of Health for enough free ARV drugs to treat 100 PLWH. However, the Ministry of Health could see via the notifiable disease system that there were far more than 100 PLWH in Xinjiang. When asked to identify precisely which PLWH would be receiving the medicines—the Ministry wanting to prevent diversion or corruption—officials in the Xinjiang Health Department could not, exposing a major flaw in the anonymous testing strategy that had been predominantly employed up to that point.

Real-name reporting was not a common practice globally at that time. It was recommended neither by the World Health Organization (WHO) nor the Joint United Nations Programme on HIV/AIDS (UNAIDS). Potential for breaches of confidentiality or violations of privacy and resulting stigma and discrimination toward PLWH were cited as serious concerns with real-name testing strategies. Nevertheless, real-name reporting of HIV cases seemed the only way to get an accurate count of exactly how many PLWH needed treatment (so that ARV medicines could be purchased and ART support services could be scaled up) and to get an accurate view of exactly who needed treatment (so that they could be reached, linked to care, and given their free ARV medicines). Finally, by mid-2004, all HIV testing in China required collection of identification and contact information (see Chap. 12 for more information).

26.2.2 The Rise of Active Case Finding

Even though HIV testing had been made free, uptake remained very low. Thus, an active testing campaign was proposed, inciting a great debate between government officials and health professionals.

From June to September 2004, millions of people were surveyed about their history of plasma donation in the early to mid-1990s. More than 280,000 admitted that they had donated plasma during that time. All were offered free HIV testing, more than 90% accepted, and a total of 23,157 individuals (9% of those tested) were newly diagnosed with HIV infection. These were "real" people, not just numbers. Public health workers had their names and contact information. They could be reached and offered treatment.

Building on this success, China moved forward with several more rounds of active testing campaigns in other provinces and among other high-risk groups, all the while receiving criticism from domestic and international sources. Many more PLWH were found, and importantly, as many as 10,000 were in serodiscordant relationships. Thus, the active testing campaigns had also identified a large group at high risk of infection who were urgently in need of prevention services (see Chaps. 12 and 19 for more information).

26.2.3 The Evolution of Two-Stage Case Management

26.2.3.1 Modernization of HIV Testing

After the conclusion of the active testing campaigns, China began to set targets for case finding based upon forecasting the numbers of people needing to be diagnosed. These forecasts and targets were then used to inform the scale-up and modernization of China's HIV testing infrastructure. Testing sites were scaled up from fewer than 3700 in 2007 to nearly 25,000 in 2015. Approximately 23 million HIV tests were conducted in 2007, while more than 143 million were conducted in 2015. This included testing in all facility-based settings, VCT, MHT, and provider-initiated testing and counseling (PITC), as well as testing in the context of premarital counseling and special epidemiological surveys (Pisani and Wu 2017) (see Chap. 12 for more information).

26.2.3.2 Case Management in the Pretreatment Period

Traditional case management cannot begin until after a confirmed diagnosis. However, HIV diagnosis is very complicated in China (Wu et al. 2015), and many people who initially screen HIV-reactive are lost to follow-up even before they receive their confirmed diagnosis (Gu et al. 2016). After an individual takes an HIV screening test and receives an HIV-reactive result, either in a medical care setting or at a VCT site, he/she first needs to obtain a second HIV screening test at local Center for Disease Control and Prevention (CDC) laboratory. Once a second HIV-reactive screening result is received, the individual must then seek and obtain confirmatory Western blot (WB) testing, also at a local CDC laboratory, to confirm a diagnosis of HIV infection. Only WB test-confirmed cases are considered diagnosed HIV infection. Since local CDCs are the only places to obtain WB confirmatory testing, it is the local CDCs that make the official diagnosis HIV infection. And, since HIV is a notifiable disease, case reporting to the national notifiable disease system is required within 24 hours but is typically performed by the doctor who initiated the original HIV screening test.

Further complicating matters, HIV case management is not offered by the doctor who initiated the HIV screening test. HIV case management is the joint responsibility of epidemiologists from the local CDC and doctors from the local designated hospital providing free ART, usually the county general hospital in rural areas and the infectious disease hospital in urban areas. Additionally, ART has historically not been available to all PLWH who receive a diagnosis—CD4 count-based ART eligibility criteria have been in place for many years, as recommended by WHO (World Health Organization 2016).

At the beginning of China's free ART program, only diagnosed PLWH who had CD4 cell count results of less than 200 cells/mm^3 were eligible for initiating ART. This criterion was in place from 2004 to 2008, when it was expanded to include all diagnosed PLWH with CD4 less than 350 cells/mm^3 (Ministry of Health Working Group on Clinical AIDS Treatment 2012). In 2014, it was further relaxed

to 500 cells/mm^3. However, for more than 10 years, this separation of some PLWH waiting in the pre-ART period, and some PLWH receiving ART, and both groups having different needs, necessitated a two-stage case management scheme—case management for before and for after initiation of ART.

All newly diagnosed PLWH are provided an initial epidemiological investigation within 30 days of confirmed and reported HIV diagnosis. The initial epidemiological investigation is an interview to collect demographic information, to evaluate the most likely route of HIV infection, to assess current sexual and drug use risk behaviors, and to facilitate CD4 cell count testing. PLWH whose CD4 count results do not meet the criteria have to wait until their immune systems are compromised to the point of meeting the CD4 requirement. Pre-ART cases continue to receive public health case management by local epidemiologists, via follow-up at 6-month intervals for re-collection of information on recent sexual and drug use risk behaviors and blood specimens for re-testing of CD4 count. This type of first-stage, public health case management continues until the CD4 count criteria are met (some exceptions were made for certain populations beginning in the late 2000s; Ministry of Health Working Group on Clinical AIDS Treatment 2012). However, this method of case management for pre-ART PLWH was difficult, and many have been lost to follow-up during this stage (Gu et al. 2016).

26.2.3.3 Case Management for Treatment

For those whose CD4 count result has met ART eligibility criteria, a referral to treatment at the local designated ART hospital is made. Second-stage, clinical case management is offered by doctors at the designated hospital, usually the county general hospital in rural areas and the infectious hospital in urban areas. Our follow-up of patients after ART initiations is 2 weeks, 1, 2, 3, 6, 9, and 12 months in the first year, then, every 3 months. The main purpose of the first three follow-up visits is to monitor for side effects of the patient's ART regimen. CD4 count testing is provided twice each year after initiation of ART. Viral load test is not provided before or at the initiation of ART but is only offered for free at least 6 months after initiation of ART and then once a year thereafter. Those whose have not achieved virological suppression are to be tested for drug resistance and changed to a second-line ART regimen (Ministry of Health Working Group on Clinical AIDS Treatment 2012) (see Chap. 13 for more information).

26.3 Monitoring Case Management

The concept of HIV case management was relatively new when it was first introduced in 2006. Originally, the rationale for introducing public health case management was to provide counseling services on safer sex and safer injecting practices to diagnosed PLWH to reduce the risk of their passing HIV infection on to their sexual partners or partners with whom they share drug-injecting equipment. Ideally, if all diagnosed PLWH received public health case management at least twice a year, the

risk of onward HIV transmission would be very low. Therefore, the coverage of public health case management was used as an indicator for monitoring the HIV response beginning in 2006. Performance against this indicator was measured by calculating the number of PLWH that had been contacted by local epidemiologist for risk assessment and counseling at least once in a specific year divided by the total number of PLWH that were alive in that year. In 2006, public health case management coverage was 34%. It then rose to 43% in 2007 and 60% in 2008 (National Center for AIDS/STD Control and Prevention 2009).

Unfortunately, however, this indicator was flawed. For PLWH on ART, public health case management was a more objectively measurable and verifiable activity, but for PLWH not on ART, public health case management was mainly based on the self-reporting of local epidemiologists, and verification of their work was not possible. Hence, in order to more accurately measure public health case management, a new indicator had to be developed. CD4 cell count testing was selected since, according to national guidelines, all diagnosed PLWH regardless of treatment status should receive a CD4 test each year. The logic was that if diagnosed PLWH received public health case management services during a year, they were more likely to have received a CD4 test in that year. Performance against the CD4 testing indicator was measured as the proportion of all diagnosed PLWH who received a CD4 test. Not surprisingly, when public health case management coverage was measured in this way, performance was poorer—only 10.7% in 2007 and 22.2% in 2008 (Table 26.1; National Center for AIDS/STD Control and Prevention 2009).

As part of a broader initiative around quantitatively monitoring and evaluating the national HIV response, performance against a broad range of indicators, including this one, was evaluated annually. Provinces were ranked, and top performers received awards, while low performers were encouraged to do better the following year (Table 26.1). Performance against this indicator improved to 32% overall in 2009 and then 62% in 2010 and 91% in 2015, and remained at 91% in 2017 (National Center for AIDS/STD Control and Prevention 2018) (see Chap. 23 for more information).

26.4 Case Management for Special Populations

26.4.1 Migrants

In the past, China has employed a unique strategy for controlling and limiting the movement of people from one place to another within its borders. Residency registration, called *hukou* in Chinese, is used for limiting free movement. However, dramatic political, economic, and social change over the past three decades has resulted in loosened controls, and enormous migrations of huge numbers of people have resulted. Many people have moved from rural areas to urban cities, moved from small cities to larger cities, and moved from one city to another. The migrations occur within provinces and between provinces, sometimes over very long distances, and these migrations are sometimes temporary or can be long term, and for many, it is seasonal (see Chap. 17 for more information).

Table 26.1 Provinces ranked by performance against the CD4 test indicator—proportion of diagnosed PLWH who received CD4 testing—which was used as a measure of public health case management coverage in 2008 (National Center for AIDS/STD Control and Prevention 2009)

Rank	Province	Number of PLWH in need of CD4 testing	Proportion of PLWH who received CD4 testing (%)
1	Jiangsu	881	68.0
2	Hebei	498	62.0
3	Shanxi	633	57.5
4	Jilin	448	56.3
5	Anhui	1602	53.1
6	Heilongjiang	415	50.1
7	Hubei	1323	49.2
8	Shaanxi	353	46.2
9	Tianjin	217	46.1
10	Ningxia	101	44.6
11	Zhejiang	1669	42.5
12	Henan	6926	42.2
13	Shandong	872	38.1
14	Gansu	249	37.8
15	Liaoning	825	34.9
16	Yunnan	27,286	32.7
17	Fujian	674	32.3
18	Jiangxi	484	31.8
19	Guizhou	2483	26.7
20	Hunan	2544	25.5
21	Qinghai	78	24.4
22	Inner Mongolia	194	24.2
23	Beijing	1891	22.6
24	Chongqing	2418	21.4
25	Sichuan	9017	17.8
26	Shanghai	1939	17.1
27	Guangxi	21,922	9.6
28	Guangdong	10,354	9.4
29	Xinjiang	18,194	7.8
30	Hainan	153	7.2
31	Xinjiang	118	1.7
32	Tibet	36	0
	Total	116,797	22.2

Migration causes serious challenges for HIV case management, particularly since state-provided medical benefits are tied to each person's *hukou*, or residency registration. For example, if a person who has his/her residency registration in rural Anhui province is diagnosed with HIV infection in Hangzhou city, the manner in which his or her HIV case management is performed depends upon how long he or she has already stayed in Hangzhou and how much longer he or she plans to stay in Hangzhou. HIV/AIDS regulations state that PLWH should receive HIV case management services from "the local health facilities where they live." However, the interpretation of the regulation varies. Some believe it means the health facilities in the place of residency registration. Some believe it means the health facilities in the new place of current residence. The Chinese Central Government, as a rule, bases

funding allocations for HIV response activities on the number of PLWH in each provincial-level administrative area. However, large cities, such as Beijing and Shanghai, which generally attract large numbers of migrants, have policies in place supporting HIV case management for migrants.

Nevertheless, good communication between local health authorities is critical to the provision of HIV case management to migrant PLWH. The National HIV/AIDS Comprehensive Response Information Management System (CRIMS) has been an important facilitator of improvement in this area. CRIMS is a nationwide web-based system for the real-time documentation and monitoring of national HIV/AIDS programs. All PLWH diagnosed in China have records in CRIMS that include not only identification, contact, and demographic information but also clinical management information such as dates and results of HIV, CD4 count, and viral load testing, dates and details of the initiation of ART regimens, and dates and details of follow-up visits. It has provided a much-needed platform for HIV case management among highly mobile and migrant PLWH (see Chap. 24 for more information).

26.4.2 Serodiscordant Couples

HIV-serodiscordant couples were not recognized as a special group in need of specific HIV case management services until it was discovered that 12,159 of the more than 23,000 PLWH in Henan province, who were identified during the 2004 active testing campaign, had HIV-seronegative spouses or regular sexual partners (Wu et al. 2006). Since then, condoms and counseling have been regularly provided to these serodiscordant couples, and as a result, the HIV seroconversion rate among the uninfected partners of PLWH in Henan was only about 1% from 2005 to 2010. By contrast, data extracted from CRIMS has shown that the HIV seroconversion rate among serodiscordant couples in other provinces has been unacceptably high. For example, it was 8–10% in Sichuan and Xinjiang in 2010.

From 2009 to 2011, He and colleagues with the National HIV Prevention Study Group conducted a prospective longitudinal cohort study among over 1000 serodiscordant couples. In the study, HIV-infected partners who had CD4 cell counts less than 350 cells/mm^3 were given routine ART, and HIV-uninfected partners were monitored for HIV seroconversion. The main finding of the study was that serodiscordant couples with the HIV-infected partner on ART had a 66% reduced risk of HIV seroconversion for the HIV-uninfected partner compared to serodiscordant couples with HIV-infected partner not receiving ART (He et al. 2013).

This result was consistent with the landmark study of treatment as prevention (TasP) by Cohen and colleagues (Cohen et al. 2011). Both domestic and international research findings have provided solid scientific evidence demonstrating that treatment of PLWH can significantly reduce the onward transmission of HIV to sexual partners. Thus, China immediately adopted the TasP approach among serodiscordant couples nationwide in 2011 (Ministry of Health Working Group on Clinical AIDS Treatment 2012) (see Chap. 13 for more information).

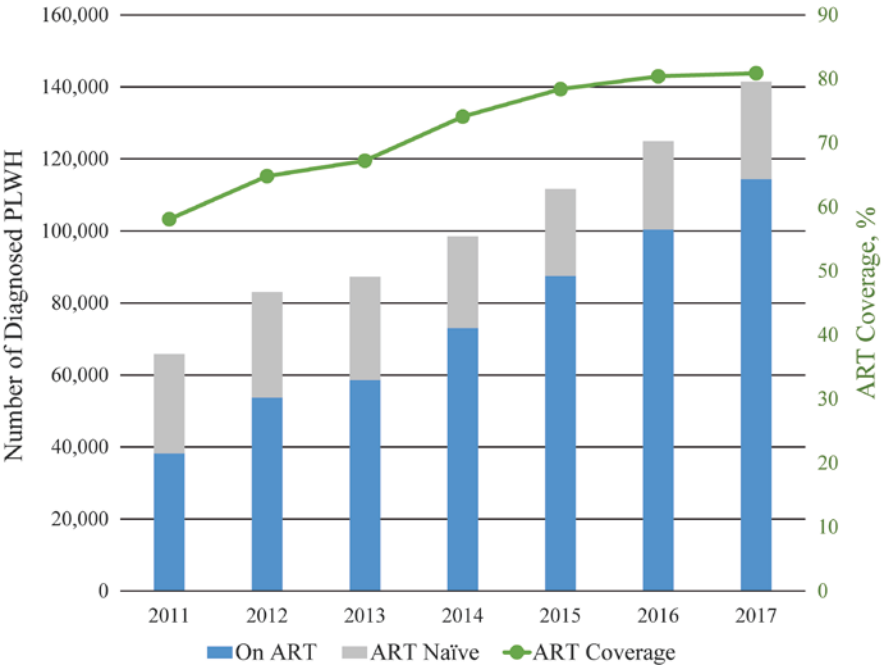

Fig. 26.1 Implementation and impact of HIV TasP among serodiscordant couples nationwide, 2011–2017. The number of diagnosed PLWH who were treated and untreated each year is shown along with ART coverage

China maintains a nationwide open cohort of serodiscordant couples to monitor the implementation and evaluate the impact of TasP. Although the eligibility criterion was CD4 count less than 350 cells/mm^3, China eliminated this requirement and provided ART for all serodiscordant couples regardless of CD4 cell counts. Results from this open cohort show that the HIV seroconversion rate declined from 2.6% in 2011 to 0.7% in 2017 (National Center for AIDS/STD Control and Prevention 2018) (Fig. 26.1).

26.5 Integration of Case Management and ART

Both international and domestic observational studies and clinical trials have demonstrated that ART for PLWH with CD4 cell counts over 500 cells/mm^3 has benefits for both individuals (i.e., reductions in morbidity and mortality) and communities (i.e., reductions in incidence). This has led WHO to issue revised guidelines for provision of ART, and ART is now recommended for all PLWH, regardless of CD4 count (World Health Organization 2016). China incorporated this recommendation into its ART clinical guidelines in 2016.

This change eliminated the need for two-stage HIV case management allowing all case management for PLWH to be merged into the National Free ART Program, simplifying HIV care services, improving case management services, and promoting ART uptake. In summary, China has moved from initially no HIV case management before the landmark "Four Frees and One Care" policy issued in 2004, to a two-stage case management strategy between 2004 and 2016, and now to case management integrated into ART service delivery. This evolution reflects China's consistent, pragmatic approach to evidence-based policymaking that allows new findings and innovative strategies to be quickly adopted in order to benefit as many PLWH as possible.

26.6 Conclusion

China has significantly evolved policies and practices related to HIV case management based on a pragmatic approach to evidence-based policymaking. The original HIV testing policy was modified from anonymous testing to now universal real-name diagnosis and reporting that has made HIV case management possible. Removing CD4 count-based ART eligibility criteria and providing universal ART for all PLWH has simplified HIV case management from a previous stepwise, two-stage, pre-ART and ART program involving multiple agencies to a now rapid and integrated one-care setting ART program. Effective case management has benefited PLWH themselves as well as their communities through reduced HIV transmission. However, there are still challenges, including a considerable number of PLWH who temporarily migrate for job opportunities, a shortage of qualified health providers, and a continually increasing number of PLWH who need services. China needs to continue to be innovative to meet these challenges.

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Building Capacity for Scaling Up HIV/AIDS Programs

27

Ye Ma and Changhe Wang

Abstract

The rapid scale-up of HIV programs in China has caused a need to address deficiencies in the area of human resources—both more personnel and better-trained personnel were required. In particular, emphasis on human resource development was critical for the expansion of China's National Free Antiretroviral Therapy (ART) Program and China's National Methadone Maintenance Treatment (MMT) Program. These two programs, both critical to the success of China's comprehensive HIV/AIDS response, grew from nothing to routinely treating hundreds of thousands of patients annually in just 10 years. Service quality was crucial to patient retention in care and achievement of positive clinical and community outcomes. Thus, clinical guidelines were created, training curriculum was developed, training centers were established, and evaluations of the effectiveness of training have been performed. However, there are still many challenges and much room for improvement. Capacity building within China's National Free ART Program and National MMT Program must continue to receive focus and funding and needs to improve and grow as these programs evolve over time.

27.1 Introduction

Significant international investment in the early stages of China's HIV response, and quickly increasing domestic investment in more recent years, has meant that China's HIV response programs scaled up at a very rapid pace. One of the biggest challenges faced by program administrators during this scale-up period was related

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to human resources. Human resource constraints are not uncommon in public health programs in resource-limited and resource-rich settings alike. However, meeting these challenges has been important for ensuring adequate coverage and service quality (Li et al. 2013; Zhang et al. 2011).

The National Center for AIDS/STD Control and Prevention (NCAIDS), a division of the Chinese Center for Disease Control and Prevention (China CDC), has been in charge of training design and nationwide implementation of training for local health staff since it was established in 2002. All training and capacity-building programs have been designed based on the results of demand analysis, and training centers have been established in areas of high uptake of HIV/AIDS response programs. Considerable assistance with this effort has been provided through international cooperation programs, especially the China–US Cooperation Global AIDS Program (GAP), which was a strategic technical collaboration program jointly implemented by the US Centers for Disease Control and Prevention and the China CDC. (See Chaps. 20 and 21 for more information.)

This chapter focuses on the capacity-building efforts that were required to scale up China's comprehensive HIV/AIDS response programs, with particular focus on its National Free Antiretroviral Therapy (ART) Program and its National Methadone Maintenance Treatment (MMT) Program. (See Chaps. 9 and 13 for more information.)

Substantial capacity building was also required for the scale up of China's National HIV Laboratory Network. However, this topic is not discussed in this chapter. (See Chap. 5 for more information.)

27.2 Capacity Building Within the National Free ART Program

In 2002, there were fewer than 100 physicians nationwide who were trained in treating HIV. Nearly all of them were working in large infectious disease hospitals or general hospitals located in first-tier cities such as Beijing and Shanghai. At that time, there were neither adequate technical resources nor any official or unofficial national treatment guidelines available for currently practicing medical professionals in rural areas where a majority of HIV patients were actually living (Zhang et al. 2005). Furthermore, HIV treatment was only briefly covered in professional textbooks on infectious disease that were used at medical colleges and universities, and not surprisingly, these textbooks could not keep up with the latest developments in HIV care and treatment.

27.2.1 Demand Analysis

Implementation of the China Comprehensive Response Program (China CARES) in early 2003 ramped up delivery of ART from just a few hundred patients to more than 7000 by the end of the year. By the end of 2003, China had announced its "Four

Frees and One Care" policy and the dramatic scale-up of ART was underway. Although initial roll-out of free ART targeted central China because of the widespread epidemic among former commercial plasma donors (FPD) in the region, scale-up expanded to the entire country soon after (Zhang et al. 2005). (See Chaps. 1 and 25 for more information.)

However, it became clear very quickly that the growth of the program would outpace the development of the human resources it required. For the initial piloting of ART, physicians were trained in the field. But with 7000 people living with HIV (PLWH) having cumulatively received ART by the close of 2003, training individual providers in the field was proving impractical. Furthermore, the delivery of ART services through the CDC system was not sustainable and a transition needed to be made from emergency response to routine treatment through the health system. Demand for standardized clinical treatment guidelines and a scalable training model grew (Zhang et al. 2005).

The "Four Frees and One Care" policy, announced in late 2003, set up a framework for China's new National Free ART Program. Implementation-oriented policies supporting this new program were issued shortly thereafter, which laid out roles and responsibilities for institutional actors at various levels of government, ensured the transition of HIV treatment from public health emergency status to routine health system service, and acknowledged the need to address the substantial financial, technical, and human resource requirements (Zhang et al. 2005). (See Chap. 18 for more information.)

27.2.2 Development of National Treatment Guidelines

The first Chinese national guidelines for HIV clinical management were developed by a group of Chinese clinical experts with support from the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF). The first edition of these national guidelines was distributed to care providers in July 2002. The guidelines consisted of three parts: (1) diagnosis and management of HIV-related opportunistic infections (OIs), (2) management of HIV infections for pregnant women and prevention of mother-to-child transmission (PMTCT), and (3) delivery of ART. The guidelines provided a solid technical foundation for the subsequent launch of pilot treatment programs and HIV care staff training.

In 2003, the first edition of the "Training Package for HIV/AIDS Clinical Treatment and Care" was published. It consisted of 13 different components, each focused on a specific aspect of HIV treatment and care: epidemiology, virology, immune change and reconstruction, OIs, systemic diseases, ART, mother-to-child transmission (MTCT) and PMTCT, treatment using traditional Chinese medicine, clinical care, occupational exposure and protection, prevention and control, and laboratory testing and counseling. This new treatment guideline greatly expanded upon the guideline previously in place, and served as more of a technical reference and a foundation upon which enhanced training curriculum could be developed.

New policy that supported the implementation of the "Four Frees and One Care" policy named the Ministry of Health as the national-level body responsible for supervision of treatment and care, which included the development of technical documents and treatment guidelines as well as the training of health and public health workers on appropriate treatment and care for PLWH (Zhang et al. 2005).

27.2.2.1 The China Free ART Manual

In 2004, China's Ministry of Health published its first formal document on HIV/AIDS treatment and care, "The China Free ART Manual." This manual was based on all prior national guidelines for the clinical management of HIV infection published since 2001. Experts from NCAIDS and 16 other domestic health facilities worked together with a number of international organizations including WHO, the Joint United Nations Programme on HIV/AIDS (UNAIDS), and the United States Centers for Disease Control and Prevention (US CDC), to make the new manual more current and more comprehensive with respect to the provision of medical services, with the intent to drive standardization of treatment regimens and services. The manual was also designed to guide the implementation and scale-up of China's new National Free ART Program. Thus, the China Free ART Manual contained specific requirements for the design, organization, and management of the National Free ART Program. It was distributed to all physicians involved in the diagnosis, treatment, and care of HIV patients nationwide (Zhang et al. 2005, 2007).

As China's National Free ART Program was scaled up, "The China Free ART Manual" was updated—the second edition published in 2008 and the third in 2012. Some of the most important revisions in these later editions included updated ART enrollment criteria, updated antiretroviral (ARV) drug recommendations for first- and second-line regimes, updated instructions on patient follow-up and laboratory monitoring, and added information on clinical care for HIV patients with co-infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and tuberculosis (TB). (See Chap. 13 for more information.)

27.2.3 Establishment of National Clinical Training Centers

Since 2003, NCAIDS has been commissioned by China's National Health Commission (formerly the Ministry of Health) to organize, design, implement, and monitor the training of clinicians involved in ART. Several national clinical training centers were established in infectious disease hospitals located in major Chinese cities, such as Beijing, Shanghai, and Guangzhou, and in the capital cities of high prevalence provinces, such as Yunnan, Guangxi, and Xinjiang (Zhang et al. 2007). These centers have the longest history of providing training to clinicians treating HIV patients in China. Each trainee enrolled at these centers receives 2 months of specialized training that includes 5 days of lectures covering all relevant areas of HIV prevention and control. Trainees must pass a standardized examination in order to complete the course.

Three training centers based in community health centers were established in 2004 to further improve the capacity of physicians caring for HIV patients in rural areas. The Clinton Foundation and the US CDC Global AIDS Program (GAP) were involved in establishing these centers. The first such center was opened in Lixin County, Anhui Province, where there was a particularly high concentration of HIV patients infected through contaminated blood products. The second was located in Luzhai County, Guangxi, where the main modes of HIV transmission were sexual contact and injection drug use. The third was established in Zhaojue County, Liangshan Prefecture, Sichuan Province, specifically to provide services to people of the Yi ethnic minority. Training in these facilities is provided in an intense two- to three-month course and differs from the training provided at the national centers in several respects. The classes have typically been smaller and more one-on-one mentoring has been provided. Mentors are community health practitioners and experts employed by the US CDC. The training center links village, township, and county HIV care and treatment, and helps trainees to better understand the healthcare system by incorporating outreach services and home visits into the training.

To expand training coverage and explore alternative and more cost-effective training models, national and international experts were asked to help develop curriculum "packages" for use as online training modules. Online ART training started in 2010. After finishing the online course and passing an exam, trainees receive their qualification and may begin to provide ART.

27.2.4 Outcomes

By the end of 2013, over 3700 ART clinics were in operation nationwide. During the 8 years of training leading up to that point, the central level had provided in-depth ART training to more than 6000 professionals operating at provincial and city levels, and more condensed, shorter training to more than 5300 providers. Nearly 2800 clinicians had received certification via the online ART training program. A large proportion of these doctors and nurses are still actively working in more than 3700 clinics providing ART to patients around the country.

27.3 Capacity Building Within the National MMT Program

MMT has become a critical component within the set of HIV-related harm reduction strategies China has launched to support its comprehensive HIV/AIDS response. China's National MMT Programs is focused on decreasing dependence and use of opioid drugs and reducing HIV and HCV infections. China has rapidly scaled up MMT nationwide, from eight clinics serving about 1000 clients in 2004 (Pang et al. 2007) to 738 clinics that had served more than 340,000 clients cumulatively by 2011 (Wang et al. 2015). Today, the program regularly serves nearly 200,000 former drug injectors annually across its 785 full-service brick-and-mortar clinics, 29

mobile vans, and 325 satellite sites (Wu and Pisani 2017). (See Chap. 9 for more information.)

The sheer pace of the scale-up created a huge demand for qualified service providers and resulted in an unanticipated strain on providers in existing MMT clinics. This human resource shortage, unfortunately, resulted in compromised service quality (Li et al. 2013; Lin and Detels 2011; Lin et al. 2010a, b).

27.3.1 Demand Analysis

The early years of China's National MMT Program (i.e., 2007 and prior) were very challenging—the program covered only a small fraction of the entire opioid-dependent population, methadone doses were too low according to international standards, a large proportion of clients frequently engaged in concurrent opioid use, and dropping out of treatment was very common (Pang et al. 2007; Sullivan and Wu 2007; Yin et al. 2010). As the focus was on scaling up the program, the causes of these serious problems were not investigated at the time. However, international experience suggested that lack of knowledge and misperceptions of opioid dependence and opioid dependence treatment via agonist substitution led to ineffective service delivery and poor service quality (Li et al. 2013).

In an attempt to address some of these problems, a National MMT Training Center was established. Its mission was to provide basic operational, clinical, and technical training and support to providers in new MMT clinics. However, curriculum was limited, coverage was low, and no further education, training, or capacity building was offered beyond the one-time initial start-up training session (Li et al. 2013).

27.3.1.1 All-Clinic Survey

National MMT Program leaders recognized the need to make program-wide improvements and that service quality would need to be improved by the providers themselves. However, what exactly the providers needed to improve service quality was unknown, and how exactly to give providers what they needed was also unknown. Thus, the National MMT Training Center set out to conduct a survey in mid-2007 of providers in all 320 MMT clinics that were operational as of the end of 2006. The aim of the survey was to investigate barriers and facilitators of long-term, high-quality service as perceived by MMT clinic providers (Li et al. 2013).

A total of 854 clinic staff members (70% physicians, 21% pharmacists) from 276 clinics participated in the survey, yielding several important main findings. Firstly, a majority reported that their clinics were understaffed and that they themselves had little prior experience in drug dependence rehabilitation or psychiatric medicine fields and felt underprepared to perform their job duties. Only 63% had ever received any training at the National MMT Training Center. More than 80% specifically requested training or additional training. Participant-suggested training topics included clinical treatment guidelines, prevention and management of overdose, and HIV prevention (Li et al. 2013).

As of the end of 2007, a total of 503 MMT clinics were operating and had provided services to a cumulative 97,554 clients, 57,947 of whom (59%) remained in treatment. A national-level evaluation of all programmatic data found that methadone doses, treatment compliance, and abstinence from concurrent drug use were all still unacceptably low (Li et al. 2013).

27.3.1.2 Small Qualitative Study

A small qualitative study was conducted in 28 MMT clinics in two provinces (i.e., Zhejiang and Jiangxi) in mid-2008. One service provider and 20 clients from each clinic were engaged in lengthy face-to-face interviews. The overall aim of the study was to investigate MMT service providers' perceptions of the challenges they face that may contribute to low coverage and retention and MMT clients' perceptions of barriers and facilitators to enrollment and retention. Providers identified issues including lack of resources, lack of professional training, lack of institutional support, low income, heavy workload, concern for personal safety, stigma and discrimination, and stress and burnout as problems that stand in the way of providing high-quality care in the MMT clinic setting. Extended hours of operation, incentives, and provision of comprehensive services were identified as factors that could improve recruitment and retention among clients (Lin et al. 2010a, b).

27.3.2 Capacity-Building Plan

The National MMT Training Center took these new findings into consideration and redeveloped education, training, and capacity-building plans. The result was a newly designed technical training program, which aimed to achieve four main goals. Firstly, the new program was to ensure that all new clinics had at least two fully trained staff members present prior to opening (i.e., trained at the National MMT Training Center). Secondly, the new program was to strengthen provider knowledge and skills relevant to the provision of regular MMT services as well as psychosocial support. Thirdly, the new program was to increase coverage of training, skill development, and capacity building by training providers to themselves become trainers within their home province. Finally, the new program was to send selected technical experts into the field to conduct week-long visits to new clinics for the purpose of providing on-site support and coaching (Li et al. 2013). The National MMT Center—provided training curriculum expanded dramatically after 2008 (Table 27.1) and two levels of training were provided—training for individual providers and training for providers who would themselves become trainers (Li et al. 2013).

27.3.3 Outcomes

An evaluation of selected National MMT Program performance indicators was conducted on data from program years 2004 through 2011, comparing the periods 2004–2007 and 2008–2011, and important improvements were observed. For

Table 27.1 Training topics covered by the National MMT Training Center for MMT providers before and after 2008

Training topics	Before 2008	After 2008
For MMT providers		
Overview of MMT	✓	✓
Diagnosis of heroin dependence	✓	✓
Treatment of heroin dependence	✓	✓
Behavioral and psychological characteristics of people dependent on heroin	✓	✓
Overdose prevention	✓	✓
Policy support for, and administration of, the National MMT Program	✓	✓
Pathology of opioid dependence	✓	✓
Pharmacology of methadone	✓	✓
Prevention of HIV infection	✓	✓
Counseling skills		✓
Motivational interviewing skills		✓
Management of poly-drug abuse		✓
Management of common mental health problems		✓
Reproductive health needs among female patients		✓
Methadone dosage, compliance, and retention		✓
Meaning of a positive urine test in an MMT patient		✓
Prevention of HCV infection		✓
For MMT providers		
Role and responsibility of substance abuse counselor		✓
Drug dependence counseling procedure		✓
Substance abuse assessment and counseling		✓
Motivational interviewing		✓
High-risk situation management		✓
Goal setting		✓
Refusal skills		✓
Coping with drug cravings		✓
Relapse prevention and therapy		✓
Management of overdose and poisoning		✓
Time, stress, and anger management		✓
Conflict resolution		✓
Strengthening familial support		✓
Prevention of HIV and HCV infection		✓
Working with young people and with women		✓
Harm reduction		✓
Supervision and support		✓
Burnout prevention		✓

This table adapted from Li et al. (2013)

example, staff-to-client ratios improved, suggesting that efforts to address understaffing problems were being addressed. The mean number of clients per clinic increased, signifying improving enrollment rates. Importantly, the mean duration of clients in treatment improved (i.e., mean of 238 days in 2011 compared to 93 days in 2004), indicating retention was increasing. While not direct measures of improved provider capacity, clinic accessibility, or service quality, these results demonstrate that capacity-building interventions among providers likely have meaningful positive impacts on client experiences (Li et al. 2013).

However, there is still room for further improvement. One major issue that still needs to be addressed is methadone dose. Mean daily methadone dose increased by only roughly 25% (from 47 mg in 2004 to 59 mg in 2011 and to 61 mg in 2014). This dose level is still far below international recommendations (Li et al. 2013). A wealth of clinical trial and observational study findings as well as routine clinical experience have demonstrated that dosages of 80–120 mg per day are required to reliably achieve positive outcomes. Low methadone dosing within China's National MMT Program has been specifically studied and found to be caused by four main issues. Firstly, providers fear giving larger doses as they may be liable for potential overdose-related fatalities. Secondly, providers still lack understanding or have low acceptance of the long-term maintenance approach that MMT is based upon. Thirdly, poor communication between provider and client results in failure to adjust dosages as needed. Finally, dose reduction is a common response by providers when clients report side effects (Lin and Detels 2011).

27.4 Advanced Training for HIV/AIDS Program Managers

Prior to 2004, provincial-level HIV/AIDS program managers had relatively few training opportunities. Therefore, with the support of the US CDC GAP, NCAIDS developed the Provincial Project Management Training Project (PPMTP). This program aimed to improve capacity to respond to local HIV epidemiological trends; lead, plan, implement, monitor, and evaluate HIV/AIDS programs at the provincial level; and help project management staff to do so at local levels. The PPMTP also established a platform for communication and coordination of activities between provincial CDCs and NCAIDS, and strengthened the network connecting provincial CDCs to each other (United States Agency for International Development 2009).

27.4.1 Training Protocol

The training program runs over 6 months and encompasses three parts: (1) 4–6 weeks of classroom instruction, (2) a rotation through each of the seven NCAIDS divisions, which takes 5 months to complete, and (3) mentored field visits. Class sizes are kept small with eight trainees per session. All trainees take a qualification exam and receive evaluations from mentors and division directors. After graduation, ongoing support, networking, and refresher training is provided.

Since 2004, more than 50 experts on HIV prevention and control have been invited to give lectures to trainees in this program as part of the classroom component of training. These expert trainers have been recruited from, for example, international nongovernmental organizations (NGOs), WHO, UNICEF, NCAIDS, and domestic institutions including China CDC and some of the most prestigious medical universities in China. Many unique topics have been covered such as different global and China-specific HIV epidemiological circumstances and response

strategies, HIV testing and counseling, HIV/AIDS interventions, AIDS clinical treatment and care, HIV virology, and project management, program development, and monitoring and evaluation (United States Agency for International Development 2009).

27.4.2 Outcomes

An evaluation was conducted in August 2011 after 12 training classes with 95 trainees from 30 provincial-level administrative regions had completed the training program. The evaluation found that 95% were satisfied with the program, 77% were working in planning and management of provincial, national, or international HIV programs, 80% were supervising county-level HIV programs, 67% had provided HIV-related training for others, and 87% had conducted HIV/AIDS program monitoring and evaluation activities.

From May 2004 to May 2013, 14 training cohorts, with a total of 112 participants, had completed the program. These participants have been drawn from 30 of China's 31 provincial-level entities, as well as from some cities with decentralized planning such as Dalian, Qingdao, and Shenzhen.

Some graduates from the program have gone on to manage HIV prevention and control in areas where the HIV epidemic has been severe, such as Zhumadian (Henan), Dehong (Yunnan), Yili (Xinjiang), and Liuzhou (Guangxi). Some graduates have been promoted to project manager, director, or deputy director positions for HIV/AIDS within the China CDC network.

Trainees have also attended national HIV/AIDS annual meetings for work planning, and two workshops provided by the International Training and Education Center of Health (I-TECH) at the University of Washington—one on qualitative research methods and data analysis and one on leadership and management skills. Training topics include program management and planning, policy development, HIV prevention among key, high-risk populations, testing and intervention, care and treatment, ethical and legal issues, and monitoring and evaluation.

Each class of trainees has been invited to frequently share their feedback and suggestions for improvement of the PPMTP with NCAIDS division directors. Post-training evaluations have been conducted among program graduates every 2 years. Starting in 2013, NCAIDS began funding the PPMTP to supplement the ongoing support being provided by US CDC GAP. (See Chap. 21 for more information.)

27.5 Conclusion

Significant effort has been put into the development of human resources for HIV prevention and control programs in China since the early 2000s. Each level of government has contributed domestic funding for training and capacity building for all personnel involved in treatment, from high-level program officers to medical staff based in the community. The training programs described herein have helped

develop domestic human resources involved in HIV/AIDS prevention and control programs in China. However, the number of PLWH in China continues to grow and the HIV epidemic has become more complex. Thus, despite these large capacity-building efforts, human resources that are trained for, and dedicated to, the fight against HIV/AIDS in China are still lacking. Capacity building for HIV/AIDS prevention and control in China needs to be viewed as a task requiring continuous focused attention. With continued program scale-up, emergence of new technologies, and redevelopment of testing and treatment procedures and integration of services, it is crucial that these efforts to build capacity receive consistent priority, focus, and funding and that they are thoroughly evaluated and frequently improved, so that China can meet the ongoing challenges of human resource shortages.

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HIV-Related Stigma and Discrimination in China

28

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Stigma remains the single most important barrier to public action. It is a main reason why too many people are afraid to see a doctor to determine whether they have the disease, or to seek treatment if so. It helps make AIDS the silent killer, because people fear the social disgrace of speaking about it, or taking easily available precautions. Stigma is a chief reason why the AIDS epidemic continues to devastate societies around the world.

Ban K-Moon, Secretary General of the United Nations, 2008

Closing gaps in service coverage requires the empowerment of populations that are often left behind: women and girls, young people, key populations and people living with HIV. All national AIDS programmes require a strong community empowerment element and specific efforts to address legal and policy barriers.

Report of the Secretary General of the United Nations, 7 April 2017

Abstract

Stigma and discrimination are major barriers to an effective response to HIV/AIDS in China. The early discovery of HIV among foreigners and Chinese ethnic minority populations reinforced the perception that AIDS was a "foreign disease." Initial campaigns focused on the terrible nature of HIV disease that created stigma associated with HIV infection. Stigma and discrimination against marginalized populations was only reinforced by the high rate of HIV infection among these populations. Improving access to care services by reducing HIV-related stigma and discrimination is feasible and essential to reaching ambitious

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targets to end the AIDS epidemic. Chinese leaders have made a point of publicly challenging HIV-related stigma and they were among the first in Asia to make appearances with people living with HIV (PLWH) on World AIDS Day. Gradually, China has adopted many international "best practice" models of HIV prevention, care, and treatment into the national AIDS strategy. New legislation protecting the rights of PLWH was introduced in 2006; yet implementation of protective legal norms is often suboptimal and groups that face discrimination may feel left behind, and large-scale social campaigns, including among health care workers, have been carried out in China to reduce stigma and discrimination. These have led to a significant reduction in prejudicial attitudes toward PLWH. Nevertheless, more needs to be done still to eliminate stigma and discrimination and to implement existing laws and policies protecting the rights and privacy of PLWH in China.

28.1 Introduction

Since the beginning of the epidemic, HIV-related stigma has been recognized as one of the main barriers to the effective prevention and care for people living with HIV (PLWH). It marginalizes both those with HIV and those at risk of being infected, affects health-seeking behavior, and creates a range of challenges for HIV interventions. It affects the families, friends, and even doctors of people with HIV, creating social and family tensions that have serious, long-term impacts on far more than just individuals with HIV infection. It even impacts economic growth and the financial well-being of both families and the wider community.

In China, stigma is also an important barrier to an effective response to the HIV epidemic, perhaps even more so than in many other countries. Although China is a multi-ethnic country with a rich and culturally diverse history, mainstream Chinese culture does not embrace diversity, and there is often open criticism of the "Western" concept of individualism. Traditional Chinese culture tends to stress conformity and harmony at the expense of the individual, with the family unit rather than the individual taking priority in social interactions. While there have been significant social changes over the last 50 years in China, there is still a heavy focus on, and deference to, family compared to European or American culture. In short, the individual should not "make waves" lest he or she upsets elders or authority figures in family units, society, or the government. These dynamics resonate throughout modern-day Chinese culture. On top of this rather restrictive social system, China was extremely isolated between 1950 and 1980, with strict social and political rules that effectively controlled every aspect of daily life. Although many practices and institutions of traditional Chinese society were dismantled, this system only served to reinforce traditional attitudes toward nonconformist lifestyles, attitudes, or activities, engendering a fertile environment for stigma and discrimination in Chinese society.

In this social context, stigma and discrimination against marginalized groups such as people who inject drugs (PWID), men who have sex with men (MSM), and

female sex workers (FSW) have long been present, and did not suddenly arise because of the HIV epidemic. After the Communist Party came into power, a series of political campaigns was launched against drug use and commercial sex work. These campaigns were an expression of the high degree of disapproval and social stigma that these populations faced. Sex work was effectively eliminated, and drug users were arrested and subjected to strict punishment. Even now, anyone caught trafficking more than a small quantity of drugs in China is still facing life imprisonment or even the death penalty. Homosexuality was officially considered a mental illness until 2001, and although a large gay subculture has long existed, MSM did not dare reveal their sexual orientation, even to family or close friends.

Former plasma donors (FPD) who were infected with HIV were also subject to stigma and discrimination, though this was largely due to their HIV status rather than their identity (as blood donors or plasma sellers). Stigma against this group was compounded by social inequality and discrimination directed at poor rural populations, many of whom migrate to cities in search of work. In a survey of rural plasma donors infected with HIV, more than 80% reported suffering from "widespread" stigma, including nearly half who reported experiencing it in healthcare settings (Cao et al. 2009).

The first person identified with HIV infection in China was a foreigner in 1985. By 1988, there were 22 confirmed cases, mostly foreigners, Chinese returning from abroad, or people with hemophilia who had been given imported blood products, reinforcing the view that AIDS was a foreign problem and those who were infected were separate from Chinese society (Sun et al. 2010). By 1989, an outbreak of HIV was reported among PWID near the Yunnan–Myanmar border, which had infected at least 146 people (Ma et al. 1990). During the first decade of the epidemic, the imagery used to represent HIV and PLWH was shocking. Frightening images of gaunt, dying Africans reinforced both the terrifying nature of the disease and the "foreignness" of the epidemic. The central government quickly imposed restrictions on the import of foreign blood products and required that all foreigners entering the country be tested for HIV. These initial reactions to the epidemic helped to reinforce social stigma and discrimination against those living with the virus.

During the first decade of the epidemic in China, the various ethnic minority groups in Yunnan province, who were generally looked down upon and thought to be backward and uneducated by many Han Chinese, were discovered to have much higher rates of HIV infection than the general population. Although ethnic minorities represented around 8% of China's total population, by 2002 more than 30% of reported HIV cases had been identified in people of minority ethnicities (Deng et al. 2007). Whether this disparity was due to geography, drug use, or other factors is unknown, but it only served to compound existing discrimination. At the same time, this disproportionate infection rate among those in Yunnan's border regions further reinforced the idea that AIDS was a "foreign" disease, which created a false sense of security for the Han Chinese population (Deng et al. 2007).

Although the Chinese government took steps to control the HIV epidemic in the 1990s, these measures were primarily focused on border security—testing

foreigners or returning Chinese attempting to enter the country (Sun et al. 2010). In addition, initial attempts at public education focused on the terrible nature of AIDS, with HIV infection portrayed as a death sentence. These efforts, intended to control the spread of the epidemic, actually served to increase stigma associated with HIV and AIDS more than anything else.

Since the early 2000s, the central government has made increasing efforts to control the spread of HIV, treat those who had been infected, and reduce stigma and discrimination against those with the virus. Government investment in information campaigns, legal reform, and policies have been directly aimed at reducing stigma and discrimination. Furthermore, the government has reviewed and evolved their early responses. For example, the ban on foreigners with HIV infection entering China was eventually eliminated in 2010. Unfortunately, a high degree of stigma and discrimination remain major obstacles for PLWH accessing prevention or care services, and many people still do not dare to be tested for HIV even if they know they are at risk (Sun et al. 2010).

Chinese leaders have expressed a clear determination to control the epidemic and limit its social and health impact. Chinese leaders were some of the first in Asia to make public appearances with PLWH, and cooperated with international programs to introduce "best practice" models of HIV prevention, care, and treatment in the country. While funding for innovative HIV-related programming was initially provided by international programs such as the US CDC Global AIDS Program, UK Department for International Development (DFID), and the Global Fund for AIDS, Tuberculosis and Malaria (The Global Fund), Chinese government investment has steadily grown since the mid-2000s and now far exceeds international support (Wu et al. 2011).

28.2 Forms of Stigma and Discrimination in China

There are many different forms of HIV-related stigma and discrimination in China. Far from being a simple case of being "discredited" by their HIV status (the traditional conceptualization of stigma in academic discourse), stigma against PLWH in China arises through a complex layering of many factors, including deviance from social norms as well as existing inequalities of ethnicity, gender, sexuality, residency (urban versus rural), and poverty (Goffman 1963; Parker and Aggleton 2003). *Discrimination* is an outcome of this stigma, in this case toward people living with or linked to HIV.

Stigma in China can be divided roughly into four categories: (1) *self*-stigma; (2) *family* stigma, from within one's immediate circle of family and relations, those who would traditionally form one's "safety net" in Chinese society; (3) social stigma, including public attitudes, as well as attitudes of friends, coworkers, and strangers; and (4) *institutional* stigma, including laws, policies, and stigmatizing attitudes and behavior from institutions such as hospitals, schools, and government.

28.2.1 Family and Self-Stigma

28.2.1.1 Self-Stigma

Self-stigma affects a majority of PLWH in China. A UNAIDS survey, published in 2009, revealed that 62% of respondents in China reported feeling ashamed, 75% blamed themselves, and 43% felt guilty about their HIV status (UNAIDS et al. 2009). While self-stigma is, by definition, internalized psychological pressure, it can have serious consequences on both the individual and those around him or her. Internalized stigma generally depresses the individual's self-esteem and will to engage with friends and family, find or retain a job, or have children. Multiple studies show that depression is very common among Chinese PLWH. Self-stigma is often exacerbated by external pressure and stigma from family members, friends, and health-care providers, the same people who could otherwise help reduce feelings of shame (Zhang et al. 2011).

28.2.1.2 Family Stigma

As China is traditionally a very family-centered culture, the one "safe harbor" for Chinese people is normally inside the family. However, the stigma associated with HIV is so strong that it has created isolation within this structure. For many Chinese PLWH, their status was impossible to disclose to their parents or to their sexual partners (UNAIDS et al. 2009). While this has obvious epidemiologic implications (*see below*), the psychological stress, including feelings of isolation, guilt, and shame, are serious challenges and serve to devalue PLWH.

In some Chinese families, there is a high degree of blame placed on individual, and sometimes they are completely rejected by family members. There are many anecdotal accounts of parents rejecting their HIV-infected children (especially those who are using drugs) and wives or husbands becoming mistrustful of a spouse who contracted the virus. Given the importance of the family unit in China, stigma from within this core is capable of destabilizing the foundations of a person's emotional and psychological well-being.

28.2.1.3 Secondary Stigma

Family members of PLWH in China are particularly susceptible to secondary stigma and are indeed often seen as "tainted" or "guilty" simply due to family relation. In many documented cases in the early 2000s, parents, siblings, or children of PLWH have been shunned by neighbors, fired from jobs, or denied opportunities for work or education. Families, especially parents of PLWH who are seen to have "strayed" into drug use, sex work, or promiscuity, are blamed for not raising their children to avoid such "evils" and for not correcting the behavior before it led to HIV infection (Li et al. 2008a, b). Such secondary stigma also causes resentment and conflicts between family members. One survey conducted in a rural village showed that 47% of villagers said they would discriminate against family members of PLWH, and 40% of children would not be willing to

play with the children from a household with an family member that had HIV infection (Liu et al. 2010). In a national survey, more than three-quarters of PLWH said that their family members had experienced discrimination due to their own HIV status (UNAIDS et al. 2009).

Children of PLWH are often seriously affected by secondary stigma, which includes being rejected by other children's parents, refused places in local schools, and sometimes exposed in local media reports. In one famous case, an orphan from one of the "AIDS villages" in central China was adopted by a family in Beijing and appeared to have escaped stigma. However, her picture was later featured in a local media report. Her adopted mother, an outspoken professor, sued the newspaper and won compensation, but there was no reversing the effect of the stigma.

28.2.2 Social Stigma and Discrimination

In China, the biggest fear for most PLWH is to have their status revealed without their consent by health care providers or government officials, friends, NGO staff, and even other PLWH. A major concern for PLWH was that if their HIV infection status was known, they would become the subject of gossip and rumors (UNAIDS et al. 2009). Overall, 87% of female respondents and 79% of male respondents expressed this concern, indicating the severity of the risk they faced. More than half of the respondents worried about being insulted if their HIV status were to be revealed (UNAIDS et al. 2009).

Those whose HIV status is exposed risk a high degree of isolation from friends, coworkers, and other acquaintances. PLWH report that a sizeable portion of medical staff (26%), government officials (35%), as well as teachers (36%) showed a "discriminatory" attitude after learning of a person's HIV status (UNAIDS et al. 2009). A 2007 study found that 53% of survey respondents would not join in recreational activities known to include PLWH, and 51% would not shake hands with PLWH (Zhang et al. 2007).

While China's AIDS Regulation protects the right of PLWH to marry, the intense social pressure surrounding HIV creates many obstacles for PLWH who want to get married. Chinese parents feel enormous societal pressure to ensure these marriage bonds, not only between child and new spouse, but between the families. Thus, matches are carefully selected. This makes it almost impossible for Chinese parents to agree to their children marrying PLWH. This causes many people to simply give up on marriage or having a family, although some do marry other PLWH (UNAIDS et al. 2009). This stigma can also affect health care workers caring for PLWH. In one well-publicized case in 2013, a nurse working on an HIV ward in a Shanghai hospital was forced to end her relationship when her boyfriend's family discovered she was providing care to AIDS patients (Cai 2013).

28.2.3 Institutional Stigma and Discrimination

28.2.3.1 Educational Discrimination and Housing Discrimination

Children of PLWH were often being asked to leave schools when their parents' HIV statuses were disclosed, even if they themselves are not infected. Nearly one in ten PLWH who have children complained that their children had been forced to leave school because their parent's HIV statuses had been revealed. While such rules may not exist on paper, they are reinforced by pervasive institutional discrimination and attitudes: In the same survey, more than one-third of study participants who had revealed their HIV status to teachers complained that their teachers had shown a "discriminatory" attitude upon learning of their status (UNAIDS et al. 2009). Many PLWH report being forced to move when neighbors or landlords discovered their HIV status, and many landlords will openly refuse to rent housing to PLWH.

28.2.3.2 Employment Discrimination

Despite laws protecting PLWH right to work, employment discrimination is very common in China. Since being diagnosed with HIV infection, one in six PLWH complained they had experience of being refused for employment, which is not surprising given that a majority of Chinese express fear at working alongside infected coworkers (UNAIDS et al. 2009; International Labor Office 2011; Zhang et al. 2007).

According to a joint report issued by the International Labor Organization and China CDC, the handbook on health qualification for Chinese civil servants explains that "unlike those who carry Hepatitis B, people living with HIV have a 100% chance of developing AIDS, and most of them will die within 2 years of developing the disease given no anti-HIV therapy. Therefore, once HIV infection is detected, whoever carries the virus will be disqualified" (International Labor Office 2011). Similar disqualifications have been imposed on applicants for teaching positions and other jobs, and these decisions were successfully defended even when PLWH took the cases to court (International Labor Office 2011).

28.2.3.3 Discrimination in Healthcare Settings

Discrimination in health care settings in China usually takes the form of either (1) refusal to provide medical care to PLWH, for example, by "referring" a patient to another facility, or (2) providing poor quality or inappropriate care, or (3) treating the patient with a lack of respect or care, including failing to protect their confidentiality. Such treatment can also reduce the confidence and self-esteem of PLWH, which has been shown to have a direct impact on their health and well-being.

There is a growing recognition that barriers in HIV prevention, testing, and treatment services are fueled by stigma and discrimination, especially within health care settings (UNAIDS 2017). Empowered communities and CBOs can help to monitor the quality of health services provided to PLWH, improve service

delivery, and assist in addressing serious complaints. When local governments allow such measures, the pledge of leaving no one behind can be realized, thus removing a significant barrier to achieving ambitious prevention and treatment targets (UNAIDS 2017). A study in 2002 found that around half of health care workers in China had not received adequate training on HIV and were "misinformed" about the means of transmission of HIV. Inadequate knowledge and fear of contagion only exacerbated their discrimination toward PLWH (Wu et al. 2002). In a similar study, 33% of health care workers said they would request to be assigned elsewhere if they were treating PLWH (Zhou 2009). In many cases, the discriminatory attitude of doctors or nurses was so intimidating that PLWH do not seek necessary medical care, choosing instead to self-medicate or wait until the problem becomes unbearable before seeking treatment. A training program on universal precautions, improving HIV patient care, and fighting HIV-related stigma was implemented in Chinese hospitals for doctors, nurses, and laboratory technicians (Li et al. 2013). Those who received the training showed a significantly greater reduction in stigma and negative attitudes toward PLWH than those who did not receive the training.

28.2.3.4 Unintended Consequences

In many cases, poorly planned anti-HIV campaigns or government actions intended to protect PLWH led to increased stigma and/or discrimination. For instance, according to China's Prison Law, those with a serious need for medical treatment cannot be sent to prison, resulting in many cases of criminals with HIV infection being released after they were arrested. This policy created a public uproar and increased resentment and stigma against PLWH. In another example, an AIDS prevention slogan that was intended to raise awareness and reduce risky behavior used the slogan "Don't let AIDS through your door," causing many people to call for zero contact with PLWH and increasing discrimination rather than lowering transmission rates. Additionally, strict HIV prevalence targets, meant to push local officials to strengthen HIV prevention efforts, actually resulted in officials either falsifying data or actively discouraging people from getting HIV tests. Moreover, open bidding for the price of ARV drugs pushed the price so low that local companies no longer had any incentive to produce high-quality medicines. Finally, in many cases, local CDC staff assigned to follow-up and case management feared having contact with PLWH. They also exposed PLWH and their families to the suspicious attention of neighbors by arriving in CDC vehicles, potentially causing confidentiality to be lost and creating secondary stigma for the family.

28.3 Social Norms and Other Determinants of Discrimination and Stigma in China

Early on, a common refrain heard among ordinary Chinese, and even some government officials, is that PLWH somehow "deserved" their HIV infection, as they are seen to have broken the social contract and are being punished for their

immorality (Lee et al. 2005). In the eyes of many Chinese, there is a sort of "hierarchy" of those infected with HIV, with children, medical staff, and wives infected by their husbands considered worthy of sympathy, and drug users, sex workers, and MSM considered "guilty" and deserving of their fate (Chan et al. 2007).

A certain degree of moral indictment of PLWH by society is nearly universal in China. For example, in the eyes of most ordinary Chinese, the strong stigma associated with FSW, PWID, and MSM was often transferred to anyone with the virus, and anyone with the virus was considered morally compromised, forcing PLWH to hide their status and maintaining a vicious cycle of fear and stigma. Many Chinese parents, unable to keep up with the rapid pace of social change in the country, could not understand their children's lives—for example, those involved in same-sex relationships—and young people often chose not to disturb their parents by revealing these realities. Flaws in the legal and medical systems, combined with people's lack of trust in these systems, also served to create, maintain, and even intensify stigma and discrimination against PLWH in China. A lack of understanding of how HIV is transmitted among many members of the general public caused great anxiety and fear, which created a high degree of stigma against anyone living with HIV. In its most basic form, ignorance of HIV transmission pathways leads to a desire to avoid any contact with anyone who is or may be infected. This creates social isolation for PLWH and a range of social, psychological, and even health problems. In China, this was a common phenomenon before antiretroviral therapy became widely available, as information was either not available, did not reach those at community level, or was not trusted by the general public. A 2003 survey of more than 5000 people in Southwestern China revealed that 51% of people thought HIV could be transmitted by insect bites and 60% thought that PLWH should be quarantined, 37% thought they should be barred from social gatherings, and 40% thought they "deserve no sympathy" (Derlega et al. 2006).

28.3.1 Fear and Avoidance of HIV

Another common reflection of uninformed fear is the so-called "AIDS Phobia" which was common in China. For many people, the fear of having been infected with HIV became an obsession, and they called HIV information hotlines or posted on discussion forums in a panic about a suspected exposure to the virus. Even after multiple negative HIV tests, this group of people continued to harbor a fear of infection that could not be eased.

Widespread public fear and ignorance also led to a rapid dissemination of rumors regarding PLWH intentionally infecting others as a means of "revenge" against society, despite the lack of any documented incidents of such attacks. In fact, surveys conducted by NGOs in China show that while the majority of PLWH feel they are treated unfairly by society, they do not harbor angry resentment or have any intention to get revenge.

28.3.2 Stigma and Discrimination in the Medical Sector

Both the health settings and staff are important sources of discrimination against PLWH in many places of China. This may be one of the most dangerous forms of discrimination, since effective medical care is critical to the survival of those infected with HIV. This discrimination has many causes and manifestations.

Since 2004, in line with China's "Four Frees and One Care" policy, ARV treatment has been primarily provided by some designated hospitals due to concentration of health resources, but it does not necessarily mean that the infected people are limited to other hospitals for other disease treatments. As misinterpreted, this led to most other hospitals refusing to see these HIV patients. These operational guidelines were sometimes misused as a pretext by doctors, who did not want to treat HIV patients, to send them elsewhere. Often this was because medical staff feared for their own safety or did not want other patients to know that they were sharing a facility with PLWH.

Hospital management and staff are also members of the community and are influenced by the same misconceptions and fears of HIV as the general population. This further contributes to widespread discrimination against PLWH seeking care. During the early years of the epidemic, many medical staff might have reasonably feared for their personal safety, given that knowledge was poor, experience was little, and effective treatment for HIV infection was nonexistent. Surveys as recent the early 2000s show that medical staff had insufficient knowledge of HIV infection and treatment, and that they were not willing to work in an AIDS ward or see HIV patients. In a study of hospital-based medical staff in Guangxi Zhuang Autonomous Region, 33% responded that they would consider asking for a transfer if assigned to care for HIV patients (Anderson et al. 2003). In a 2008 survey of 204 nursing students in their final year of training, majority of respondents thought that HIV could be transmitted by sharing utensils or using the same toilet, and roughly half of respondents said that PWID who have HIV infection "got what they deserved" and felt that young children should not have contact with an HIV parent (Li et al. 2008a, b). Even after years of AIDS education and plentiful evidence that universal precautions effectively prevent occupational transmission and infection, attitudes had not changed very much. In a 2013 study in Shanghai, 59% of medical staff felt that PLWH should be isolated from healthy patients, and 50% felt that PLWH should not be allowed to have operations in general hospitals. In the same survey, 58% of medical staff said they would allow their children to go to school together with the children of PLWH (Huang et al. 2013).

Finally, there is a deeply rooted lack of trust in the medical system and a nearly universal complaint among working-class Chinese that medical treatment is out of reach due to the profiteering of some medical institutions. These fears among patients are not without a basis in reality, as there are many documented and many more suspected cases of people being infected through medical procedures (Liang et al. 2009; Mastro and Yip 2006; Chan et al. 2007).

The medical system and medical staff are also negatively impacted by the stigma associated with HIV. Doctors and nurses in China who work with PLWH have

reported that they also feel marginalized or stigmatized among hospital staff. One survey of 478 doctors, nurses, and lab technicians working with PLWH, conducted in 2006, found a "significant association between internalized shame reported by service providers and their perception of being stigmatized due to working with [PLWH]" (Li et al. 2007). The stigmatization of health care workers discourages many from pursuing a career that involves working with PLWH. Because treatment for HIV is free, and because many PLWH are poor or marginalized populations that are unable to afford expensive medical bills, the scope for these sales is greatly reduced.

28.3.3 Economic Growth and HIV Stigma

The economic environment has played an important role in negative attitudes toward PLWH in nonmedical fields as well. Indeed, fear about the impact of the epidemic on economic development is a factor from the small rural village to the large city and the provincial levels. In some rural areas, villagers reported that people from surrounding areas would no longer buy their produce or products knowing that there are PLWH living in the village. At a higher level, officials privately complained that their cities or regions were being "marked" as "AIDS areas" and that everything from foreign investment to tourism would suffer as a result. The consequence of this sort of fear was all too often an attempt to minimize any discussion or attention paid to the growing epidemic, with local officials, doctors, and others trying to downplay information or even conceal HIV infection figures in order to reduce the potential impact on their economic development.

28.3.4 Laws, Policies, and Official Attitudes Toward HIV

The idea that PLWH should be isolated or are in some way "dangerous" to society is reinforced by existing laws in China. In 2010, a joint report issued by the China CDC and the International Labor Organization (ILO) highlighted the discriminatory nature of an existing national policy for recruiting civil servants. It explicitly disqualifies people who have a variety of infectious diseases from employment as civil servants stating, "… those who suffer gonorrhea, syphilis … HPV, genital herpes or HIV will be disqualified" (International Labor Office 2011).

In subsequent interviews, an official from the ILO said that this regulation effectively sanctions the exclusion of PLWH from the workplace saying, "[i]f the government discriminates against people with HIV, then other sectors will follow, for example, if you apply to be a teacher…" (Burki 2011). In common practice, teachers, doctors, and many other professions exclude PLWH, with or without official legal sanction. The report also notes that national guidelines prohibit PLWH from working in "public places," a classification so broad that it potentially restricts nearly all employment. All of this is in violation of the ILO Code of Practice on HIV/AIDS, to which China is a signatory (International Labor Office 2011).

Despite government policies and laws that demand the protection of the rights and confidentiality of PLWH, the discriminatory attitudes of the officials implementing these rules means they are often ignored or distorted. A 2005 study published by a researcher in the Communist Party's Central Party School in Beijing concluded that it was an "urgent priority of HIV/AIDS prevention and control to reinforce knowledge dissemination and policy advocacy and to change discrimination among major government and Party officials" (Jin 2005). The study revealed that 39% of officials surveyed "strongly agreed or basically agreed to segregate [PLWH] from the general population." Furthermore, 65% reported that they would choose to "segregate family members infected with HIV." Finally, 36% said they believed that "only the degraded groups such as drug users can be infected with HIV" (Jin 2005).

While some more progressive policies to protect the rights of PLWH have been introduced at the national level, China's legal system is still struggling to ensure enforcement of these policies, especially at local levels. A lack of supervision and few strict enforcement mechanisms make it impossible to guarantee strict implementation, and there is little or no legal aid available to ensure that PLWH can effectively protect their rights. Removing sex work and related activities as offenses under the law in China, however politically difficult, might ease the situation for female and male sex workers who currently have no rights protections (Shen and Csete 2017).

28.4 The Impact and Consequences of Discrimination in China

HIV-related stigma and discrimination have serious impacts not only on PLWH but also to their families and communities. They can include psychological, social, and medical problems for affected individuals. Without proper treatment, AIDS is fatal. Even if a person has social and psychological support, HIV infection can bring many challenges including strain on, or breakdown of, relationships with intimate partners, family, friends, and coworkers (Zhang et al. 2011). Employment and housing are both at risk, threatening the stability of PLWH and their families. Family members, including children, are often subject to stigma and isolation from their peers, and in some areas, the entire community can be "marked." There were, for example, many so-called "AIDS villages" in Henan province in the mid-2000s, where local villagers complained that neighboring areas shunned them and even refused to buy their produce. At an epidemiologic level, stigma can cause people to avoid HIV testing and drive PLWH underground, creating perfect conditions for the rapid growth in the number of new infections and deaths. Although the consequences of stigma and discrimination are extremely complex, they can roughly be placed in two categories, direct consequences and indirect consequences.

28.4.1 Direct Consequences

28.4.1.1 Personal Consequences

Perhaps the most immediate consequence of stigma and discrimination is on the mental and physical health of PLWH. During the first two decades of the epidemic (1985–2005), most HIV testing sites in China provided only basic testing and counseling and had very limited ability to provide ongoing support and referral services. For those who tested positive for HIV, this lack of resources often led to a sense of isolation and panic. Feelings of shame, guilt, and self-blame, as well as depression, anxiety, and consideration of suicide have been found to be common among PLWH. Without effective psychological support, many PLWH reported that they had given up on hopes of families, employment opportunities, and bright futures (UNAIDS et al. 2009). Thus, even before requiring urgent medical care, many PLWH in China face an urgent need for psychosocial support, counseling, and, in some cases, mental health treatment.

Many PLWH reported that they had been refused employment when their status was revealed (15%) or that the job or nature of the work at their existing job changed (17%) (UNAIDS et al. 2009). Without income, even basic needs such as food, shelter, and clothing are not secure, and there is no government-run safety net to assist PLWH. If their families have the means, many will be partly supported by parents or siblings, though China's one-child policy means many have no siblings (Zhou 2009). Living in constant fear of being "discovered" and evicted from one's home is a desperate situation, especially for those who may not have told their friends or families about their HIV status.

Children of PLWH, including those who are not infected, experience widespread discrimination, with their neighbors, friends, and even relatives rejecting them. Given the severity of prejudice, many schools explain to parents that they simply cannot enroll the child for fear of other parents' reactions. For so-called "AIDS orphans," children whose parents have died of AIDS and who may or may not be infected themselves, the risk is even higher. While some family members might care for an orphaned uninfected child, almost no families, nor state-run orphanages, will take in children who are infected. At best, this discrimination causes anxiety, stress, and loss of self-esteem for children. At worst, it is a threat to their very survival.

28.4.1.2 Impact on Families

In some cases, families rallied around and supported each other, often participating in support groups and creating new circles of more tolerant friends. In some Henan villages with high HIV prevalence rates, there was a clear reduction in stigma and strong support structures emerged within the community. These social support structures are important for both the psychological and physical well-being of PLWH and their families.

28.4.1.3 Medical and Health Consequences

For many PLWH in China, the virus still represents a serious threat to survival. Despite the availability of free ART, stigma and discrimination has a direct and often serious impact on their health. Each step in the continuum of care in China is potentially impacted by social or medical stigma and discrimination.

In many documented cases, PLWH in need of surgery faced a serious dilemma—local hospitals were unwilling to provide treatment and designated infectious disease hospitals lacked surgical facilities. In 2001, a well-known AIDS activist was hospitalized with spinal tuberculosis, a serious condition that could lead to fused vertebrae. Although this person only needed a simple surgery, no hospital was willing to perform the procedure until a personal appeal to the hospital director convinced him to approve the surgery. In other cases, doctors were reluctant to start PWID with HIV infection (even if they no longer were injecting drugs) on ARV therapy, claiming that their adherence would be too low. The consequences of any medical discrimination involving HIV can be severe, including death.

Even if PLWH have access to medical care, stigma can have a serious impact. Many PLWH in China delay initiation of ARV treatment out of fear of side effects or other factors that might reveal their illness (such as being seen taking ARVs or visiting designated AIDS treatment clinics). The lack of sympathetic and systematic counseling and treatment support—itself an outcome of ignorance and stigma—means that these fears are difficult to dispel. Many patients who are on ARVs immediately discard any packaging or instructions, again in order to prevent discovery by friends or family members. If their medical provider discriminates against them and does not treat them with respect, it is likely to damage both the patient's self-esteem and health outcomes. Research has shown that "even where [PLWH] have access to health care, they may not experience better health and quality of life as a result" (Farmer et al. 2006).

Finally, research among Chinese PLWH has documented a reluctance to disclose one's status to sexual partners among rural migrants and MSM, which may perpetuate a cycle of infection, concealment, and continued transmission risk (Hong et al. 2008).

Thus, from an epidemiological point of view, there are serious negative consequences of stigma and discrimination. Especially during the first decade of the epidemic in China, multiple stigmas associated with HIV inhibited those most vulnerable to it from accessing services such as HIV information, HIV testing, and primary health care (Zhou 2009).

28.4.2 Indirect Consequences

Though more difficult to quantify, the indirect impact of HIV stigma and discrimination can have a serious long-term and equally life-threatening effects. As mentioned above, the first such impact is the increased incidence of HIV infection caused by "hidden" populations (e.g., PWID, MSM, FSW), but also denial of being

at risk of HIV infection (e.g., sexually active youth) and those who do not seek medical care even after receiving positive test results due to a fear of discrimination.

The degree of this impact can be surmised by identifying the key challenges faced by China's response to HIV. Originally, the main challenge was effective public education (for prevention) and identifying PLWH (for treatment), both of which were exacerbated by the high degree of stigma surrounding HIV and AIDS. Subsequently, the main challenge was reaching populations such as PWID and MSM with effective interventions, including harm reduction (for PWID), HIV prevention information and testing (for MSM), and treatment scale-up for both populations. These were both impeded due to the high degree of legal and social discrimination against both these populations, with treatment scale-up obstructed by medical stigma (especially against PWID). Until now, the main challenges were the continued scale-up and improved quality of ARV treatment and reaching hard to reach populations such as migrant PWID and FSW. These goals are both hindered by the lack of wide-scale adoption of peer-led outreach and treatment models, which have been shown to improve both the coverage and, importantly, the quality of such interventions. One major reason such models have not evolved and grown in China is the high degree of discrimination against peer-led initiatives, especially for PWID.

28.5 The Response to Stigma and Discrimination in China

Recognizing the importance of reducing HIV and AIDS-related stigma and discrimination, the Chinese government has been increasing its efforts to eliminate stigma since 2003.

28.5.1 Legislation and Policy Enforcement

The elimination of discrimination against PLWH is a common goal of the international community, and the Chinese government joined and furthered this effort. This also highlights the issues of social equity and justice in China, and the government has introduced new legislation and policy or adjusted relevant laws and regulations to protect the rights of education, employment, health, and marriage for PLWH.

"The Infectious Disease Prevention Law of The People's Republic of China was first introduced in 1989 and has been revised successively in 1994, 2004 and 2013. In the 2004 version, there was a strong emphasis on anti-stigma and discrimination. Article 16, Chapter 2 of the law says that: *The state and society should care for and help patients with infectious diseases, pathogen carriers and suspected patients of infectious diseases, made them receive timely medical treatment. Any organization or individual shall not discriminate against patients with infectious diseases, pathogen carriers and suspected patients of infectious diseases*." *(2004).*

The law also stipulates that institutions of disease control and medical care shall not divulge any information or materials relating to patient privacy. In cases where there are violations of the legitimate rights and interests of individuals, the individual may apply for administrative review or bring a lawsuit in the relevant court. The law also stipulates that disease prevention and control institutions in violation of the provisions of this law, including those that intentionally leak information about infectious disease patients or suspected patients, will be subject to punishment.

In 2004, the Chinese government initiated the "Four Free and One Care" policy that provides free testing, free treatment, free schooling, and free PMTCT (prevention of mother-to-child transmission), and care and support to those PLWH in urban areas who are living in poverty and all PLWH living in rural areas. The policy brought great health benefits for PLWH but also had a positive impact on the Chinese public's attitudes toward the universal right to health for all citizens, which helps to reduce HIV- and AIDS-related stigma and discrimination overall. Notably, the State Council promulgated a set of "AIDS Management Regulations" in 2006 (State Council decree 457 of the People's Republic of China). This is the first time that the management and prevention of an individual disease was elevated to the level of legislation in China. These regulations state that "the legitimate rights and interests of the people living with their families to enjoy the marriage, employment, medical care, and education shall be protected by law. Any unit and individual shall not discriminate against people living with HIV/AIDS and their spouses, children and family." In Article 41, Chap. 4 of the 2004 version, the regulations clearly mandate that "the medical institutions shall not refuse to receive and treat persons infected with HIV/AIDS." In 2007, the central government introduced "The Employment Promotion Law of People's Republic of China," which clearly stipulates that "employers should not refuse to recruit those personnel who suffer from infectious disease or are a pathogen carrier."

In 2010, the Chinese Ministry of Health officially issued "The National Hospital System and Staff Job Responsibilities" which required that PLWH have equal medical and health rights and that if those rights are violated, they have the right to directly question or criticize hospitals, or to request the hospital to take corrective action and to provide treatment to PLWH.

In 2010, the State Council approved "State Council on the decision of revising 'The Frontier Health and Quarantine Law Implementation Rules'" and "The State Council of the People's Republic of China on Amending 'Entry and Exit of Aliens for the Implementation Rules.'" This decision lifted the ban that had previously forbidden the entry of PLWH into the country.

28.5.2 IEC and Social Campaigns

To expand the anti-stigma and discrimination efforts, a wide variety of public service advertising, mass media campaigns and information, and educational and communication materials have been developed and implemented nationwide. Community mobilization and volunteer events were a central part of

government- and NGO-led HIV prevention and control plans and have raised public awareness of HIV and—to some extent—succeeded in reducing discrimination against PLWH. The theme of anti-stigma has been a focus of almost all of the annual "World AIDS Day" campaigns in China. Data from sentinel surveillance systems show that in 2010, levels of basic awareness of HIV among young students (in-school youth) and male migrant workers reached 88% and 75%, respectively (Chinese Ministry of Health 2012).

In 2011, the State Council AIDS Working Committee Office (SCAWCO) developed and produced a documentary film entitled "Get Together" to further promote public understanding of HIV. The film included a performance by Liyuan Peng, a famous singer who is the WHO Goodwill Ambassador against TB and AIDS, and the wife of China's President Xi Jinping. Other AIDS Ambassadors, including Yao Ming, the former NBA star, also played active roles in educating the public and delivering information to mobilize all sectors of society to fight against HIV.

28.5.3 Anti-Stigma Related Action

Over the last decade, Chinese leaders and officials—including Presidents, Premiers, and a range of high-level health officials—have demonstrated their personal commitment to reducing stigma against PLWH by regularly visiting those areas which were heavily hit by the HIV epidemic. These efforts were also intended to mobilize all of society to reduce discrimination and commit to protecting the rights and health of those who are living with HIV.

At the top levels of the Chinese government, a coordinated multisectoral response to HIV also emerged. By cooperating and defining each sector's responsibilities, different government ministries developed and implemented their own AIDS response work plans in accordance with the "AIDS Prevention Regulations" and 5-year plan. The Ministries of Health, Civil Affairs, Public Security, Justice, and Railways were all involved in the plan, as were the All-China Federation of Trade Unions, Communist Youth League, and All-China Women's Federation.

The anti-discrimination publicity and education efforts were included as part of the annual assessment of leading cadres. As clearly regulated by "The Twelfth Five-Year (2011–2015) Plan," local governments at all levels are responsible to ensure that comprehensive AIDS prevention and control activities are well carried out, with regular monitoring and inspection by local authorities. Any local governments which fail in the annual assessment will be investigated.

28.5.4 Improved Health-Care Services for PLWH

While a degree of stigma and discrimination persists against PLWH and marginalized populations such as PWID, MSM, and FSW, a number of policies have been introduced to increase services and reduce stigma. For example, China introduced evidence-based harm reduction services for PWID in 2004. By the end of 2017, a

total of 762 methadone maintenance treatment (MMT) clinics in 29 provinces were in operation. A cumulative total of more than 450,000 drug users had received MMT services, among which 146,688 were still on treatment. According to national statistics, it was reported that the rate of new HIV infections among MMT clients fell from 0.95% in 2006 to 0.03% in 2017. Each month, over 30,000 PWID are reached by needle and syringe exchange services. In addition to these public health benefits, providing these services and conducting community-level education campaigns help to reduce the level of stigma and discrimination against PLWH and PWID.

Between 2004 and 2014, the Chinese government implemented a series of activities funded by The Global Fund, which cost hundreds of millions of dollars and reached millions of people with prevention and care services. During the course of these programs, China adopted many international "best practices" (such as voluntary counseling and testing and the harm reduction services described above), incorporating comprehensive approaches including peer education, outreach, condom promotion, and STI services targeting sex workers and MSMs. The coverage of these interventions has continued to increase, and public awareness of these services is also conducive to reducing stigma and discrimination against high-risk groups, including PLWH.

28.5.5 Anti-Stigma Response by Civil Society and the International Community

Civil society, and especially grass-roots NGOs and CBOs, can play indispensable roles in fighting stigma and discrimination. By providing services to PLWH and other targeted groups, and by providing more tailored services, these groups can not only improve community health but also play a bridge between PLWH and the rest of society. For example, Chinese peer-led interventions providing care and support to PLWH can effectively link them to medical service providers, government officials, and community members, delivering services and information in both directions. Unlike government agencies, civil society groups are both flexible in their message and able to reach "underground" populations.

Despite these strengths, China's civil society still faces considerable challenges, including a degree of sensitivity in the eyes of many government officials. In recent years, the CBO community has had increased opportunities to access capacity building and institutional development, with the support from both government and nongovernment sources. The government-run "social mobilization program" and international support, such as The Global Fund, China-Gates Foundation, UK DFID, and Marie Stopes, have all supported civil society efforts to reduce stigma and discrimination.

28.6 Progress and Achievements Made

28.6.1 HIV-Related Stigma in Rural Areas Has Been Significantly Reduced

It is estimated that more than 60% of PLWH in China are living in rural areas. This is mainly due to two demographic characteristics of the epidemic: In central China, it is due to a wave of unsafe commercial blood plasma collection in the 1990s that mostly affected poor villagers. Along China's porous borders in the west and southwest, needle sharing and easy access to cheap heroin sparked an explosion of HIV infection among PWID. As the epidemic was geographically concentrated, the "Four Free and One Care" policy implemented since 2004 and the government-led "China Cares Program" were able to cover most of the places heavily impacted by HIV. At the county level, several activities have been rolled out in those areas, with targeted interventions and treatment services. In most cases, public education and community mobilization against HIV-related stigma toward rural residents were commonly the first strategy on the ground, even before delivering health services. Qualitative assessments show that in many areas, the social environment and attitudes toward HIV and PLWH has gradually improved compared with the past. Most of the people at risk of HIV infection have received HIV testing and counseling, and those in need of treatment have mostly received free ARV treatment. In most cases, local authorities (in particular, Civil Affairs departments) can provide some social and financial support to PLWH and their families. Moreover, many community-based organizations as well as self-support groups have been established at the local level with the aim of providing care and support, income generation opportunities, or other services to PLWH. These joint efforts are conducive to improving the overall quality of life of PLWH, but also to protect their human dignity and spread anti-stigma messages throughout the society through direct participation, media reports, or word of mouth.

28.6.2 Decriminalization of MSM and Its Impact

In 1997, the Chinese Criminal Code was revised, abolishing the crime of hooliganism. This crime had been historically maintained as a sort of catch-all criminal article in earlier versions of the law and was frequently applied to homosexuality (Chinese Criminal Code 1997). This change represented a significant step toward the destigmatization of MSM behavior in China, and has exerted a profound influence on both the growth of MSM groups and the public attitudes toward MSM. MSM as a population have increasingly identified themselves and protected their legal rights accordingly. On the other hand, the public has gradually begun to accept and respect the different sexual orientation of this and other groups (such as transgender

people). An increasingly inclusive environment is now solidifying in China, and there is an expectation that stigma and discrimination against MSM, together with HIV, will continue to decline.

28.6.3 Health Insurance Extended to Include HIV Care

Since 2004, PLWH have been covered by the national "Four Free and One Care" policy, under which first-line ARV drugs are provided to all eligible patients. The notion of AIDS as a terminal disease is gradually being replaced with the idea of HIV infection as another chronic condition. In addition, treatment for opportunistic infections has been integrated into the national system of medical insurance. This adjustment was made as a way of alleviating the financial burden on PLWH, and in order to provide more social assistance. At the provincial level, there are customized health insurance protocols to accommodate additional services, designed in consideration of the local government's financial capacity. This policy shift is also a signal to the public that HIV is no longer excluded from the medical insurance system and that both the disease and those infected with HIV should be treated equally, without stigma and discrimination.

28.6.4 CBOs Participation Strengthened

In any society, the degree to which CBOs actively participate in important social movements can be considered a representation of the inclusiveness of that society. In terms of HIV prevention and discrimination reduction, the greater participation of CBOs is essential not only to reduce stigma and discrimination but also to effectively reverse the spread of HIV among key populations. In China, CBOs are mainly composed of either PLWH (such as "self-support" or "mutual support" groups), those at risk of being infected (e.g., PWID and MSM), or by nongovernmental organizations that are committed to work among these high-risk groups. After many years of sometimes strained collaboration with CBOs, the Chinese government has increasingly recognized the indispensable roles of CBOs and peers in the response to HIV. The China Global Fund AIDS program funded a total of 887 CBOs to complete 978 projects, all of which were awarded via open competitive bidding. With their more accessible and flexible working manner, these mostly peer-led CBOs were able to reach those hidden vulnerable groups with HIV prevention and care or treatment services. In this way, a growing number of people at risk of HIV infection received HIV testing, counseling, and referral services, both preventing new infections and rapidly increasing access to life-saving ARV treatment.

28.6.5 Increased Public Awareness of HIV

In a large survey conducted by the Chinese Ministry of Health, it was shown that public awareness of HIV has significantly increased (Chinese Ministry of Health 2012). Even though increased awareness does not necessarily produce a reduction

of stigma, it is fair to say that stigma and discrimination cannot easily be reduced without increased awareness. With growing understanding of the specific transmission routes of HIV/AIDS, the promising outcome of ARV treatment, and the standardized case management of HIV, there is an increasingly small chance of intense stigma and epidemic panic that was seen a decade or more ago. The social environment is growing increasingly supportive and willing to accommodate a diverse culture and evolved social norms in respect to both HIV and other "sensitive" social issues.

28.6.6 Emerging Signs of Improvement in Medical Care

While discriminatory attitudes persist among some medical staff and policymakers, in recent years there have been clear signs of improvement, especially regarding the provision of essential medical care to PLWH. Many PLWH report a decrease in overt discrimination on the part of medical staff, and more doctors are now willing to perform basic surgeries for PLWH. In addition, after nearly a decade of ART provision, a growing number of doctors and nurses have emerged in China specializing in AIDS treatment and increasingly committed to their long-term patients' health. Many local PLWH support groups work closely with these specialists to support their peers, and report a growing degree of mutual trust and cooperation. Since 2010, one local civil society group has organized an annual award program called the "Positive Commitment Award" where doctors, policymakers, and others are acknowledged for their commitment to the health and well-being of PLWH, which represents not only the progress made in medical care but also the development of civil society working on HIV.

28.6.7 Strengthened Multisectoral Cooperation

From an institutional perspective, China's response to HIV and HIV-related stigma has mostly been led by multiple government departments, with the health sector leading most efforts. Due to the inherent lack of coordination between different departments, early efforts to address stigmatizing attitudes, policies, or practices were less effective, and great efforts have been made to strengthen coordination and cooperation between sectors since then. To this end, both national and provincial HIV coordination bodies have been established and local-level "AIDS offices" are tasked with leading all aspects of HIV-related work. While this arrangement is not a guarantee of effective interventions, sensitive issues such as stigmatizing policies toward PLWH, PWID, or FSW may be discussed across sectors by Public Security, Civil Affairs, Health, and other departments. For issues such as protecting the identity of PLWH, reducing police crackdowns on drug users who are receiving harm reduction services and protecting the safety and confidentiality of peer staff members in HIV prevention projects, such a coordination body is important to decrease the chance of unintended stigmatization or other negative consequences.

28.7 Gaps and Challenges of Anti-Stigma Work in China

A decade of significant investment by both the Chinese government and international organizations has made a massive impact on the spread of HIV in China. Nevertheless, only modest progress in reducing the level of stigma and discrimination PLWH face has been made. There are a wide range of gaps and challenges facing China's efforts to reduce stigma and discrimination against PLWH, including addressing some of the root causes of discrimination in China.

28.7.1 Contradiction Between Law/Policy and Enforcement

A significant delay between the passage and the enforcement or implementation of a new law or policy is a common phenomenon in China. This flexibility allows local officials to adjust broad central government policies to local conditions, but can also cause problems, such as the slow roll-out of HIV treatment or insufficient protection of the rights of PLWH to medical care. China's HIV response toward sex workers is also hampered by conflicting policies such as the police's use of condoms as evidence of sex work, which impedes sex workers' use of condoms to protect against HIV transmission (Shen and Csete 2017).

There have also been direct contradictions or conflicts between different laws and policies, leading to confusion at the local level. For example, China's regulations on health examinations for civil servants clearly require that applicants found to be carriers of infectious diseases will be disqualified. However, the National Regulations on HIV/AIDS Prevention and Control, which was officially issued in 2006, clearly states that PLWH must not be discriminated against in healthcare, employment, and housing. Many inconsistencies also exist during the enforcement of relevant legislation, both due to differing local interpretations of the laws or policies and due to the sorts of contradictions described above. In some such cases, policies originally designed to protect the rights and/or health of PLWH has caused the opposite effect. For example, some local policies requiring local CDC officials to make regular follow-up visits to all PLWH enrolled in the national free ART program not only created a huge burden for local health workers, reducing the amount of time they had to actually care for patients, but also risked exposing PLWH to public exposure when vehicles with CDC logos appeared in small villages. Many villagers complained that their HIV status was easily surmised by neighbors when such follow-up visits took place.

28.7.2 Lack of Social Support System

China lacks an effective system of social support and care for marginalized populations (such as PWID, FSW, and MSM) based on tolerance and psychological support. Without this sort of system, it is very difficult to engage with and support PLWH in a non-stigmatizing environment, or to support them to overcome the barriers they face in society.

28.7.3 Awareness Alone Does Not Eliminate Stigma and Discrimination

A core issue that remains a challenge in both China and other countries is that awareness does not necessarily change attitudes and behaviors. As described above, China's efforts to date have focused on raising awareness and understanding of HIV, but there is no guarantee that awareness will necessarily eliminate the sort of complex social stigma that lies behind HIV-related discrimination. Indeed, there is a fundamental challenge of reversing traditional ingrained attitudes, and most commonly employed methods are usually insufficient to truly change the deepest prejudices. In China, a number of related factors can be identified:

- Legislation protection is still weak, and there is a lack of strict supervision and guarantee of policy and enforcement. For example, there is no clear mechanism for PLWH to report violations of the law or policy, medical discrimination, or other problems that directly impact their rights and health.
- Legal aid is not easily accessible to PLWH whose rights have been violated, and even when it is available, it might not be sufficient to help them take a case to court.
- There is generally a lack of awareness among PLWH themselves, both of existing policies and regulations and about their ability to protect those rights.
- Effective enforcement mechanisms are generally not in place. Even those who try to seek redress are usually not successful. According to the China Stigma Index report, of those who reported having experienced rights violations, 31% had sought redress. The primary reason given for not seeking redress was a lack of faith in the possibility of success. This lack of faith is reasonable given that only 20% of those that sought redress for a violation of their rights had been successful, while 68% could not achieve any resolution (UNAIDS et al. 2009).

28.8 Ongoing Fight Against Stigma and Discrimination in China

In order to curb the spread of HIV and minimize the damage HIV is doing to both individuals and society, it is essential to continue fighting against stigma and discrimination from a fundamental humanitarian principle of fairness and from a perspective of social progress. The Chinese government has endorsed the UNAIDS "three zeros" policy and continues to make a high level of investment in both medical and social interventions. Among the "three zeros," the goal of "zero stigma" is a great challenge, but is critical for the development of a just and fair society. For China to substantially reduce and eventually eradicate HIV-related stigma, a wide variety of measures and efforts will need to be taken.

Renewed effort to change common attitudes toward HIV must be made in order to popularize the view that HIV infection is just another chronic disease that can be treated and controlled. Implementing this approach will require medical and public

education based on accurate scientific facts. With our now-advanced knowledge of disease pathophysiology, increased access to ART for all PLWH, and improved safety and efficacy of ARV drugs, HIV should no longer be viewed as the "mystery disease" or "death sentence" that caused public panic in the past. Besides health and medical services, inclusive attitudes and well-informed awareness must be promoted from a young age, to ensure that people understand HIV as a preventable and treatable disease without shameful implications and social prejudice. Changing attitudes will require long-term efforts to introduce different ways of thinking, expanded and specific social campaigns, and customized social, health, and medical services to be implemented.

Chinese policymakers must refine relevant laws and regulations and strengthen enforcement to achieve a greater reduction in HIV-related discrimination. The Chinese government has made strong political commitments and put much emphasis on HIV prevention and control through legislation. There is a wide spectrum of supportive policies and regulations issued to address HIV in China. However, some inconsistencies and contradictions have been recognized among different contexts related to employment and medical services. Therefore, it is crucial to maintain a strictly coordinated interpretation of different laws and regulations, removing those inconsistencies, which might hamper progress at the ground level. In addition, mechanisms should be introduced to monitor the enforcement of existing policies and laws at different levels, and any deviation or violation should be rectified. Legal protection for all PLWH must be guaranteed. Anti-stigma and anti-discrimination law, regulation, and policy should be further refined to better reflect the nature of fairness, justice, and social development.

Harmful existing social norms and traditional thinking should be challenged in order to find more effective strategies for fighting HIV-related stigma. Creative approaches to accessing high-risk groups with customized services should be adopted. This approach will also increase the possibility of PLWH regaining the ability to be self-sufficient and restoring their ordinary social functions. High-quality individualized counseling, psychological support services, referral assistance, and coordinated treatment for co-infections and other health problems will be much more readily accepted with effective privacy protection. At the end of 2015, China was striving to achieve the targets of "two reductions," namely reduction of new infections by 25% and reduction of mortality by 30%. Only in an environment of reduced stigma and discrimination will early HIV detection and ART initiation be sought by those at risk of HIV infection.

Medical personnel must be properly trained and educated about HIV prevention and treatment, and adoption of universal precautions against occupational exposure and infection must be required. Elimination of the fear of occupational exposure by health personnel should be a high priority, as there are many cases of service refusal that have prevented PLWH from receiving timely and necessary treatment. Finally, CBOs and other peer-led initiatives should be recognized and promoted, and their roles in fighting stigma and discrimination enhanced. Given the large size and varied geographic distribution of key populations, the efforts and strength made by government sectors and professional institutions are insufficient to meet the actual need. The roles played by the other parts of society, especially by CBOs, are

indispensable in both social campaigns and service delivery alike. For instance, social mobilization for HIV testing, referral to treatment and prevention services, counseling, and peer education are all more effectively undertaken by CBOs than government agencies. Currently, the Chinese government is continuing to increase its investment in and supporting the participation of CBOs in the HIV response, including anti-stigma efforts. CBOs should make the most of their unique capacities and advantages in society, and further coordinate their efforts with the national strategy of eliminating stigma and discrimination against PLWH.

28.9 Conclusion

HIV-related stigma and discrimination are a global obstacle for curbing the spread of HIV and creates barriers across the HIV prevention, testing, and treatment cascade. Due to traditional values and social norms in China, stigma and discrimination is an ingrained problem with different manifestations that seriously impact the effectiveness of HIV control and prevention. However, China has made great efforts toward eradicating HIV-related stigma and discrimination by creating a more supportive policy environment, mobilizing social campaigns, adopting creative approaches to service provision, and promoting greater participation of CBOs. Although a wide range of challenges and gaps remain, China is committed to the global goal of ending the AIDS epidemic as a major public health threat by 2030. An enabling environment without stigma and discrimination depends on a unified effort by the entire society.

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Part V

Key Response Areas

The HIV Epidemics and Responses in Yunnan

29

Lin Lu and Manhong Jia

Abstract

In 1989, when 146 cases of HIV were discovered among drug users in a small town bordering Myanmar, Yunnan province became known as the site of the first Chinese HIV outbreak. The HIV infection spread slowly from the southwest corner of Yunnan then throughout the whole province. The HIV transmission mode has shifted from over 95% via injecting drug use in the early 1990s to over 95% via sexual contact in recent years. The Yunnan government launched three rounds of a "People's War" to combat the HIV/AIDS epidemic. Many innovative strategies have been tested and expanded, with remarkable progress made. The HIV incidence and case-fatality rates have declined. The "Dehong Model" has been expanded throughout Yunnan province, as well as the whole country, and has even been discussed at UNAIDS in Geneva in order to share best practices from its implementation. However, there are still many challenges to controlling the HIV epidemic in Yunnan. Future policies must improve efficacy and coverage of programs specifically targeting ethnic minorities, people who inject drugs, men who have sex with men, and female sex workers, particularly those who work at the street level.

29.1 Introduction

Situated in southwest China, Yunnan's specific history, geography, and demographics have shaped the epidemic since the first HIV outbreak among drug users in Ruili. Contextualizing the interrelated factors of economic growth, geography and

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mobility, and ethnicity is key to understanding the characteristics of the epidemic in this province.

Since the opening up and reform policies began to take hold in China, economic development in Yunnan has focused on agriculture, energy, and tourism because of its abundant natural resources. However, Yunnan remains one of the poorest provinces in China. Poverty is often correlated with HIV prevalence because fewer resources are available for education and health services. In China, the discovery of a domestic HIV outbreak came at a time when policies were shifting toward decentralized financing for health and education, thus exacerbating the dual problems of low levels of education and weak health infrastructure. In provinces such as Yunnan, the HIV response (as described later) has been implemented in this context. Income inequality (as measured by rural and urban disparities) is an especially strong predictor of HIV prevalence in China. Income inequality contributes to increased HIV risk through economic development and large-scale employment migration. The flow of people causes changes in sexual networks and growth in incomes increases demand for sexual services.

In Yunnan, Ruili City in Dehong Prefecture and Xishuangbanna Dai Autonomous Prefecture illustrate the various economic development strategies that have shaped the circulation of goods and people. Unlike most of the other provinces that bear a heavy burden of HIV in China, Yunnan is not a significant source of interprovincial migrants; instead, most migration in Yunnan happens within the province or across international borders. Ruili, where the HIV epidemic among drug users was discovered, is located across the border from the city of Muse in Myanmar. Since the border was opened, cross-border trade in goods such as precious stones has surged. The presence of cross-border traders and other businessmen in Ruili has supported the development of an entertainment industry, which has drawn migrants from poorer parts of Yunnan and regionally. Many of these workers supporting the entertainment sector also provide sexual services and frequently have sexual relationships with wealthy men who have several other sexual partners. Xishuangbanna is located 800 km southeast of Dehong along the Mekong River and bordering both Laos and Myanmar. Historically, Xishuangbanna was home of the Dai ethnic group and also of much of Yunnan's beautiful biodiversity. These characteristics promoted the development of ecological and ethnic tourism (Hyde 2007).

In addition to officially recognized economic activities, Yunnan's location has facilitated the covert and illegal movement of goods and people, including illicit drugs.

In the 1980s, with the loosening of borders, heroin entered China via overland drug trafficking routes from the "Golden Triangle" (the internationally recognized heroin-producing region of approximately one million square kilometers encompassing northwestern Laos, northern Thailand, and much of Myanmar) into Yunnan. Presently, heroin moves into Yunnan primarily through eastern Myanmar, passing through border areas such as Ruili and into Kunming, Yunnan's provincial capital city. The proximity to drug-producing areas and overland drug routes, and consequently the constant availability of inexpensive heroin, has been posited as a major factor in the spread of HIV in China (Chen et al. 1995). Thus, not surprisingly, the

far western regions of Yunnan that border Myanmar have some of the highest concentrations of HIV cases in the province (Peng et al. 2011). The same subtype of HIV-1 in geographically disparate places suggests that there are cross-border networks, and these social networks may be important for propagating behaviors such as injecting heroin and sharing drug injecting equipment.

Despite the increase in HIV among ethnically Han people in Yunnan over the past two decades, economic marginalization and social discrimination faced by many minorities may have contributed to ethnic disparities in HIV prevalence that persist in parts of the province. Yunnan surveillance data show that among PWID, HIV prevalence was higher for ethnic minorities than the Han Chinese after adjusting for education levels (Jia et al. 2010). In Yunnan, research on HIV among ethnic minorities has primarily been conducted among the Jingpo and Dai groups. The Jingpo are part of a larger Kachin ethnic group who are also present in Myanmar and India. Early studies on the epidemic in Yunnan found that young Jingpo men had 1.8 times the risk of initiating drug use compared to men of other ethnic groups and that Jingpo PWID were almost six times as likely to share injecting equipment as PWID of other ethnic groups (Wu et al. 1996a, b). Surveillance data indicate that, ethnically, Jingpo PWID continue to have the highest prevalence of HIV among all ethnic groups in Yunnan (Jia et al. 2010). Additionally, a community-based study among the general public found that HIV prevalence was the highest among the Jingpo and that drug users were over five times more likely to be Jingpo, suggesting that ethnic disparities in drug use continue to influence the shape of the epidemic in Yunnan.

Dai communities in Yunnan are part of the larger Tai-Kadai ethnic group that is spread throughout Myanmar, Thailand, and Laos. These regional ethnic networks facilitate transnational labor migration for many Dai women, and there is some evidence that suggests that the husbands of these women who remain in Yunnan practice unsafe sex in their absence. Additionally, forced marriages, which involve bride selling due to limited economic opportunities, have been reported on both the Chinese and Myanmar sides of the border. HIV prevention services often cannot reach these women and the lack of citizenship status also prevents many women from seeking health care. Among drug users, an early study in Yunnan found that Dai men were more likely to initiate drug use than Han men (Wu et al. 1996a). However, in a 2008 study of the general population of Xishuangbanna, which has a plurality of Dai residents, the primary transmission pathway was heterosexual sex, in contrast to other areas of Yunnan at that time. Despite the heterogeneity of risk, ethnic minorities, as a whole, are frequently designated as a "high risk" group. Yet, communities with a high HIV prevalence often also face economic and cultural marginalization, and the HIV response must address these factors rather than stigmatizing ethnic minorities.

While these demographic, geographic, and historical factors led to the initial outbreak among drug users, the epidemic has shifted significantly over time. Although ethnic minorities remain disproportionately affected by HIV in Yunnan, injecting drug use remains a serious issue and sexual transmission is on the rise (Chen et al. 2005; Lu et al. 2005; Lu et al. 2006).

29.2 HIV Testing

29.2.1 Testing in Medical Settings

All HIV cases found in any medical setting are reported directly to the provincial Centers for Disease Control and Prevention (CDC). HIV testing is conducted primarily in a provider-initiated testing and counseling (PITC) format in medical settings as a part of presurgical screening, inpatient screening, antenatal screening for pregnant women, screening of blood donors, and as part of standard medical exams or on the discretion of physicians with patients exhibiting symptoms consistent with HIV disease.

29.2.2 Testing in Other Settings

Voluntary counseling and testing (VCT) in China are offered by provincial, prefectural, and county-level CDCs. CDC-certified hospitals and specialized medical centers also provide VCT services. Additionally, VCT is now recommended for couples applying for marriage certificates, particularly in regions with high prevalence of HIV, such as Yunnan. Nongovernmental organizations (NGOs) primarily became involved in VCT after 2010, particularly among high-risk groups such as PWID, female sex workers (FSW), and men who have sex with men (MSM). In 2004, the national Ministries of Health, Justice, and Public Security passed a joint resolution requiring HIV testing for all individuals admitted to a detention center for the first time. By definition, "detention centers" include prisons, compulsory drug detoxification centers, re-education through labor camps, and detention centers for commercial sex offenders (commercial sex workers and clients) and for other types of offenses.

29.2.3 Key Changes in Testing Strategies

The introduction of new, national testing strategies in the mid-2000s resulted in dramatic changes in a number of reported HIV cases. These strategies included the promotion of PITC and VCT, expansion of testing among key affected populations, screening of the general population in high prevalence areas, and training increased numbers of health workers (such as rural doctors) to perform testing. Also, since 2005, premarital screening was recommended for all couples in Yunnan registering for marriage. These strategies partly explain the sharp increase in the number of reported HIV/AIDS cases in the past two decades, as the number of those tested increased significantly (Fig. 29.1). Additionally, conducting screening among detainees and persons seeking medical care increased the number of individuals tested, but inevitably also oversampled groups particularly vulnerable to HIV

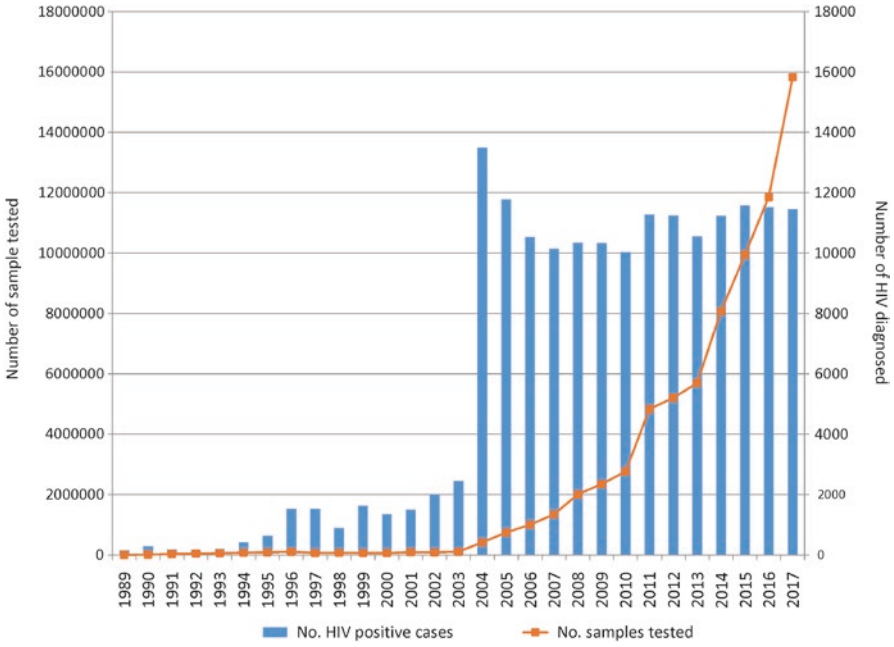

Fig. 29.1 Annual number of samples tested and reported cases of HIV in Yunnan, 1989–2017

infection. Efficiency of case reporting improved in 2005, due to a requirement that all confirmed cases be directly reported to the National CDC within 24 h, in contrast to the previous practice of aggregating HIV cases on a quarterly basis at lower-level CDCs (Xiao et al. 2007). Once ART became broadly available in China (after 2003), these changes in testing strategies reflect a shift in objectives—the focus turned to diagnosis and treatment initiation, rather than simply understanding the epidemic.

29.2.4 HIV Testing Laboratory Procedures in Yunnan

In 1995, Yunnan began using alternative HIV testing methods (e.g., without using Western Blot for confirmation) recommended by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) for developing countries (Chinese Ministry of Health 2002, 2005; Ngan et al. 2002). Western Blot confirmation was not performed because it is quite costly, particularly in high prevalence areas. Instead, three types of ELISA-based testing kits were used. These alternative testing strategies are most commonly used for testing PWID in Yunnan. Currently, these strategies are still used in areas where HIV prevalence among PWID is over 10%.

29.3 HIV/AIDS Epidemics in Yunnan

Between 1998 and 2017, more than 73 million samples had been tested for HIV in Yunnan, of which there were 170,340 confirmed cases of HIV infection, or 0.23% of tested samples. Screening has increased substantially since the beginning of the epidemic, with 15,821,127 samples tested in 2017 alone. Generally, the annual number of newly identified HIV infections peaked in 2004, with a reported 13,486 cases before stabilizing at around 11,000 cases per year since 2005. In 2017, there were 11,450 newly diagnosed cases of HIV infection in Yunnan (Fig. 29.1).

29.3.1 Trends Reflected in Reported Cases of HIV

HIV in Yunnan has spread rapidly since the first case was discovered in 1989 in a single county in one prefecture. By 2007, HIV cases were reported in all 129 counties of all 16 prefectures in Yunnan. As of 2017, a majority of these cases were found in the province's southeast and southwest (Fig. 29.2).

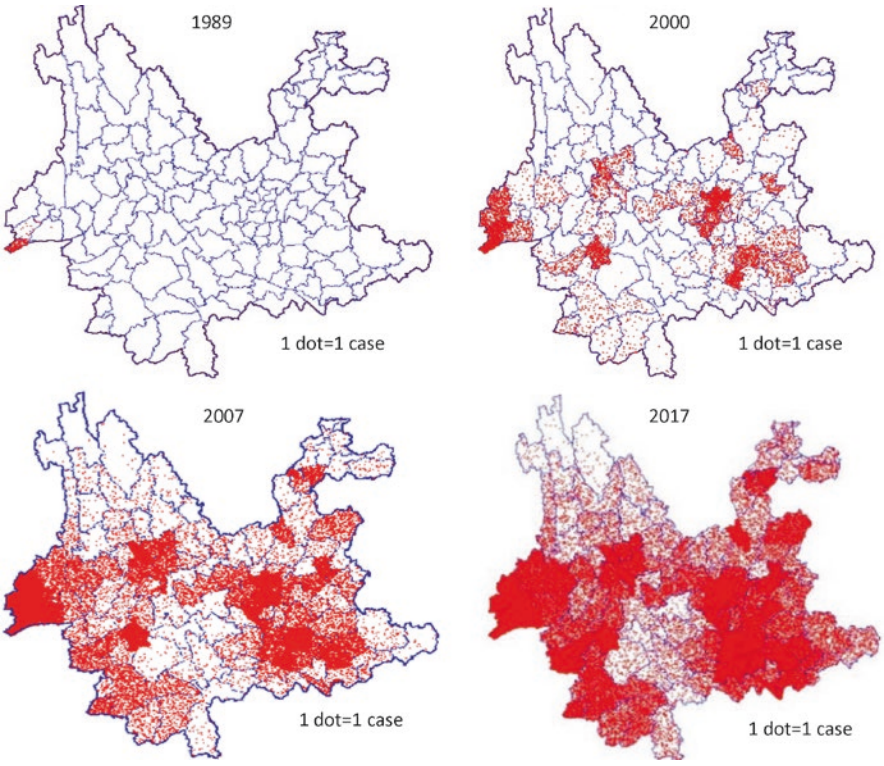

Fig. 29.2 Geographical distribution of cumulative reported cases in Yunnan since 1989

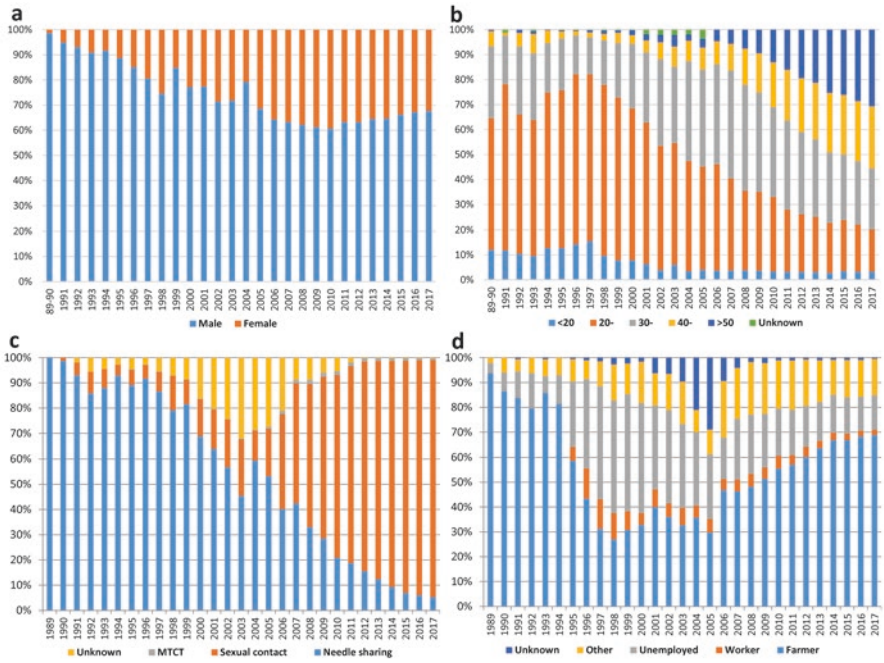

Fig. 29.3 Annual new HIV cases in Yunnan by (**a**) sex, (**b**) age, (**c**) transmission route, and (**d**) employment status/occupation, 1989–2017

In Yunnan, men are more likely to be infected with HIV compared to women; however, the proportion of people living with HIV (PLWH) who are women is increasing. Initially, more than 98% of PLWH were men and only 1.3% were women. The proportion of women among PLWH cases in Yunnan peaked in 2009 at 39% and has changed little since. As of 2017, 68% of cases were among men and 32% were among women (Fig. 29.3).

The PLWH population has also gradually aged over time. In 1989, 52% of PLWH were 20–29 years of age, while in 2012, only 23% were in this age group, and by 2017, only 17%. By contrast, the proportion of cases found among middle-aged adults 40–49 years old grew from 6% in 1989 to 22% in 2012 to 25% in 2017. Likewise, the proportion of cases found in those aged 50 years old and above has increased from 0.5% in 1989, to 19% in 2012, and to 31% in 2017 (Fig. 29.3).

Although, the HIV epidemic in Yunnan was initially driven primarily by injection drug use, HIV infection transmitted through needle-sharing behaviors drastically decreased from 100% in 1989, to 16% in 2012, to 5% in 2017. Sexual contact and mother-to-child transmission (MTCT) now account for 94% and 0.7% of all new infections in Yunnan, respectively (Fig. 29.3).

Lastly, the employment status and occupation of newly diagnosed PLWH has also shifted since the early stages of the epidemic, reflecting the overall urbanization of Yunnan province over the last few decades. In 1989, 94% of PLWH were farmers and 4% were unemployed. By 2012, 60% were farmers, 16% were unemployed, and 19% had other forms of employment, usually in cities. These proportions have remained relatively unchanged since. This underscores the epidemiological transition of HIV from rural people to urban PWID, and then to the general population (Fig. 29.3).

29.3.2 HIV Prevalence Trends Among High-Risk Subgroups

29.3.2.1 Trends Among PWID

HIV initially spread slowly among PWID in Yunnan, and the prevalence of HIV among PWID was 2.8% in 1992. Due to lack of prevention, testing, and treatment interventions, HIV continued to spread and prevalence among PWID peaked at 45% in 2000. Although it has since slowly declined, it remains high, at 29% in 2016 (Fig. 29.4).

29.3.2.2 Trends Among FSW

HIV surveillance data among FSW were collected from the Kunming detention center and community-based testing sites around Yunnan and analyzed separately to determine trends in HIV prevalence in this key, high-risk population. Until

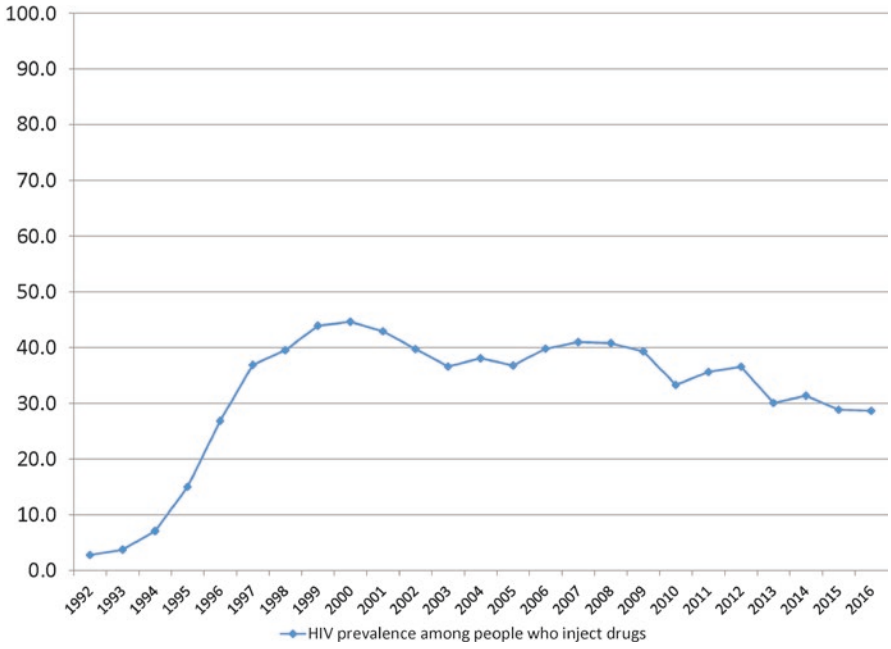

Fig. 29.4 Annual HIV prevalence among PWID in Yunnan, 1992–2016

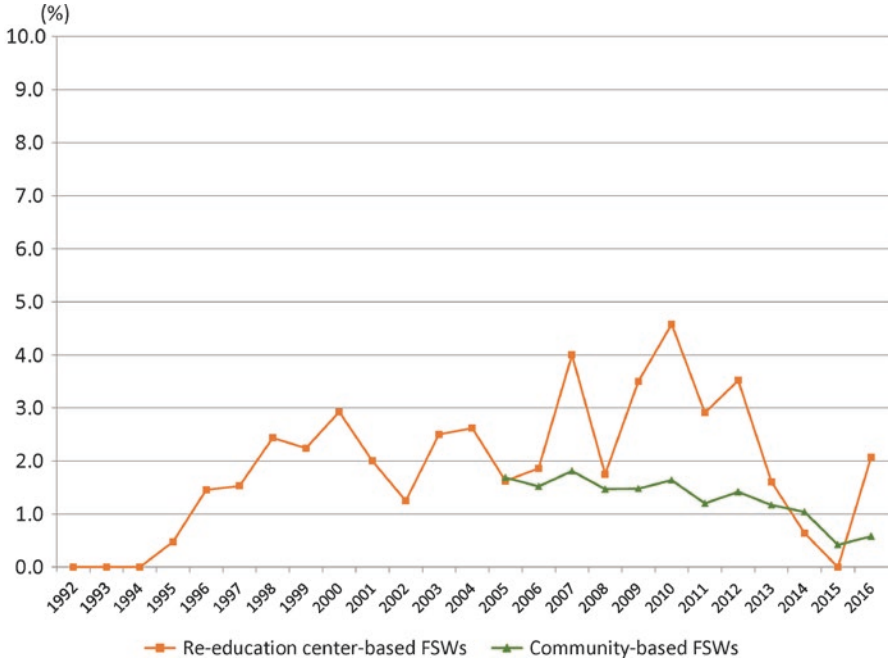

Fig. 29.5 Annual HIV prevalence among FSW in Yunnan, 1992–2016

1994, no HIV was found among FSW in the Kunming detention center, but HIV prevalence had climbed to 0.5% in 1995, 1.5% in 1997, 1.9% in 2006, 4.0% in 2007, and peaked at 4.6% in 2010. However, by 2016, it had been cut in half, to 2.1%. In contrast, surveillance conducted at community testing sites indicated that the average provincial prevalence between 2005 and 2017 fluctuated between 0.4% and 1.8%. It was at its highest in 2007, at 1.8%, but had fallen to 0.6% in 2016 (Fig. 29.5).

29.3.2.3 Trends Among MSM

HIV was first detected among MSM in Yunnan in 1999. Average provincial prevalences from 14 surveillance sites in Kunming were evaluated from 2010 to 2017. A peak of 13.2% was observed in 2013. However, throughout this entire time period, HIV prevalence among MSM has remained relatively high (Fig. 29.6), indicating a particularly serious HIV epidemic among MSM in Yunnan's capital city.

29.3.2.4 Trends Among Male STI Clinic Attendees

HIV was first found among male sexually transmitted infection (STI) clinic attendees in 1993. Since then, according to surveillance data, the average HIV prevalence among these men has never climbed above 2.8% (this peak was observed in 2002–2006). It has since declined and, in recent years, has been less than 0.6% (Fig. 29.7).

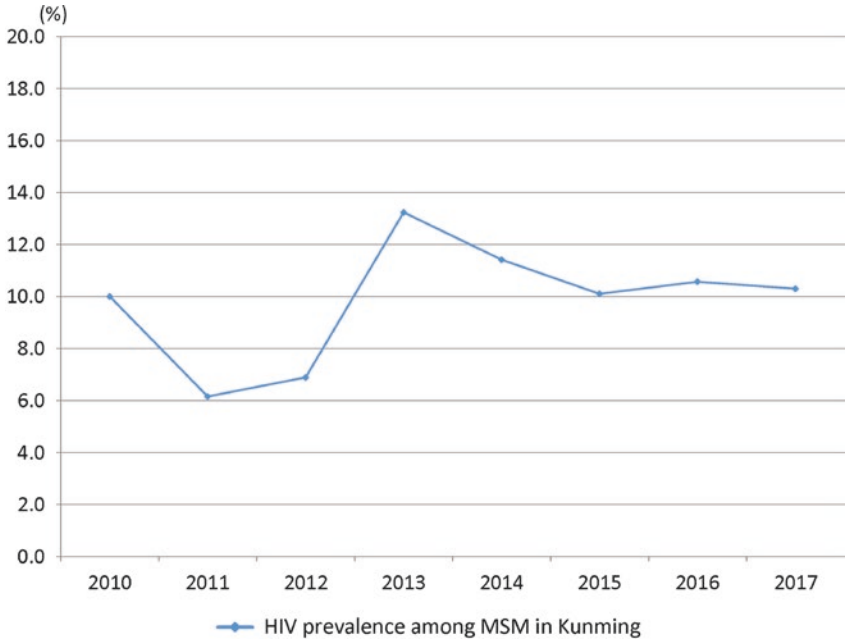

Fig. 29.6 Annual HIV prevalence among MSM in Kunming, Yunnan, 2010–2017

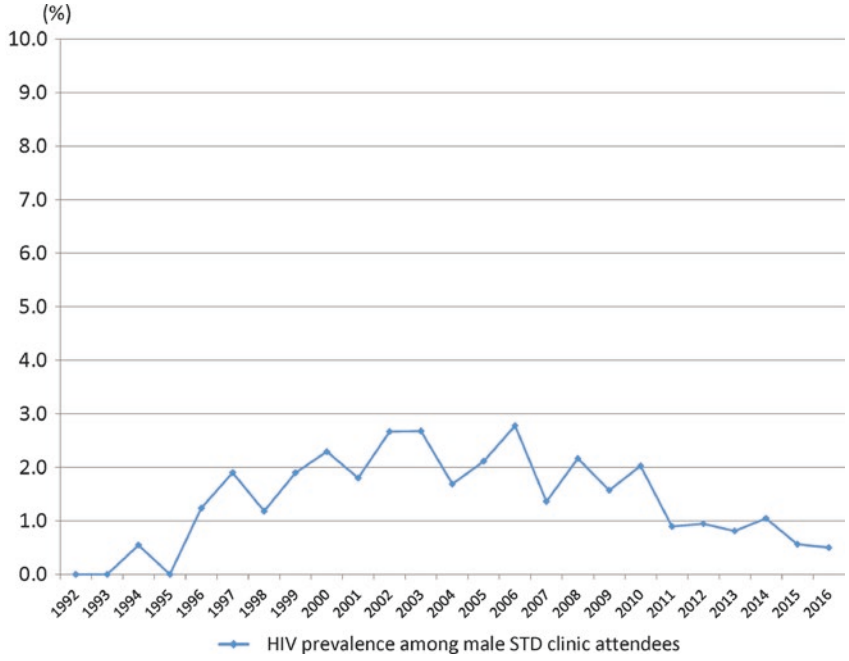

Fig. 29.7 Annual HIV prevalence among male STI clinic attendees, 1992–2016

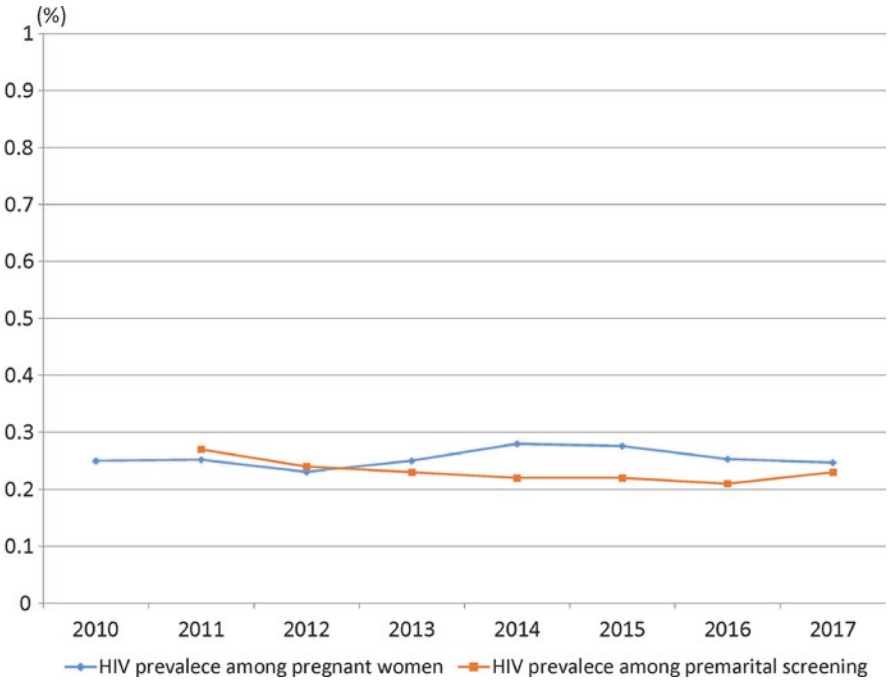

Fig. 29.8 Annual HIV prevalence among pregnant women attending antenatal care and couples seeking premarital screening in Yunnan, 2010–2017

29.3.2.5 Trends Among Pregnant Women and Premarital Screening Attendees

Average HIV prevalence among pregnant women in Yunnan has remained relatively unchanged—between 0.2% and 0.3%—over the 7 years from 2010 to 2017. These findings are consistent with estimates of HIV prevalence in the general population generated via surveillance among premarital HIV screening attendees (Fig. 29.8).

29.3.2.6 Trends in Other Populations

Screening of blood donors began in Kunming in 1992. In 2008 alone, more than 84,900 donors had been screened for HIV, of which 63 tested positive, for a prevalence of 0.07%. HIV prevalence among this group has remained low and was at 0.01% in 2016 and 2017 (Fig. 29.9). Thus, blood donation is not a significant transmission route of HIV in Yunnan.

29.4 Analysis of the HIV Epidemic in Yunnan

Yunnan has reported more cases of HIV than any other province in China. This highlights both the severity of the epidemic in Yunnan and the robustness of Yunnan's long-standing surveillance system. Observations made possible

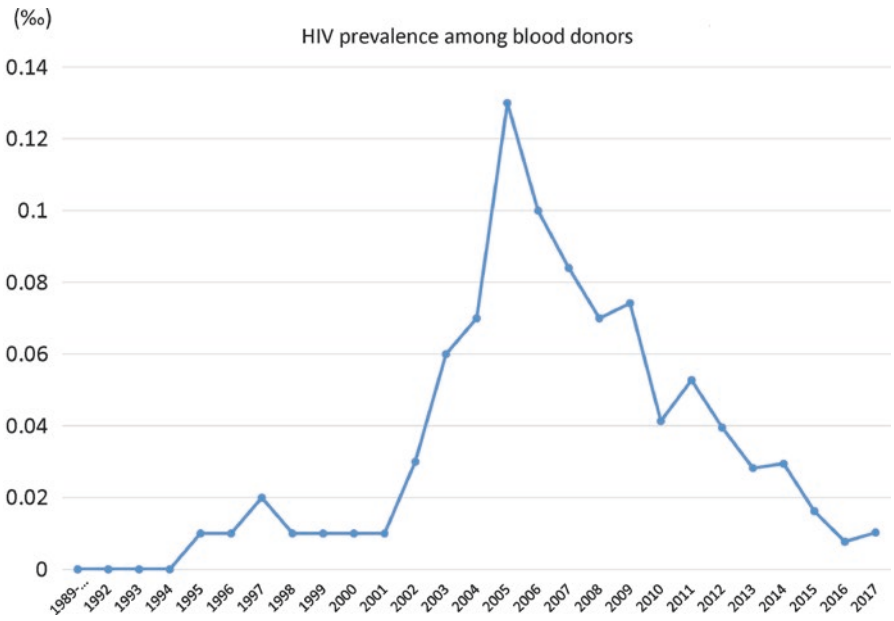

Fig. 29.9 Annual HIV prevalence among blood donors in Yunnan, 1989–2017

by Yunnan's HIV surveillance system have led to the development and analysis of trends, which help us to understand the dynamic nature of Yunnan's HIV epidemic.

29.4.1 Interpreting the Trends: The Epidemic Over Time

The course of the epidemic in Yunnan that has emerged from synthesizing three decades of surveillance data and epidemiological reports reveals an epidemic that has undergone four distinct phases:

- *Import (1987–1989)*. The first AIDS case was reported in 1987, and the first HIV epidemic outbreak was reported among PWID in 1989.
- *Spreading Phase (1990–1995)*. HIV spread from PWID to their spouses, sexual partners, and groups such as FSW. Through the clients of FSW, the epidemic spread to the general population. The first case of HIV among FSW was reported in 1991 and the first child diagnosed with HIV infection was reported in 1995.
- *Increasing phase (1996–2008)*. The HIV epidemic increased rapidly among all groups during this period. Prevalence among PWID increased between 1995 and 2001, while the prevalence among MSM in Kunming remains volatile, from 10% in 2010 to approximately 6% in 2011 and 2012, before climbing to 13% in 2013. Within FSW, the prevalence also peaked in the last decade, at 4.6%.
- *Stable phase (2008–present)*. Since 2008, HIV prevalence rates among PWID, FSW, and pregnant women have remained stable.

29.4.2 Interpreting the Trends: Growth of the Sexual Epidemic

HIV surveillance data suggest sexual transmission through high-risk behaviors, particularly commercial sex, began in the mid-1990s. The sexual transmission of HIV has had the most pronounced impact on FSW and their male clients, MSM, and sexual partners of PWID and PLWH (Yang et al. 2015). All sexual epidemics originated in areas with prevalent injection drug use, suggesting an important link between the needle sharing and sexual networks. Yunnan has witnessed an increase in the proportion of cases attributed to sexual transmission and a decline in the prominence of the injecting drug use transmission route. HIV infection via sharing drug injecting equipment has declined from 100% in 1989 to 5.3% in 2017 of all newly diagnosed infections annually. A growing body of research supports a conceptual framework of a threshold prevalence among PWID having a "seeding effect," whereby the missed opportunity to control the epidemic among PWID facilitated the development of larger sexual epidemics (Xia 1995; Saidel et al. 2003). The high prevalence of unsafe sex, multiple sexual partners, and commercial sexual networks have played a crucial role in the transition of the epidemic to being primarily sexually driven (Yao et al. 2009). Two groups of particular concern are street-based FSW and MSM. These groups are not only at risk for primary infection and secondary infection to their partners, but are also difficult for public health practitioners to access because of their stigmatized and/or criminalized behaviors and highly mobile lifestyles.

29.4.3 Interpreting the Trends: HIV in the General Population

HIV prevalence among pregnant women, those attending premarital screening, and blood donors has remained quite low in Yunnan throughout the past decade. With consistently low prevalence rates of less than 0.3% among these groups since the mid-1990s, Yunnan's general population remains at relatively low risk for HIV infection.

29.4.4 Interpreting the Trends: Risk Factors of HIV Infection in Yunnan

Based on surveillance data and research reports, the major risk factors for HIV infection in Yunnan are needle-sharing behaviors among PWID, commercial sex, casual sex, and male–male sexual behaviors. Several factors, such as a large, mobile population, liberalizing sexual attitudes and norms, and lack of sexual health awareness among the general population, may also fuel the HIV epidemic.

29.5 HIV Prevention

Many prevention demonstration projects were conducted in Yunnan and the results have been used to develop national guidelines.

29.5.1 HIV Prevention for FSW

In the mid-1990s, injecting drug use was still the main driver of the HIV epidemic in Yunnan. However, commercial sexual activities were of growing concern due to the potential of an HIV sexual epidemic. Commercial sex work is illegal in China, making FSW difficult to access if not largely inaccessible to public health workers (who are also government workers in China). FSW could only be approached at women's re-education (i.e., detention) centers, where they were sent if caught by the police. Only during their incarceration could public health workers counsel FSW about HIV and STI prevention and condom use.

In 1996, the first outreach program targeting FSW was conducted in beauty parlors. This program was implemented in Longchuan, Ruili, and Chengjiang. It was China's first community-based intervention, testing the feasibility and effectiveness of a program to promote consistent condom use among FSW. After the 3-month intensive outreach intervention, knowledge of HIV transmission routes increased from 25% to 88%, knowledge of condoms for prevention of STI/HIV infection increased from 56% to 94%, and condom use during last sexual encounter and during the last three sexual encounters increased from 61% to 85% and from 41% to 70%, respectively (Wu et al. 2007). This first community-based outreach intervention for FSW has become a model for national HIV prevention programs. The study results have been used for developing the first version of a national guideline for specific interventions targeting FSW in China.

29.5.2 Methadone Maintenance Treatment for Opioid Users

Yunnan is the center of the dual epidemics of drug use and HIV infection. The rapid increase of HIV infections among PWID in the 1990s and early 2000s highlighted the urgent need to implement harm reduction programs, such as methadone maintenance treatment (MMT) and needle exchange programs, in order to slow down the HIV epidemic in China. Yunnan was among the first of eight MMT pilot program sites in 2004 (Pang et al. 2007). Since then, the number of MMT clinics expanded quickly and the number of opioid users receiving MMT increased rapidly. By the end of 2017, there were 68 MMT clinics, together with over 100 extension sites, in operation to provide services for over 20,000 clients in Yunnan (Secretariat of National MMT Working Group 2018) (See Chap. 9 for more information).

After implementation of the first eight MMT pilot program sites, a national meeting was held to evaluate the program in 2005. Results were very encouraging, and the National MMT Working Group planned to expand the MMT service countrywide. Unfortunately, there were a limited number of qualified personnel to provide these services in China at that time, suggesting an urgent need to have a national MMT training center in order to build capacity to meet the rapid expansion of a national MMT program. The National MMT Training Center was thus established in the Yunnan Institute of Drug Abuse in 2005. Since then, the National MMT

Training Center has provided training for staff in order to open MMT clinics and has provided hands-on technical support for every new MMT clinic for the first 2 weeks of operation. The center also has periodically provided capacity building to update and re-refresh knowledge for health-care providers working at MMT clinics (See Chap. 27 for more information).

29.5.2.1 MMT Mobile Vans

Yunnan is a mountainous province and most drug users live in remote, rural areas. Some drug users must travel more than 20 km per day in order to access MMT services at a designated MMT clinic. Thus, for drug users living in a remote township or village, it is not feasible to access an MMT clinic. In order to provide easy access and convenient MMT services to these hard-to-reach individuals, Yunnan developed the first MMT mobile van. This van provides MMT services at designated stop points in order to provide MMT services to remote, rural villages.

29.5.2.2 MMT Extension Sites

Running a mobile van is costly. Therefore, local health officials set up extension sites at township health-care centers and village clinics, under the supervision of a designated MMT clinic. Drug users living in remote rural areas welcomed this new strategy as it improved their access to obtaining MMT services. There are now over 100 extension sites attached to MMT clinics to provide services to drug users in Yunnan.

29.5.2.3 Peer-Driven Intervention

After a few years of rapid expansion of MMT, the number of drug users receiving MMT services peaked in 2012. Since then, the number of clients accessing MMT services has significantly declined. The Yunnan MMT program tested a community-based, peer-driven intervention project to motivate those who had never tried MMT to join the MMT program, or convince those who had dropped out to rejoin. Incentives were provided to "seeds" and to clients. One year after implementation of this peer-driven intervention, the program has brought over 3000 drug users back to the MMT program.

29.5.2.4 "Take-Home" MMT

It is not convenient to come to an MMT clinic to take methadone every day, particularly for those who need to pursue employment elsewhere. The Yunnan MMT program has aimed to address this issue by piloting take-home doses. To be eligible for the study, clients needed to have good compliance in the past 12 months and have a low rate of positive urine opioid test results. Qualified clients started as "Bronze Card Members," taking home 2-day's worth of methadone. If these clients continued their good compliance for 3 months, then they could apply to become "Silver Card Members," taking home 4-days' worth of methadone. After another 3 months of good compliance, "Silver Card Members" could apply to upgrade to "Gold Card Members" status, taking home 6-days' worth of methadone. The program was well liked by participants, as it made getting MMT much easier.

29.5.3 HIV Care and Treatment

HIV case finding and notification is managed by the CDC system, while HIV care services, including ART, are managed by designated hospitals. Historically, the epidemiologist who managed the notifiable information system was required to refer all PLWH to designed ART hospitals for treatment and care. However, this process was inefficient. Therefore, the Yunnan CDC developed and distributed a referral form to every newly diagnosed PLWH. This resulted in almost 100% of new cases being successfully referred to ART, but the proportion who actually received ART remained very low, at about 30–40%. Poor linkage to care and poor ART uptake is a serious issue in Yunnan. In order to combat this problem, public health workers now accompany newly diagnosed PLWH to their designated hospitals, in order to ensure a successful "handover" of the patient to the ART doctor. This strategy has significantly improved ART uptake.

29.6 The Dehong Model

Dehong Prefecture is located in southwestern Yunnan, bordering Myanmar. With 1.29 million people, Dehong is an epidemic center heavily affected by both drug use and HIV/AIDS. The first outbreak of HIV infection in the region was reported among injecting drug users in 1989 (Ma et al. 1990). After 15 years of implementing a comprehensive HIV/AIDS program, Dehong has developed many best practices for controlling the HIV/AIDS epidemic, such as strong financial commitment and technical support from the central government. The UNAIDS Executive Director, Dr. Michel Sidibé, visited the HIV/AIDS program in Dehong in 2015 and was very impressed by the remarkable progress that had been made. Dehong has tried many innovative and effective strategies, which have been implemented, scaled up, and expanded throughout Yunnan and China.

29.6.1 Expanding HIV Testing

Between 1989 and 2003, HIV testing was provided only to persons recruited by the sentinel surveillance program and for cross-sectional surveys. In 2004, HIV testing was expanded to include population screening among nine key groups, including PWID, FSW, STI clinic attendees, and spouses of PLWH individuals. In 2005, VCT was provided. This was also the first time that HIV cases attributed to sexual contact exceeded those attributed to injection drug use. Premarital HIV screening among couples was initiated a year later. In 2007, HIV case reporting that included patients' names, identification numbers, and contact information, as well as information on providers making the initial diagnoses was performed for the first time and was included in the epidemiological reporting system. Since 2008, transnational marriages were surveyed for HIV infection. In 2009, PITC was implemented. Fingerprint technology was incorporated into sentinel surveillance monitoring studies for drug

users in 2011 and for FSW in 2012. The number of people tested for HIV increased over time, in part due to these expanded testing strategies. Between 1989 and 2003, a total of 110,864 people were screened for HIV infection. Then, the number of people screened increased from 59,659 in 2004 (5% of the total population) to 739,589 in 2015 (62% of the total population) (Dehong Health and Family Planning Commission 2017).

29.6.2 Expanding MMT Services to Villages

In 2005, five MMT clinics were set up to provide MMT services to opioid users. The first MMT mobile van began operating in Ruili in 2006, while the first MMT extension site was established in a township health center, also in Ruili, in 2008. This extension site provided MMT services to remote, rural areas that may not otherwise have had access to MMT programs. This new model of MMT delivery improved accessibility of services, reduced operating costs, and increased retention rates. The model was quickly expanded to the rest of Yunnan and has been implemented in other areas in China. By the end of 2017, there were 5 MMT clinics and 34 MMT extension sites in Dehong, providing MMT care services to over 8000 opioid users. The annual retention rate was 78%, and the proportion of clients tested for HIV, HCV, and syphilis was above 95% in 2017 (Dehong Health and Family Planning Commission 2017).

29.6.3 Prevention of HIV MTCT

Since May 2005, programs to prevent mother-to-child transmission (PMTCT) of HIV infection have been initiated in Dehong. On average, about 30,000 pregnant women are screened for HIV each year, for a prefecture-level coverage rate of 98%. Since 2006, HIV and syphilis screening for premarital couples has been encouraged. Since 2010, screening has been expanded to include HBV and HCV, such that the three major viral agents that may transmit from pregnant women to their infants are monitored. The proportion of HIV-positive, pregnant women and their infants taking ART for PMTCT in Yunnan increased from 41% and 49%, respectively, in 2004 to 100% and 99%, respectively, in 2017. The rate of HIV MTCT declined from 10% in 2006 to 1.6% in 2016, much lower than the national average (Dehong Health and Family Planning Commission 2017).

29.6.4 Decentralizing HIV Care Services

Given severe stigma and discrimination against PLWH, confidentiality is of utmost importance in China's HIV/AIDS programs. Therefore, HIV diagnosis and follow-up care services were provided directly by county-level CDCs, which were previously called anti-epidemic stations. This model was reasonable when the number of

HIV cases was small and only counseling services were provided. However, once free ART was included in a comprehensive package of HIV services, county CDCs no longer had the capacity to serve all PLWH. Therefore, the local health authority decided to decentralize HIV care services to the township and village level in order to make these services easily accessible for PLWH. Village health workers assumed more responsibilities, providing feedback on laboratory testing results, distributing condoms, conducting physical exams, providing counseling and psychological support and health-care guidance, and monitoring drug adherence. Village health workers are expected to provide follow-up visits every 3 months, which include providing safe sex education, reinforcing consistent condom use, and providing HIV screening to the serodiscordant spouses of PLWH. Performance-based assessments are conducted every 6 months in order to understand the implementation and quality of HIV care services (Dehong Health and Family Planning Commission 2017).

29.6.5 ART Delivery

ART was initiated in Dehong in 2004. Since 2006, with the increased number of PLWH receiving ART, the management of care services moved from the county CDC to township health centers and village health clinics in Longchuan. Other counties in Dehong also moved ART services to township health centers and village health clinics in 2012. Integrated HIV testing and ART initiation and follow-up were combined in a so-called "one-stop shopping" model that was piloted in Yingjiang in 2013 and expanded to other counties in 2014. By the end of 2017, there were 65 health institutes covering 50 townships providing ART services, with a coverage rate of 91%. Overall ART coverage increased from less than 10% in 2004 to 92% in 2015. The AIDS case-fatality rate declined from 23% in 2005 to 3.4% in 2015, lower than the Yunnan average and lower than the national average. Dehong is on track to achieve the UNAIDS 90–90–90 target. Currently in the prefecture, over 90% of the estimated total number of PLWH have been diagnosed, 80% of diagnosed PLWH have received ART, and 93% of PLWH on ART have achieved viral suppression (Dehong Health and Family Planning Commission 2017).

Remarkable progress has been made in controlling the HIV epidemic over the past 15 years in Dehong. The number of people being tested for HIV has significantly increased, while the number of newly diagnosed HIV cases has significantly declined. The HIV seroconversion rate among serodiscordant couples has declined from 2.11 per 100 PY in 2006 to 0.25 per 100 PY in 2016. The case-fatality rate has declined from 23% in 2005 to 3.4% in 2015. The HIV MTCT rate has declined from 10% in 2006 to 1.6% in 2016 (Dehong Health and Family Planning Commission 2017).

29.7 Fighting the "War" Against HIV/AIDS

The HIV epidemic continues to spread rapidly from key groups to the general population. The provincial government of Yunnan has declared HIV a public emergency and subsequently has launched three rounds of "war" against the HIV/

AIDS epidemic. The first round was in 2005–2007. During this time, the Yunnan government issued an implementation plan for controlling HIV/AIDS in Yunnan. Under the strong leadership of the Yunnan government, all government sectors, civil society organizations, communities, and citizens mobilized and organized to respond to the epidemic. Five significant changes were implemented—from micro level to macro level, from partial response to holistic response, from concealment to openness, from passive response to active response, and from advocacy to implementation.

The second round "war" was in 2008–2010. The Yunnan government again issued a new implementation plan with clear targets to be accomplished by 2010. HIV prevention, care, and treatment services were made more easily accessible, there was higher participation of civil society organizations, and HIV prevalence began to stabilize (Yunnan Health and Family Planning Commission 2017).

The third round "war" was from 2011 to 2015. The new plan encouraged innovations in prevention, care, and treatment programs. Major strategies included (1) expanding multiple HIV testing strategies and making HIV testing more readily accessible; (2) setting up effective communication channels for government sectors and technical agencies; (3) implementing the "one-stop shopping" model of integrated HIV diagnosis and treatment services; (4) using the analysis-tree model to guide targeted interventions for reducing HIV MTCT; (5) setting up specific support to epidemic centers for government sectors and expert groups; (6) providing more social and financial support and poverty alleviation programs for people infected and affected by HIV; (7) providing more political and financial support to civil society organizations to participate in HIV/AIDS programs; (8) enhancing HIV/AIDS programs in closed settings and setting up no-gap linkage for transferring people between closed settings and communities; (9) using innovation and new technologies in order to improve HIV/AIDS programs; and (10) continuing and enhancing international cooperation and cross-border HIV programs (Yunnan Health and Family Planning Commission 2017).

After these three rounds of "war" against HIV/AIDS, remarkable progress has been made. For example, during 2010–2015, HIV incidence among PWID declined from 2.26% to 0.97%, HIV incidence among MSM has remained roughly 5%, and HIV incidence among FSW remained less than 0.3%. The case-fatality rate for PLWH declined from 6.4% to 3.8%, and the case-fatality rate among PLWH on ART declined from 2.6% to 2.0% during the same period (Yunnan Health and Family Planning Commission 2017). HIV prevalence in the region is no longer rapidly increasing. Although the number of people being tested for HIV increased from 4.8 million in 2011 to 9.9 million, the number of newly diagnosed HIV cases remained between 10,600 and 11,600 each year. HIV prevalence declined from 25% to 18% among PWID, from 1.4% to 0.4% among FSW, and from 0.5% to 0.4% among pregnant women (Yunnan Health and Family Planning Commission 2017). An estimated 21,735 HIV infections were averted, and 23,745 AIDS-related deaths avoided. Finally, the HIV/AIDS program has saved an estimated 2.3 billion US dollars between 2011 and 2015 (Yunnan Health and Family Planning Commission 2017).

29.8 Challenges

Despite these many accomplishments, challenges remain. Firstly, analysis of trends is useful and important for understanding a dynamic epidemic, but it does not improve understanding of the experiences and needs of individual PLWH. Furthermore, the spatially and temporally uneven development, launch, scale-up, evaluation, and improvement of prevention, testing, treatment and care, and harm reduction programs all aimed at controlling the HIV epidemic in Yunnan have inadvertently caused biases in both sentinel surveillance and case reporting data. This could not be helped, but must be acknowledged.

Secondly, controlling sexual transmission remains an area of concern in Yunnan. Prevention and intervention efforts must reach low-income and street-based FSW, who have a higher HIV prevalence compared to other FSW. Additionally, the large number of PLWH in Yunnan constitutes a significant community viral reservoir, and prevention of sexual transmission is very important. The high prevalence of HIV observed in urban centers indicates a need for rapid, large-scale responses, especially because of how difficult it is for public health interventions to reach many MSM. As with other MSM populations throughout China, effective behavior change interventions are still not well understood—despite high levels of HIV-related knowledge and education, consistent condom use remains low. In addition, synthetic drug use has emerged as a new HIV risk behavior among MSM both in Yunnan and nationally, alongside high-risk sexual behavior. Although synthetic drug use has been recognized as playing a role in facilitating unsafe sex, there is little understanding of the scope of synthetic drug use in Yunnan and little experience in designing effective interventions to reduce HIV risk.

Thirdly, several challenges remain in implementing the HIV response. Linking PLWH to treatment and care services is still a difficult problem. Additionally, societal awareness of HIV is low, and societal stigma is persistently high. As such, discrimination against PLWH continues and is amplified by stigma against key populations such as MSM, FSW, PWID, and ethnic minorities.

Finally, the progress of the HIV response in Yunnan is often impaired by the capacity of health systems throughout the province. Currently, the health workforce serving PLWH is limited, and health workers are often overburdened or do not have adequate expertise in clinical management of HIV. Additionally, while NGOs are a valuable partner in the HIV response in Yunnan and nationwide, capacity remains low overall and many services cannot be provided by these organizations. Finally, outside of the health system, Yunnan's unique geography and demographics have resulted in the need to craft a response that can be implemented over a large, porous border area. Currently, interventions that address the wishes of cross-border populations, as well as sex workers from Myanmar and Vietnam, have not been developed, despite the critical need. The response will need to better address language barriers, mobility barriers, and health services access barriers, all in the context of weak coordination between countries.

Future efforts in HIV prevention and control in Yunnan must focus on several key areas. First, HIV transmission by infected PWID must be reduced—both

needle-sharing and sexual contact routes need to be blocked via effective prevention interventions. Second, because HIV infection is associated with poverty and low education level in Yunnan, efforts must be redoubled to reach underserved communities with strengthened awareness and prevention interventions. Third, an improved understanding of MSM and street-based FSW will be required if they are to be successfully reached with urgently needed prevention, testing, treatment, and care services. Finally, intervention programs that are proven to reduce risk behaviors and HIV transmission events must be implemented and expanded to meaningful coverage rates. Much progress has been made in Yunnan, yet more must be done to bring its HIV epidemic finally under control.

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HIV/AIDS in Henan Province

30

Zhe Wang, Ning Li, Yanmin Ma, and Jonas Tillman

Abstract

The HIV epidemic in Henan was uncovered in the mid-1990s when authorities discovered that blood and blood plasma collection malpractices had resulted in concentrated geographical areas with extremely high HIV prevalence levels (the term "AIDS villages" has commonly been used). The Henan experience with HIV is unique from a global perspective in that it is the only large-scale HIV epidemic that has been caused by blood plasma contamination. The local epidemic in Henan first became known to the general public around the turn of the century, when local and international media started covering the issue. Following this, the provincial and national governments have consistently had a clear focus on fighting the epidemic and providing sufficient care to those affected—both providing treatment and financial support in the case of the former paid plasma donor (FPD) population. While the epidemic driven by plasma donation malpractices (first wave) was largely self-ended, the current epidemic (second wave) is mainly driven by sexual transmission (heterosexual and among men who have sex with men), more in line with the general situation in other parts of China. In order to reverse the current trend, where the number of newly reported cases has increased on a year-to-year basis, the prevention work most likely needs to adopt new methods to fight the epidemic.

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30.1 Introduction

Henan Province is located in central China, named for its location south of the Yellow River (*He*—river, *Nan*—south; see Fig. 30.1). It is the birthplace of Chinese civilization with over 3000 years of recorded history. Henan remained China's cultural, economic, and political center until approximately 1000 years ago. Henan now has the fifth largest provincial economy of China. However, because it is the most populous province in China (94 million people per the 2017 census), the per capita GDP is low compared to other eastern and central provinces. It is one of the least developed areas in China. Henan has a predominantly Han ethnic Chinese (98%) population and is a major agricultural producer among Chinese provinces. Henan's large rural population, having faced economical marginalization in an era of increasing marketization, and economic and social liberalization, has been a primary driver of the epidemiology of HIV in the province. For a broader discussion of political, economic, and social change influencing China's HIV epidemic at the national level, please see Chap. 17. Another major driver of the HIV epidemic in Henan Province has been its geographical location and its relatively well-developed infrastructure.

30.2 The First Wave: HIV Transmission via Unsafe Plasma Collection

30.2.1 The Background

The media has commonly portrayed the HIV crisis among former plasma donors (FPD) in Henan in the 1990s as the result of poor, uneducated farmers having been lured by economic incentives. However, the context of sweeping political, economic, and social change in China during the prior two decades is often omitted from these stories. During this time, the wealth gap widened dramatically and large disparities in income developed between the rural and urban populations. Added to that, social and geographical mobility was, and still is, hindered by the Chinese government's *hukou* household registration system. For more information on political, economic, and social change in China, please see Chap. 17.

During China's marketization (conversion of its planned economy to a more market-based economy) in the 1980s, hospitals became newly exposed to competition and were suddenly responsible for generating profits. Thus, doctors became incentivized to recommend products and services to patients based on the relative revenue those sales would produce. In 1984, China's Ministry of Health banned the importation of foreign blood products in order to prevent HIV-contaminated blood from entering the country (Yan et al. 2005). Hospital reform causing increased demand for blood products, together with the termination of the supply of foreign blood products, created a sudden, large demand for blood products from domestic sources.

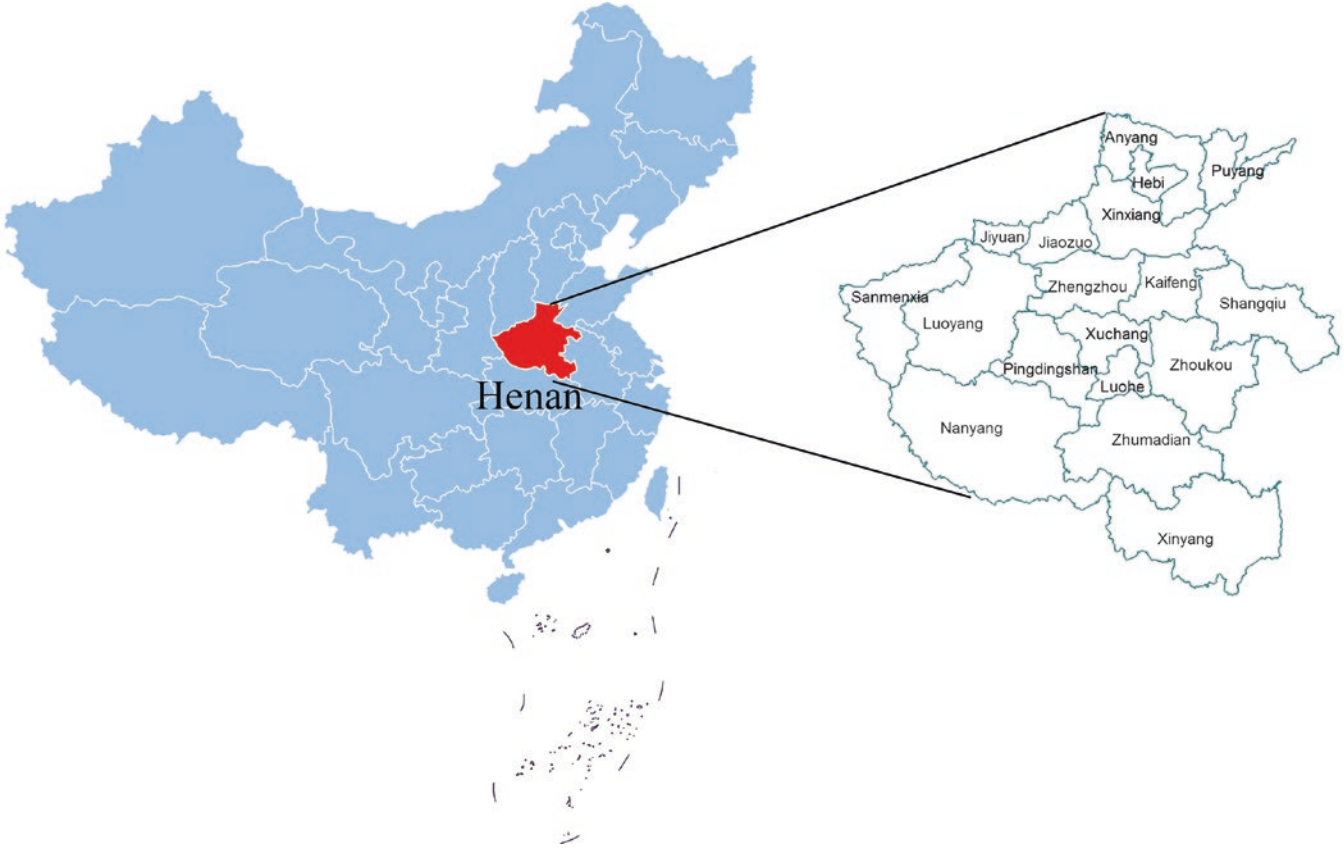

Fig. 30.1 Henan's location in China and Henan's 18 prefectures. Publisher's note: Springer Nature remains neutral with regard to jurisdictional claims in published maps

Not surprisingly, companies entered the domestic blood product market *en masse*, driven by opportunities to make significant profits under both the trade restriction on imports and the lack of regulation on domestics. These companies identified farmers in provinces with large rural populations, such as Henan, as potential targets to be recruited for the production of blood products. Farmers were perceived to be ideal potential donors, since they would have a low prevalence of infections associated with people who inject drugs (PWID, e.g., hepatitis C virus) and sex workers (SW, e.g., syphilis, gonorrhea) and would have a strong willingness to accept low levels of monetary compensation since their economic opportunities were otherwise limited.

Thousands of commercial plasma collection centers were built in rural counties, townships, and villages in Henan between 1990 and 1994. A donor would receive 50 yuan (about US$6), which was approximately half the average per capita monthly rural income in Henan each time they sold blood plasma (Wu et al. 2001). To generate more money, donors often patronized several plasma collection centers and sometimes used false names to circumvent the required 15-day interval between plasma donations. The actual frequency of most donors varied from twice a week to twice a month, although some individuals donated as often as every other day (Wu et al. 2001).

Unsafe plasma collection practices were widespread—equipment was unsterilized, disposables were reused, and blood drawn from multiple donors with the same blood type was mixed and plasma removed; then blood cells were returned to donors (Wu et al. 2001; Cheng et al. 2004). This fueled the rapid spread of HIV, not only to plasma donors, but also to recipients of untested and untreated plasma, as well as to spouses, partners, and children of donors (Wang et al. 2005). For more information on HIV among FPD, please see Chaps. 1 and 6.

30.2.2 The Outbreak

On March 8, 1995, the Sanitary and Anti-Epidemic Station of Yunnan Province (later renamed the Yunnan Provincial CDC) notified the Henan Provincial Health Department that a man from Taikang, a county in eastern Henan, had tested positive for HIV when he tried to sell blood in Yunnan. During the epidemiological investigation, Henan provincial public health officials were informed that the man had been repeatedly selling blood to blood banks in Henan since January 1993. The man did not exhibit any other major risk factors for HIV acquisition, which drew the attention of local and national public health officials and raised concerns that Henan's well-developed blood plasma industry may be contributing to the domestic spread of HIV. In 1995, the Zhengzhou City CDC (Zhengzhou is the capital of Henan Province) conducted a retrospective HIV screening study of almost 55,000 plasma samples collected from blood centers in three provincial cities and four county/district level blood banks in the province from 1993 to 1995. None of these samples had ever previously been tested for HIV infection. A total of 588 (1.0%) tested positive for HIV antibodies (Su 1997).

Table 30.1 Early studies of HIV prevalence among blood/plasma donors in Henan Province

Study	Research (publication) year	HIV+ %
Zheng et al. 2000	1997 (2000)	17.0% (15/88)
Henan CDC	1999 (2006[a])	43.5% (60/138)
China MOH	2001 (2006[a])	33.4% (111/332)

[a]Published in Wang (2006)

Studies conducted since have shown that the risk of HIV transmission was most strongly positively correlated with selling blood at private plasma centers, as compared to county, prefectural, military, and non-local blood centers (Cheng et al. 2004). The sanitary conditions of private plasma centers were very poor, and pooling of blood cells of the same blood type was common practice. Studies conducted before the epidemiological situation in Henan was thoroughly mapped indicated that the epidemic was not uniformly distributed geographically, and HIV prevalence estimates varied greatly between studies, resulting in uncertainty of the scope of the epidemic (see Table 30.1).

30.2.3 The Initial Response

On March 31, 1995, in the same month as the Henan Provincial Health Department was informed of the first HIV case among FPD, the Health Department sent out an official notice requiring all 18 prefectures' health departments to shut down all plasma collection in the province. At the same time, all blood collected for clinical use in hospitals started being tested for HIV, something that was not common practice before 1995.

In March 1996, the Henan Provincial Health Department and Public Security Department, with support from the provincial party committee and government, launched a joint action to crackdown on illegal blood collection activities that continued to operate after the initial notice was sent out a year before. This resulted in a number of illegal blood collectors being closed down. Since 1996, Henan Province has continued to maintain strict control on illegal blood collection, effectively stopping this as a mode of transmission for HIV.

The Chinese central government also implemented several initiatives aimed at stopping the blood/plasma-related HIV epidemic in Henan and surrounding provinces. In 1996, regulations issued by the State Council helped reorganize blood collection stations and enforce the ban on underground blood collection nationwide. In 1998, the Blood Donation Law of the People's Republic of China made monetary compensation for blood donation illegal and standardized medical blood collection practices, in effect making donation the only legal means for blood collection domestically (Liu et al. 2000; Zheng et al. 2000; Yan et al. 2005). Soon thereafter, in 1999, Henan achieved the goal of generating enough blood products through voluntary blood donation only to meet the demand for clinical use (Wang 2006).

30.2.4 The Silence

Even though steps had been taken to stop new infections and many epidemiological studies had begun to investigate the HIV epidemic among FPD, Henan's local government closely guarded HIV prevalence data. Despite indications from several small studies that the HIV epidemic was likely very large, local health workers and the local Henan government believed the information still to be inadequate to fully evaluate the scope of the epidemic, yet were unwilling to conduct a broad-scale survey in order to obtain the evidence they needed for several reasons. First, within lower levels of government structure, accountability for dealing with this kind of sudden, large-scale epidemic was ambiguous. Additionally, public health workers and politicians in Henan had had no prior experience with such an event, nor were they at all prepared to begin the work of epidemic investigation or response. Many perhaps even had misguided hopes that this was an isolated incident, that it would fade away over time, and that no one had to know. Finally, it was standard practice in China at that time to not share information related to epidemics with the public, and there was concern that when the affected population heard the news, they would panic—treatment was not freely available in China at the time, and the main rural population would not have the means to afford it.

All of these contributing factors resulted in the local government failing to quickly launch information campaigns to encourage testing and behavior modification. Moreover, the local and national press were not reporting on the outbreak, so no information reached the affected population. Consequently, the epidemic expanded to include more people than it would have, had the HIV response begun immediately. HIV-positive FPD in Henan were told only that they had been infected with a disease for which there was no cure, nor any free treatment. They were given only educational, mental health, and financial support and told that all that could be done was to attempt to alleviate symptoms via traditional Chinese medicine.

However, the epidemic among Henan's FPD population helped put HIV on the government's agenda, resulting in the comprehensive HIV programs and support systems currently in place. In particular, it was outside forces that brought the existence of the Henan disaster and its massive scale to light. Between 1998 and 1999, many late-stage clinical AIDS cases were reported, and mortality rates rose dramatically in Henan. In 1999, after hearing anecdotal reports of an unknown disease having affected the rural population in parts of Henan, professor Gui Xi'en from a hospital in southern China conducted a study in 1999 and found high HIV prevalence in a village in Shangcai County, including a large number of children living with HIV. He further concluded that a large proportion of those who had HIV were FPD. The study was first picked up by the local news media and later by international media outlets. The reaction of the international community was very harsh, and the Chinese government was immediately under immense pressure to investigate and respond.

30.2.5 The Secondary Response

In 2002, the Chinese central government budgeted 18 million CNY (approximately 2.2 million USD) to provide HIV treatment and services to the affected FPD population (not just in Henan, but in other provinces with similar situations as well) and to launch educational campaigns using a variety of media outlets and targeting both the general population and healthcare workers.

A comprehensive census of FPD was conducted in Henan between July and August 2004. It was initiated by the provincial party committee and government and was designed to map HIV prevalence geographically in order to accurately assess the scale of the epidemic and to better conduct targeted HIV prevention and control measures. More than 280,000 FPD were identified and registered, and almost 270,000 were tested for HIV in these 2 months, an almost unprecedented effort internationally. Among the nearly 270,000 people tested in Henan, 8.6% (23,157) were found to have antibodies to the HIV virus and given a confirmed diagnosis of HIV infection. Among those diagnosed, more than 50% had a serodiscordant spouse (Wang 2006).

HIV prevalence among FPD in Henan's 18 prefectures ranged from 0.09% to 13.0% and appeared to be highly concentrated geographically, with small, isolated villages bearing the heaviest burden (Li et al. 2010). By the end of September 2004, Henan had identified a total of 25,036 HIV cases (all transmission modes), of which 11,815 (47.2%) were clinical AIDS cases (Wang 2006).

By the end of 2012, a total of 32,226 FPD had been diagnosed with HIV infection in Henan, among which 35.4% had already died. This accounted for 57.5% of the cumulative total reported HIV cases in the province. Geographical mapping of Henan's HIV cases roughly coincided with areas where unsafe plasma collection was most rampant. There was clear clustering of cases in southeastern Henan, including prefectures like Zhumadian, Zhoukou, Nanyang, Kaifeng, Shangqiu, Luohe, and Xinyang (Fig. 30.2).

30.2.6 Scaling Up Treatment

Given the largest number of people living with HIV in the province, Henan has also focused major efforts on treatment. HIV/AIDS treatment began to include free ART in 2002 as a part of a pilot program. In late 2003, China's "Four Frees and One Care" policy was unveiled (see Chaps. 12 and 25 for more information). Although broad-scale implementation did not begin until early 2004, the FPD population was given top priority. Because of the urgency and the sheer scale of the program, only a single treatment regimen was used for all treated individuals. To help ensure adherence, a peer supervision program was implemented, where people living with HIV (PLWH) with a relatively high social position were chosen to act as peer supervisors for a group of patients.

Starting in 2004, designated hospitals for AIDS treatment were set up at provincial, city, county, township, and village levels (Li 2009). These hospitals

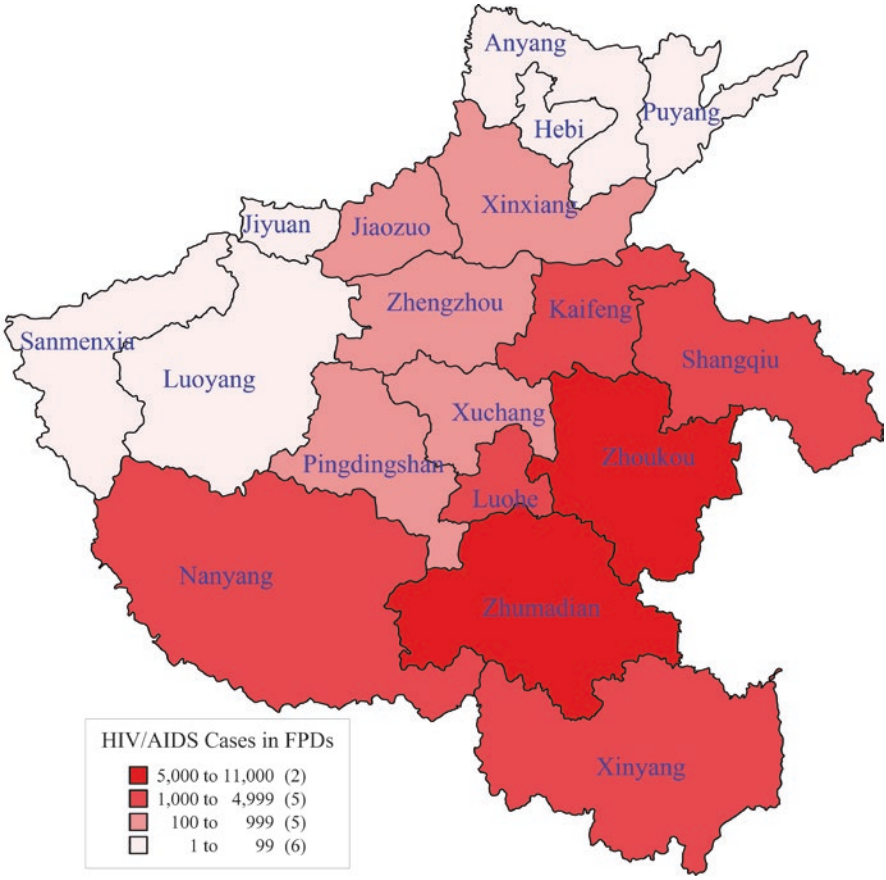

Fig. 30.2 Regional distribution of HIV cases among FPDs, 2017

provide ART, treat opportunistic infections, and employ traditional Chinese medicine to alleviate symptoms. Given that the patients are highly concentrated in rural areas, the Henan government has focused their efforts on strengthening the treatment capacity of the almost 600 township-level hospitals designated for HIV treatment. These 600 hospitals serve approximately 40% of the HIV patients in Henan, making treatment for Henan's rural populations more accessible and convenient, in an attempt to help ensure that adherence is high. These capacity-building efforts mainly included investment in equipment and training of doctors who administer ART.

From 2004 to 2008, more than 20 million CNY (2.44 million USD) was invested to establish clinics in 276 rural villages, each of which had more than 20 PLWH. These clinics covered approximately 50% of PLWH in Henan. The Henan government has also made sure that all PLWH could obtain free opportunistic infection therapy in addition to the free ART provided in the rest of China.

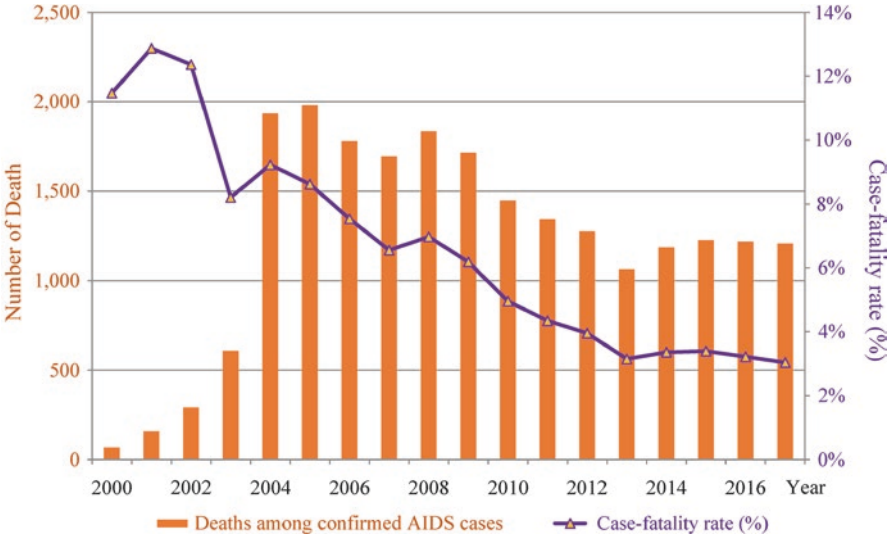

Fig. 30.3 Deaths among confirmed AIDS cases and case-fatality rates from the national case reporting system, 2000–2017

Figure 30.3 shows how the mortality rate among persons diagnosed with AIDS has decreased in an almost linear fashion in the 10 years since the census was conducted in 2004.

30.2.7 Other Support

In addition to medical treatment, the province has established many programs aimed at improving quality of life for PLWH and their families. A lot of this has been focused on giving monetary allowances to PLWH and making sure orphaned children have been cared for, adopted, or put in foster care (Li 2010). In 2002, the government selected 250 office workers and medical staff to establish 38 workgroups. These workgroups were assigned a certain village that had been severely affected by the HIV epidemic, and their main tasks were to help the villagers' economic situation and improve living standards.

30.3 The Second Wave: Onward HIV Transmission

30.3.1 Aftermath of the Plasma Collection Scandal

By the end of 2017, the cumulative number of HIV cases reported in Henan was 80,492, only some 40% of which had been due to infection through unsafe blood collection practices. This group has not ended up serving as a bridge to spread HIV

to the general population, and the explosive increase in reported cases infected through sexual transmission that generally was feared had been evaded. This was due to effective treatment programs and relatively low risk behavioral patterns among this population, where interaction with sex workers was rare, and the group generally exhibited patterns of low geographical mobility—more than 90% of the FPD with HIV infection have stayed in Henan after diagnosis, partly due to financial aid from the Henan government and the effective treatment programs (regulated by *hukou*) provided in the region.

Upon identification of new HIV infections, persons are interviewed and asked the means by which they believe they contracted the virus. The predominant mode of HIV transmission among newly reported cases has changed dramatically over time—infection via unsafe blood collection practices as a percent of total number of HIV cases decreased from 50.3% in 2005 to 0.3% in 2014, to none since 2015, while infection via heterosexual contact increased from 18.0% in 2005 to 67.8% in 2017 (Fig. 30.4). Since transmission mode is self-reported, the sharp rise in infection via unsafe blood collection in 2003 and 2004 may have been due to bias. Social stigma and discrimination against PLWH were severe in China during this time, but lessened for FPD since it was believed that their infection was not their fault and not due to some flaw in their moral character (see Chap. 28 for more information). Furthermore, programs providing enhanced services for this population had not yet been thoroughly extended to other populations. Thus, some may also have reported being FPD upon HIV diagnosis in order to better ensure they would have access to treatment and support. The dramatic decrease in infections attributed to FPD from 2012 to 2014 is

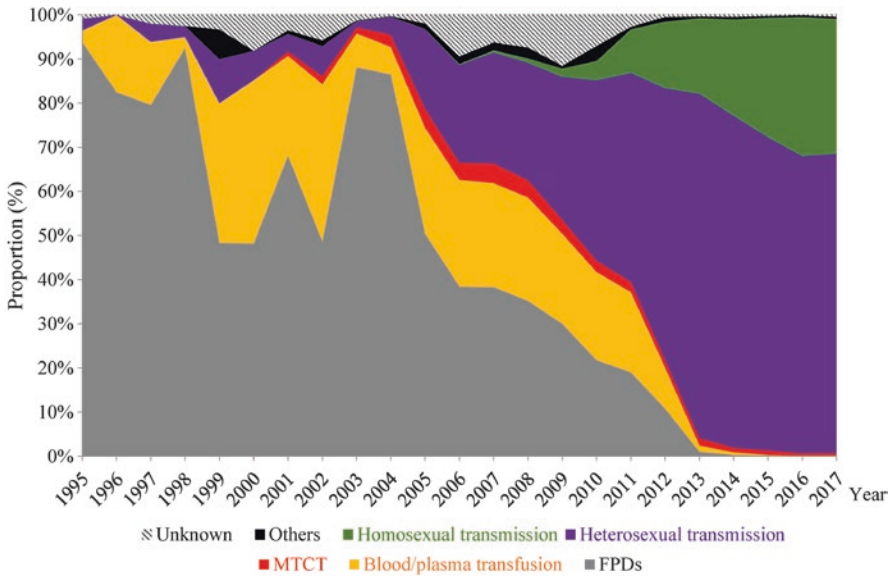

Fig. 30.4 Newly reported HIV/AIDS cases by transmission mode (%) by year, 1995–2017

largely due to investigation of the reported mode of transmission by public health workers.

Cases infected through heterosexual transmission mainly include those infected by their spouse or partner, female sex workers (FSW), and clients of sex workers and are largely disconnected from the self-ending FPD epidemic, where generally only spouses, if anyone, were infected through secondary transmission. In 2012, a retrospective cross-sectional study was conducted in Henan, surveying PLWH who had reported sexual contact as their route of HIV acquisition upon diagnosis in 2011. Researchers found that among those who reported acquiring HIV via extra-marital sexual contact, 68.9% had a history of being involved in commercial sex, both as clients and sex workers, and reported extremely low rates of consistent condom use in the last 6 months (0.7%, 4/578) (Ma et al. 2012).

Sentinel surveillance among FSW was first introduced in Henan in 1995. In that same year, the first cases of HIV infection were detected among sex workers in Henan (Wang et al. 1997). The HIV-positive rate among FSWs has remained at a stable and quite low level, with an aggregated HIV rate from 2003 to 2017 of less than 0.08% in sentinel sites (see Fig. 30.5; the large variance before 2003 is due to a smaller sample including FSW at higher risk from only two sentinel sites). However, due to the large number of sex workers in the province, these low prevalence rates still translate into a large number of PLWH, where a large number of clients seek out their services and condom use may not be consistent.

Similar to the rest of China, Henan has seen an explosion in the prevalence of HIV among men who have sex with men (MSM) in recent years. Among newly

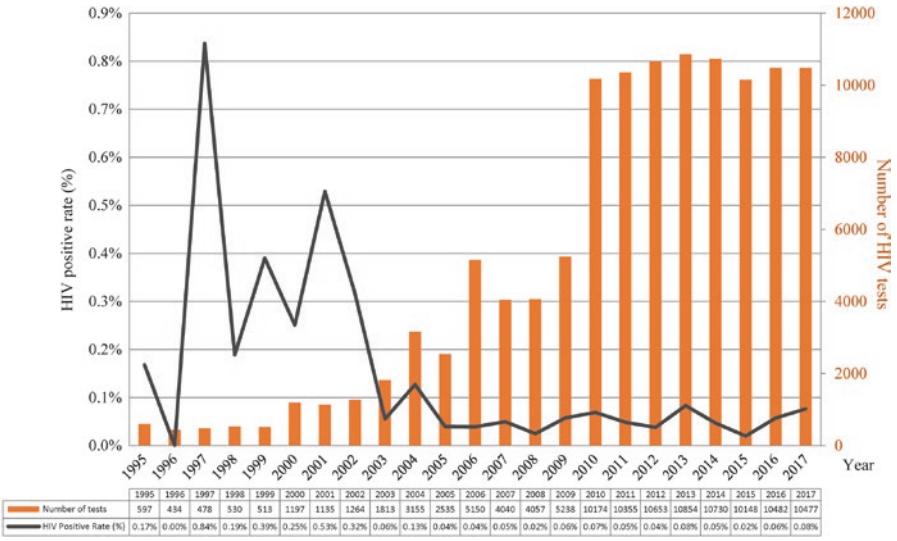

Fig. 30.5 HIV prevalence rate among FSWs and total number of HIV tests in Henan, 1995–2017

reported cases, the proportion reporting homosexual contact as their route of HIV acquisition rose from 0.1% in 2005 (the first year this transmission mode started being reported) to 30.6% in 2017. A study conducted in 2011 estimated HIV prevalence among MSM in Henan to be 6.1% (Ma et al. 2012), higher than similar studies conducted between 2005 and 2010 and also higher than the national average from a China CDC survey in 2008 and 2009 (Wu et al. 2013).

30.3.2 Prevention of Mother-to-Child Transmission (PMTCT)

PMTCT was piloted in two Henan counties from 2001 to 2004, and a program based on this pilot was fully rolled out to all prefectures in 2005 (Sun et al. 2008). In this program, village doctors were made directly responsible for PMTCT in their respective villages. This included health education, counseling services, and condom distribution to all women living with HIV who were aged 20–49. For those who were pregnant, the program also included tracking and follow-up of both mothers and infants, guidance on safe infant feeding practices, and routine maternal and child health services (Peng et al. 2008). Pregnant women with HIV infection could also elect to have free abortions. For women who decided to continue their pregnancies, the program included ART for both mother and child, free infant feeding formulas, and HIV screening for infants 18 months after being born. Doctors were also given monetary incentives to provide these services in an adequate way (Li et al. 2010; Li 2010). HIV testing for pregnant women was targeted in high prevalence counties between 2005 and 2010 and then rolled out to the whole province, when central government funding was earmarked for MTCT prevention work in Henan.

From 2002 to 2009, a total of 2,796,192 pregnant women accepted voluntary counseling and testing (VCT). Among of them, 1561 (0.1%) were diagnosed with HIV infection, including 939 women who had just given birth and 622 women who were pregnant (88.3% of whom chose to terminate their pregnancies). All women diagnosed as HIV positive and pregnant or recently delivered were immediately enrolled in the PMTCT program and provided appropriate counseling and services. By 2009, 730 HIV-exposed infants had reached the age of 18 months. Among them, 638 had been tested for HIV, and 30 (4.7%) were found to have HIV infection (Sun et al. 2010). For more information on China's national PMTCT program, see Chap. 15.

30.3.3 Prevention Among Serodiscordant Couples

From 2005 to 2015, Henan has had more than 10,000 HIV serodiscordant couples at any given point in time, making targeted interventions for this population a top priority. Although the number of serodiscordant couples registered in Henan has increased slowly during this period, it is thought that this is at least partly due to more couples being identified and more partners staying free of infection for longer durations as a result of improved treatment and treatment coverage. An early study

estimated that the pre-intervention HIV transmission rate among discordant couples (not limited to FPD) was more than 11% in certain areas (Li et al. 2003, 2008).

In order to prevent HIV transmission between serodiscordant partners, Henan became the first province in China to launch interventions and management policies for HIV discordant couples in 2005. The program covered the entire province and targeted mainly the HIV-negative partner. Village doctors were assigned to couples living in their respective villages and not only became responsible for consultation and testing services as well as enrollment in and administration of ART for those who seroconverted, but also were instructed to conduct regular home visits to provide education and support and free condoms. Because of China's "One Child" policy, it had been common practice in rural areas to use sterilization and other long-term methods for contraception after a couple had their allowed number of children. Furthermore, due to traditionally very limited sex education, many rural inhabitants viewed condoms solely as a method for birth control, and thus, they were seldom used by couples. Therefore, these village doctors became responsible not only for distributing free condoms to serodiscordant couples, but also for educating them on proper use of condoms and their importance in prevention of disease transmission.

Due to the large number of serodiscordant couples, and the need to continuously update and maintain data, Henan also became the first province in China to establish an information management system for serodiscordant couples in 2006. County-level CDCs collected and uploaded follow-up and testing information on a monthly basis for couples where one member had HIV infection. The data was then aggregated at the prefecture-level CDC and sent to the Henan provincial CDC. In 2008, Henan upgraded their system to an online version, which allowed prefectural and provincial CDCs immediate access to near-real-time data.

Following years of intervention work, the population of HIV-discordant couples has had a slow and relatively even year-to-year increase, with a decreasing seroconversion rate up to the latest publicly available data point (2010). HIV testing uptake among serodiscordant couples had reached 97.4% in 2010 (Li et al. 2012). More than 80% of couples practiced consistent condom use, and the HIV

Table 30.2 HIV test and seroconversion status among discordant couples in 2006–2017

		HIV test		Seroconversion	
Year	Number of DC	Number tested	Rate (%)	Number	Rate (%)
2006	7497	6380	85.1	108	1.94
2007	8547	6175	72.1	95	1.79
2008	9987	9190	92.0	44	0.59
2009	11,297	10,817	95.8	40	0.41
2010	12,807	12,472	97.4	17	0.15
2011	13,433	13,122	97.68	54	0.4
2012	13,931	13,588	97.54	41	0.3
2013	14,632	14,425	98.59	41	0.3
2014	15,154	15,067	99.43	70	0.5
2015	15,251	15,167	99.45	46	0.3
2016	16,740	16,450	98.27	21	0.1
2017	18,179	17,427	95.86	21	0.1

seroconversion rate among couples decreased from 1.94% in 2006 to 0.1% in 2017 (see Table 30.2).

In 2011, HIV treatment as prevention (TasP) was piloted for PLWH in serodiscordant relationships in Henan, meaning they were allowed to initiate ART regardless of their CD4 count in order to reduce their viral load, thereby reducing the odds of transmission to their partner. The hope was that this intervention would further reduce the seroconversion rate of uninfected partners. Results of the pilot demonstrated that this intervention indeed was successful at preventing seroconversion, and the policy was then extended to the entire province (Chen et al. 2013; Ma et al. 2011).

30.3.4 Prevention Among Men Who Have Sex with Men (MSM)

Transmission by male-male contact has increased rapidly in Henan in recent years, both in terms of absolute numbers and the proportion of all cases reported. The first case of HIV infection acquired via this transmission route was reported in 2005, and interventions targeting this key, high-risk population were launched that the same year. The first sentinel surveillance site (serological and behavioral) targeting MSM was established in Zhengzhou in 2005. By the end of 2012, the number of MSM sentinel surveillance sites had been expanded to four, covering the largest of Henan's cities. Since 2005, HIV prevalence among MSM surveyed at these sites has increased year over year. As of 2017, it had reached 7.4% (Fig. 30.6).

The high and increasing HIV prevalence observed in Henan's sentinel surveillance data has been corroborated by several research studies. For example, a 2010

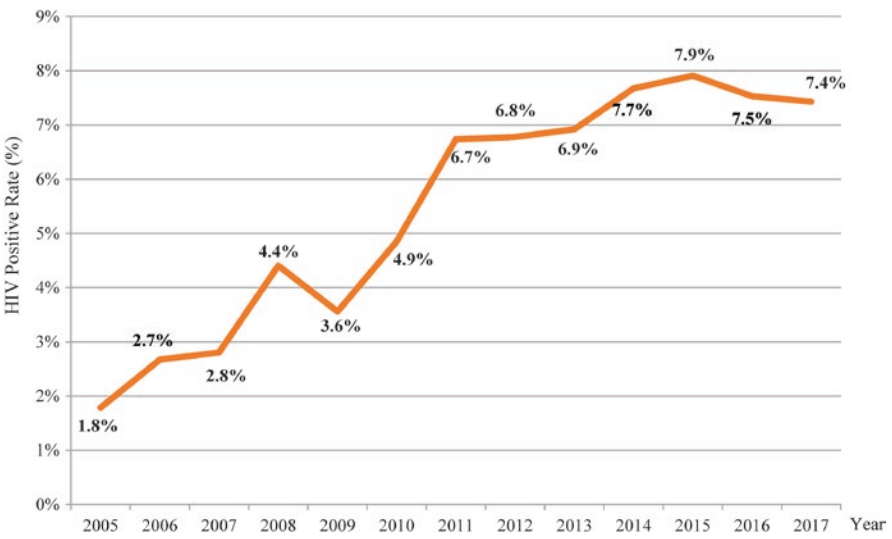

Fig. 30.6 HIV prevalence rate among MSM from sentinel surveillance in Henan, 2005–2017

study estimated HIV prevalence among MSM in Zhengzhou to be 5.5%. At a national level, similar trends were observed (Wu et al. 2013).

In China, it is common for MSM to be married or cohabitating with female partners, and this has been observed in Henan as well—a study published in 2010 found that 32.3% of MSM surveyed in Zhengzhou were married or cohabitating with female partners (Xu et al. 2010). Studies have found that married MSM are at high risk of acquiring HIV from their male sexual partners and transmit it to their wives (Zhang and Chu 2005). In general, many of the women in these long-term relationships are unaware of their male partners' external sexual activities. These women are at very high risk of HIV infection, yet are challenging to reach with HIV prevention interventions.

30.4 Future Challenges

30.4.1 Multidrug Resistance

Henan was the first Chinese province to roll out ART, starting in 2001. Henan has the largest number of people on ART in the country, many of whom are now on second-line treatment. Many of those on second-line regimens were started on ART before standardized regimens were available or before those regimens were being effectively followed, making drug resistance more of an issue in Henan compared to other provinces. Due to the large population on ART, yet the lack of standardized and well-developed regimens as well as lack of medical staff experienced with administering ART and supporting ART adherence, drug-resistant HIV strains emerged and spread quickly in Henan during the initial stages of the ART program. An early small sample survey showed that 6-month treatment-resistant strain prevalence rate was as high as 62.7% (Li et al. 2005). A cross-sectional study, of individuals newly-diagnosed with HIV infection, but not yet on ART, found that 7.7% (8 of 104) of cases carried drug-resistant HIV strains (Liu et al. 2011).

A 2010 study of long-term ART patients in Henan found that nearly 70% carried virus with drug resistance mutations, more than 60% of those on first-line treatments were resistant to the drugs in the regimen, and more than 30% were already resistant to two drugs in second-line treatment (Cui et al. 2012). The proportion of patients resistant to drugs used in treatment also tended to increase with time in treatment. A 2005 study found that among PLWH on ART for 3 months and 6 months, the rate of drug resistance had reached 45.4% and 62.7%, respectively (Li et al. 2005). Multivariate logistic regression analysis showed that the main risk factors that were correlated with prevalence of drug resistance included low drug adherence, duration of treatment, and initial regimen with certain ART drugs (Yuan et al. 2012). Good medication adherence (>97%) can inhibit viral replication and reduce the occurrence of drug-resistant strains (Gandner et al. 2008), meaning that increasing adherence is a key factor in improving the treatment outcomes. Therefore,

clinicians need to be more vigilant in their monitoring of patients for virological failure so that it can be caught earlier.

30.4.2 Controlling the MSM Epidemic

MSM have become more represented in the HIV data in Henan in recent years, and as previously discussed, they are at high risk of acquiring HIV and contribute to the spread of HIV to women and the general population since a considerable proportion of them are married to women in order to hide their sexual orientation. As it has been well-established that not only HIV-related stigma but also underlying stigma toward MSM can further fuel HIV transmission and reduce access to HIV programs (Mahajan et al. 2008), future prevention efforts targeting the MSM population must address the stigmatization of MSM that still persists in the society despite the growing visibility of MSM in cities throughout Henan. As 41.4% of MSM reported using the Internet to find partners in a study covering all Henan's prefectures between 2008 and 2013 (Ma et al. 2015), online interventions may be a feasible way to overcome challenges such as more effectively reaching out to men in long-term relationships with women.

30.4.3 The Undiagnosed Population

Henan conducted the most comprehensive massive HIV testing campaign in 2004 and thereafter. After 14 years of implementation of HIV testing and treatment, and many special supportive policies and programs for FPD and PLWH, public health officials in Henan are confident that there are no remaining undiagnosed cases of HIV infection caused by malpractice of plasma collection during 1995. However, people infected in the second wave of the HIV epidemic, by sexual transmission, are still difficult to identify. Similar to the rest of China, about one-third of the estimated total number of PLWH remain undiagnosed.

30.4.4 Female Sex Workers (FSW)

Though the sentinel surveillance showed consistent low HIV prevalence among FSW, given the large number of sex workers and even much larger number of male clients in the province, the low HIV prevalence rates may still translate into a large number of HIV infections. With rapid expansion of social app use, sex workers have mostly moved from physical venues to the "digital world" to look for clients, and that makes them even less accessible for HIV prevention programs.

30.4.5 Migrant Workers

Henan is the most populous province in China and has more than 20 million migrant workers who have left villages for urban areas—the largest such population among Chinese provinces (Tong and Wang 2009). The high level of mobility, commonly with seasonal patterns, of these migrants may facilitate HIV spread from one area to another, as migrants in China have been shown to commonly engage in risk behaviors (He et al. 2005; Li et al. 2007a, b). A number of migrant-related factors have been demonstrated to correlate strongly with the spread of the disease in the Chinese context, including low social and economic status, low education level, lacking knowledge of correct condom use, low awareness of HIV, as well as economic, linguistic, and geographical barriers to health services (Zeng et al. 2009; Liu and Tang 2010; Zhao and Wang 2010). A survey conducted in Henan did show that among cases where the disease was acquired through extramarital sexual activity, most of the individuals did have a household registry permit from rural areas, but worked and lived in urban areas (Ma et al. 2013). Preventing HIV transmission within and beyond migrant groups has become one of the most serious public health challenges that Henan must address. However, it is worth noting that many of the financial support programs, and the more comprehensive ART program in Henan, set up for FPD have incentivized this subpopulation to not move away from the province, even though their socio-economic background is rather typical for migrant workers. Henan is planning to implement HIV prevention and control programs specifically designed for migrants in the coming years and to map the behavior of this demographic, including migration patterns and secondary transmission to spouses, in order to better serve this group.

30.5 Conclusions

At the initial stages of the local HIV epidemic, Henan encountered epidemiological dynamics where the affected population was highly geographically concentrated and their behavior was relatively homogenous—showing low levels of risk behavior, something that is rare for a target population, and low levels of seasonal or long-term geographic mobility. This provided an environment where targeted efforts proved highly effective. These efforts involved surveying the whole population of FPD; changing the legal framework and rolling out the first free ART program in China; providing financial support for the affected population; and, in order to make sure that the outbreak was contained, setting up comprehensive programs to reduce MTCT and secondary transmission among serodiscordant couples. This outbreak was the only recorded one, of this scale, in the history of the global HIV epidemic that was driven by blood collection malpractices. As such, some of the experiences from the intervention and treatment programs used in the first wave of the epidemic

are difficult to adapt to the more general epidemic the province is dealing with today, in the so-called 'second wave'. With the main mode of transmission having changed to sexual transmission, the general population that does not belong to any particular risk group that is closely monitored has to be approached in some way through information campaigns and improved access to HIV testing. At the same time, it is necessary to still keep track of the epidemiological developments among groups at higher risk, such as sex workers, that would likely show higher prevalence levels if the situation got worse among the general population. To do this in a successful way, the prevention efforts in Henan need to look at best practices from other provinces, and maybe even other countries, while also taking local context into account to evaluate what kind of interventions may be most effective to fight the local epidemic.

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HIV Epidemiology and Control in Guangxi (1986–2017)

31

Zhenzhu Tang, Zhiyong Shen, Xiaofang Wang, and Jonas Tillman

Abstract

Guangxi Zhuang Autonomous Region is one of the least economically developed regions in China and has been granted the status of autonomous region due to the high share of Zhuang minority population in the region. HIV was initially spread mainly among drug users, later to be transmitted further to the general population. The epidemic also shows some specific patterns that are not as prevalent in other parts of the country. For instance, the region has the highest rate of heterosexual transmission in China, and the prevalence among senior citizens has become alarmingly high in later years (the share of reported cases age 50 and above, makes up almost 60%). In addition to this, Guangxi faces issues with a large number of late diagnosed cases; around 50% of those diagnosed are already in an advanced clinical stage. Also related to this, the region exhibits the highest HIV-related mortality rates in China. In comparison with other Chinese regions, the HIV epidemic is relatively evenly distributed throughout the region, making it difficult to target the response. In response to these issues, there have been a large number of programs implemented to increase testing and facilitate treatment.

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31.1 Introduction

Guangxi Zhuang Autonomous Region (provincial level, hereafter known as Guangxi) is located in a mountainous region of southern China that is known for its natural beauty. It encompasses an area of 236,700 km^2 and is divided into 14 prefecture-level cities, with 113 urban districts and rural counties. Twelve different ethnic groups (Han, Zhuang, Yao, Miao, Dong, Mulao, Maonan, Hui, Jing, Yi, Shui, and Gelao) reside in the region. As of the 2017 census, Han Chinese accounted for 62.8% of the total population of Guangxi (48.9 million), Zhuang accounted for 31.4%, and Yao for 3%.

Guangxi has also become known for its position along one of the oldest and most well-developed drug trafficking routes in the world. Until the early 2000s, the so-called "Golden Triangle" region of Myanmar, Lao People's Democratic Republic, and Vietnam, was the source of the vast majority of the world's opium and heroin, and still is a major contributor today. Heroin produced in the Golden Triangle has largely supplied markets in China, East and Southeast Asia, and Oceana. It is moved across the remote, mountainous border between Vietnam and China's Yunnan and Guangxi provinces. The ubiquitous availability of very inexpensive heroin in the region has been a major driver of the drug use epidemic in Guangxi and across China.

Drug use among the peoples of Guangxi, specifically heroin use via unsafe injection practices (i.e., sharing contaminated needles and syringes), directly led to the first HIV outbreak in the province. Although the first domestic cases of HIV infection in the region were identified among drug users in neighboring Yunnan province in 1989, HIV infection was not diagnosed among the people of Guangxi until 1996—several cases each among people who inject drugs (PWID) and former plasma donors (FPD). As of 2011, Guangxi ranked second among China's 31 provinces in terms of both the number of reported HIV cases and the estimated total number of people living with HIV (PLWH) (China MOH, UNAIDS, and WHO 2011). And by 2012, all of Guangxi's 113 urban districts and rural counties had reported HIV cases.

Despite being decades into its HIV response efforts, HIV prevalence in Guangxi remains among the highest in the nation. Challenges to HIV control and prevention in the region include a flourishing commercial sex industry, a shift in the predominant transmission route, and a unique cultural context for each of the different ethnic minorities in the region. In this chapter, we focus on Guangxi, and the unique course the HIV epidemic has taken in this southern Chinese province, as well as response efforts and future challenges.

31.2 HIV Epidemiology in Guangxi

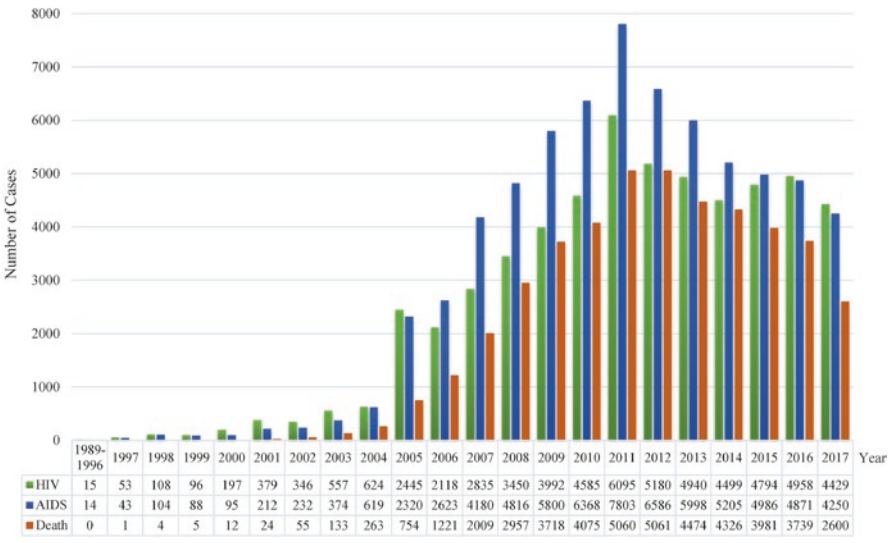
31.2.1 Overview of the HIV/AIDS Epidemic

The initial cases of HIV in Guangxi were sporadic and amounted to no more than ten in total from 1989 to 1995. All were among either foreign nationals studying in the province or Chinese business travelers who had returned from abroad. The first locally-transmitted HIV cases, detected in 1996, were among those who sold their blood or plasma in neighboring provinces and PWID residing in Pingxiang City on

the border with Vietnam. Thus, 1996 is said to mark the beginning of the HIV epidemic in Guangxi.

From 1996 to 1997, surveillance efforts had identified HIV/AIDS cases in 25 Guangxi counties. In 1998, the number of reported cases exceeded 200. This upward trend continued in the following years with the number of reported cases exceeding 500 in 2001, reaching over 4500 cases in 2005, and surpassed 10,000 in 2010 (Fig. 31.1). By the end of 2017, the total cumulative number of HIV/AIDS cases reached 124,282, 44,472 of whom were deceased. Among the 79,810 people living with HIV, 43,750 (54.8%) were clinical AIDS cases (National Center for AIDS/STD Control and Prevention, China CDC 2017). Between 2006 and 2015, there were more clinical AIDS cases than non-clinical HIV infection cases among newly diagnosed HIV/AIDS cases, suggesting many PLWH were being diagnosed at a very late stage (Fig. 31.1).

From 1997 to 2005, unsafe injection drug use behavior was the main mode of HIV transmission. In 1997, PWID accounted for 95.5% of all newly diagnosed HIV/AIDS cases. Every year thereafter, the proportion of PWID among all newly diagnosed HIV/AIDS cases in Guangxi gradually decreased to less than 50% by 2005 (Fig. 31.2). Heterosexual contact surpassed unsafe drug injecting practices as the primary mode of transmission in 2006. PLWH infected via heterosexual contact accounted for 56.3% of all newly diagnosed HIV/AIDS cases in 2007, and this proportion gradually increased to over 90% in 2011. The proportion of newly diagnosed HIV/AIDS cases infected through heterosexual contact accounted for 90.4–92.6% in Guangxi between 2011 and 2017, the highest such rate reported in China at that time. The first case of HIV transmission via male-male contact in Guangxi was reported in 2006, but by 2017, 6.5% of all PLWH in Guangxi had been infected via this transmission route.



	1989-1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
HIV	15	53	108	96	197	379	346	557	624	2445	2118	2835	3450	3992	4585	6095	5180	4940	4499	4794	4958	4429
AIDS	14	43	104	88	95	212	232	374	619	2320	2623	4180	4816	5800	6368	7803	6586	5998	5205	4986	4871	4250
Death	0	1	4	5	12	24	55	133	263	754	1221	2009	2957	3718	4075	5060	5061	4474	4326	3981	3739	2600

Fig. 31.1 Annual reported number of HIV infections, AIDS cases, and deaths in Guangxi, 1989–2017

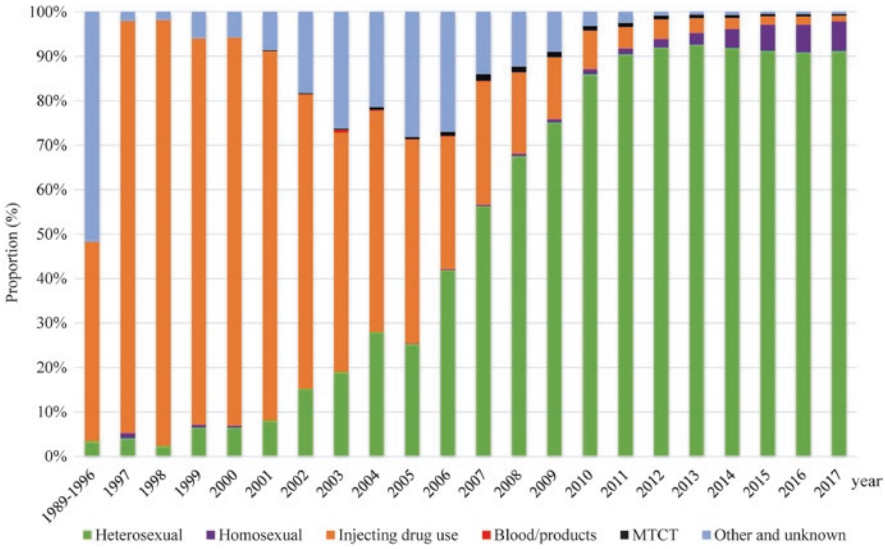


Fig. 31.2 Reported modes of transmission for HIV cases in Guangxi, 1989–2017

31.2.2 Demographics of People Living with HIV

31.2.2.1 Age

In the years when PWID accounted for a large majority of reported HIV cases, the 20–40 years age group was by far the largest. After the predominant transmission route shifted from unsafe drug injecting behavior to heterosexual contact, the age distribution of PLWH in Guangxi also made a dramatic shift. The age group 40 years or above became the largest (Fig. 31.3).

A development that has been unique for Guangxi in the Chinese context is that PLWH aged 50 years or above rose from 1.0% in 1997 to 10.2% in 2005, to 39.5% in 2010, and further 52.4% by 2017 (Fig. 31.3). By comparison, this age group on a national level accounted for a mere 1.9% in 2000 and rose to 21.1% in 2011 (China MOH 2012), and 28.7% in 2017 (National Center for AIDS/STD Control and Prevention, China CDC 2017).

31.2.2.2 Ethnicity

In the early years of the epidemic, data on ethnicity was not collected or inconsistently collected. In later years, when the reporting of ethnicity was consistent, 2008–2017, the proportion of annual newly diagnosed HIV/AIDS cases from Zhuang ethnic group was between 30% and 36% and from Han ethnic group, was between 61% and 66%. The proportion of Zhuang and Han in total population size in Guangxi are similar (Fig. 31.4).

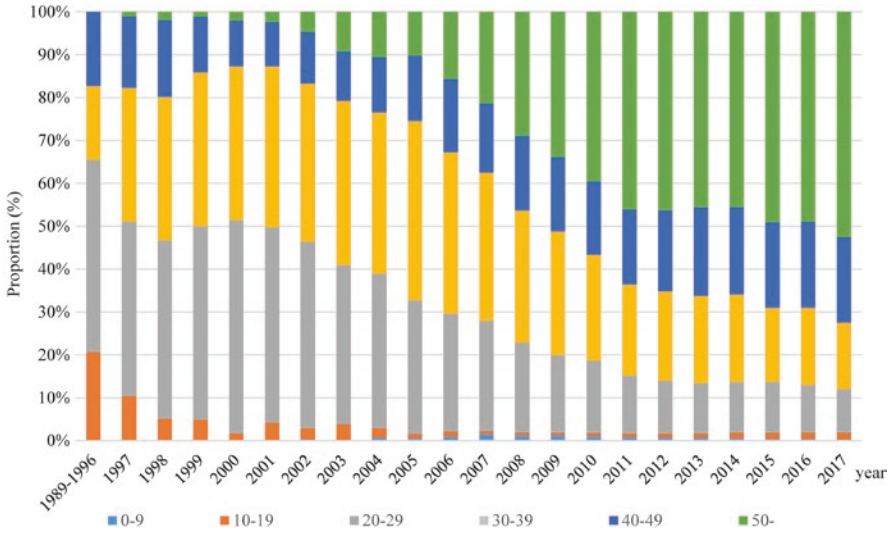


Fig. 31.3 Age distribution of reported HIV cases in Guangxi, 1989–2017

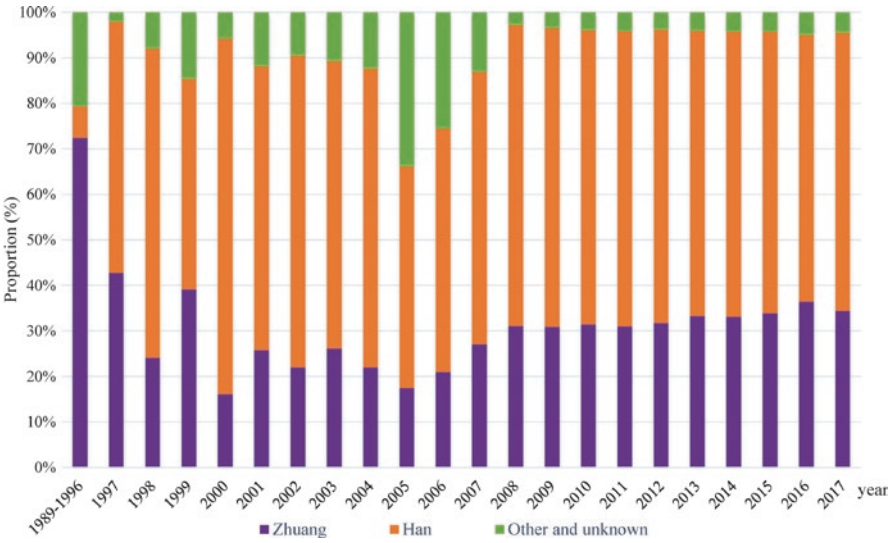


Fig. 31.4 Ethnic distribution of reported HIV cases from 1989 to 2017 in Guangxi

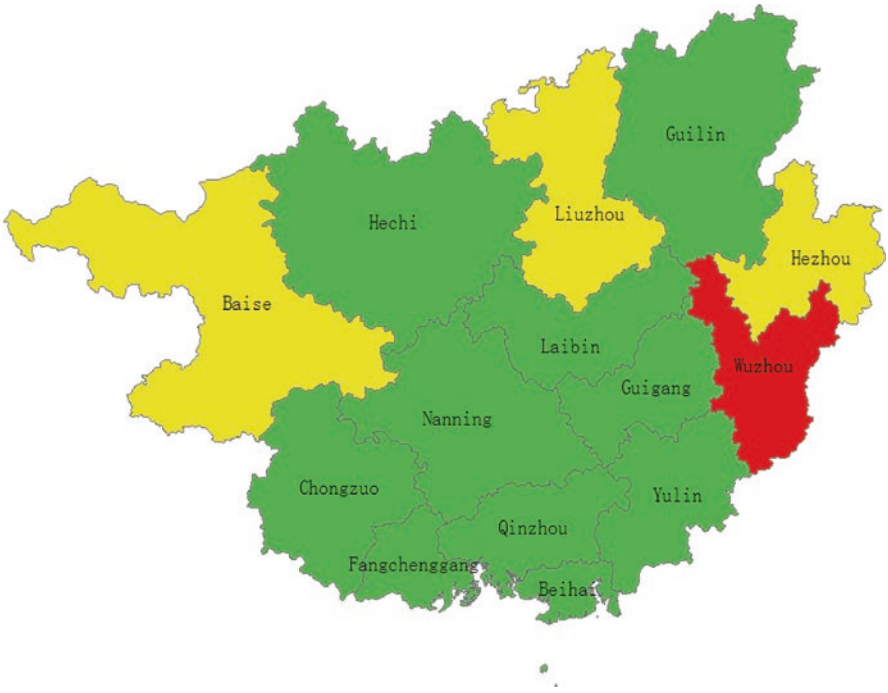
31.2.2.3 Other Characteristics

The male to female ratio among diagnosed PLWH was almost 10:1 in 1996. However, after the main mode of transmission shifted to heterosexual contact, the number of cases among females grew and then stabilized somewhat, such that between 2006 and 2012, the male to female ratio fluctuated between 2.8:1 and 2.1:1.

Most PLWH in Guangxi had a low level of educational attainment, and the majority were manual laborers. In 2012, 89.4% of newly diagnosed PLWH had 6 years of schooling or less and 66.8% were farmers. The proportion of PLWH who were unmarried fell from nearly 50% in 1998 to 20% in 2012, while the proportion of PLWH who were married rose from 23% to 62% in the same period.

31.2.2.4 Geography

Initially, the HIV cases in Guangxi were not uniformly distributed. Rather, they were clustered around Nanning, Liuzhou, and Qinzhou. These three cities have large populations, a significant proportion of which are migrant workers. Furthermore, Nanning and Liuzhou are located along a major drug trafficking route. Nanning had the highest estimated number of PWID in Guangxi, followed by Yulin, Liuzhou, and Qinzhou. However, Yulin has comparatively low HIV infection rate among this group (Fig. 31.5). These characteristics have promoted the rapid spread of HIV in Guangxi's major urban areas. Cumulative HIV cases in these three cities exceeded 33,000 by 2017, accounting for 41.5% of all cases in the region (Table 31.1). Compared with other cities in Guangxi, these three had much higher proportions of cases where the transmission mode was unsafe drug injecting



High	>40%	Wuzhou									
Middle	15%-40%	Liuzhou	Hezhou	Baise							
Low	<15%	Beihai	Yulin	Laibin	Hechi	Guili	Fangcheng	Guigang	Chongzuo	Qinzhou	Nanning

Fig. 31.5 Geographic distribution of HIV infection rates among PWID in 2017

Table 31.1 Accumulated reported HIV/AIDS cases up to 2017 in Guangxi prefectures

City	No. of PLWH	No. of deaths	Total	Proportion (%)
Nanning	12,491	5408	17,899	14.4
Liuzhou	11,689	6084	17,773	14.3
Qinzhou	8971	5025	13,996	11.3
Guigang	6414	4493	10,907	8.8
Guilin	6982	3805	10,787	8.7
Laibin	5387	2916	8303	6.7
Chongzuo	4474	3511	7985	6.4
Hezhou	4279	3556	7835	6.3
Yulin	4172	2533	6705	5.4
Hechi	4386	2257	6643	5.3
Baise	4152	1570	5722	4.6
Wuzhou	3042	1765	4807	3.9
Fangchenggang	2316	1098	3414	2.7
Beihai	995	446	1441	1.2
Unknown	60	5	65	0.1
Guangxi	79,810	44,472	124,282	100.0

behavior. In later years, the geographic distribution became more uniform compared to many other Chinese provinces with high HIV prevalence, such as Sichuan and Yunnan.

31.2.3 Key Populations

31.2.3.1 People Who Inject Drugs (PWID)

Guangxi's location, on the main route for drug trafficking from the "Golden Triangle" into Mainland China, has resulted in Guangxi becoming one of the provinces most plagued by heavy drug use in all of China. As of 2015, Guangxi had approximately 60,000 registered heroin users. Surveillance data from 1996 to 1998 indicated that more than 90% of drug users in the province were injecting on a regular basis, and that 40–60% of them had shared needles and/or syringes.

Guangxi is one of only six provincial-level entities in China where the number of HIV cases among PWID has surpassed 10,000. The estimated HIV prevalence among PWID increased steadily from 2.4% in 1997 to 15.8% in 2001. After stabilizing at roughly 10% for the next 6 years, the estimated HIV prevalence among PWID decreased from 13.9% in 2007 to 5.0% in 2013.

The China CDC at the national level and the provincial level Guangxi CDC jointly launched China's first pilot site for needle and syringe exchange in Tiandong County in 1999. Additional sites were opened in Luzhai in 2001, and in Ningming in 2002. By September 2017, 114 needle and syringe exchange sites had been established in a total of 59 Guangxi counties. This program has covered approximately 10,000 PWID each year since 2010. Self-reported rates of needle/syringe sharing in the prior 1 month among engaged PWID dropped from 20.7% in 2007 to 14.0% in 2012 and less than 10% in 2017 (See Chap. 10 for more information).

The first methadone maintenance treatment (MMT) pilot clinic in Guangxi opened in 2004. By 2017, there were 71 MMT clinics and 43 MMT service extension points in operation, spread over 14 Guangxi prefectures, covering key areas with high HIV prevalence among drug users. Approximately 38,000 drug users have been enrolled in MMT, cumulatively, as of the end of 2017. The rate of HIV seroconversion among drug users enrolled as clients in China's National MMT Program decreased from 0.64% in 2010 to 0.23% in 2012, to 0.03% in 2017 (See Chap. 9 for more information).

31.2.3.2 Female Sex Workers

The growing economy, large income disparity, significant rural-to-urban migration, and a thriving tourism industry have all contributed to a booming commercial sex industry in both urban and rural areas of Guangxi (Zhou et al. 2013a). The first HIV case identified among FSW was reported in 1997. Sentinel surveillance was initiated for this key, high-risk population, and these data indicate that HIV prevalence among FSW has remained relatively stable at 0.5–1.0% from 1997 through 2015. However, evidence indicates that not all FSW are at a similar risk for HIV—low-fee FSW, who charge as little as CNY 50 (USD $7) for vaginal sex, have higher HIV prevalence (1.9%) compared to high-fee FSW (0.5%, see Fig. 31.6).

A cross-sectional survey conducted from 2011 to 2012, covering 7936 low-fee FSW across Guangxi Province, found an HIV prevalence of 1.9% and a syphilis prevalence of 11.3%. The average age of participants was 32 years, and a majority had 6 years of schooling or less (49%), were married (65%), and had basic knowledge of HIV (68%), yet reported inconsistent condom use in the prior 1 month (53%). Results of this study have also led to speculation that low-fee FSW were

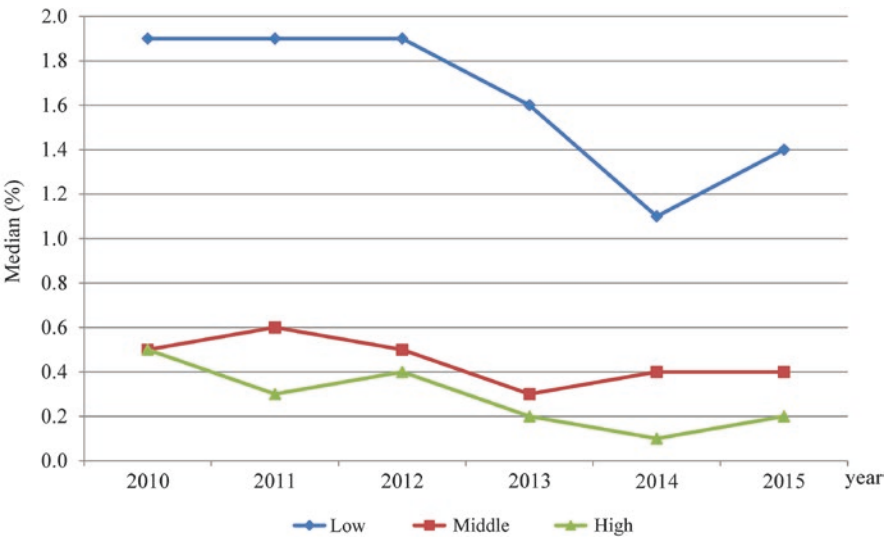


Fig. 31.6 HIV prevalence for low, middle, and high tiers of FSW in 2010–2015, median (%)

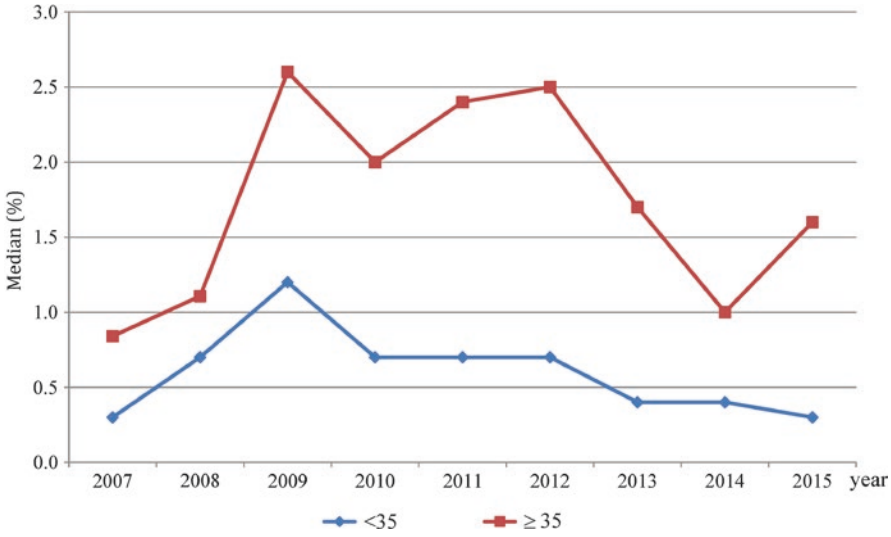


Fig. 31.7 HIV prevalence for FSW aged ≥35 years and <35 years in 2007–2015

acting as a bridge, transmitting HIV infections to older males in the rural areas of Guangxi (Zhou et al. 2013b).

HIV prevalence has been shown to have a positive correlation with age among FSW in the region (Zhou et al. 2013a). Since 2007, HIV prevalence among FSW who were 35 years of age or older increased gradually, reaching 2.6% in 2009. HIV prevalence for this group has been consistently much higher compared to FSW below the age of 35 (Fig. 31.7). In 2010, HIV prevalence among illiterate FSW was as high as 4.4%, compared to 2.6% for FSW with at least some primary school-level education (Zhou et al. 2013a).

One of the first studies in China examining how to reduce transmission of HIV and other sexually transmitted infections (STIs) among FSW based in entertainment venues was conducted in Pingxiang City in 1998 (Liao et al. 2001a, b). In 1999, Beihai City was chosen as a pilot city for a program aimed at preventing HIV and other STIs for sex workers in five provincial-level regions. Since 2008, intervention targeted specifically to FSW has been available in all cities and counties in the region. There are indications that the intervention has increased the HIV awareness and rate of condom use among FSW, which effectively has reduced the spread of HIV and STIs (Zhou et al. 2008). In recent years, the intervention programs have been increasingly focused on low-tier FSW (See Chap. 7 for more information).

31.2.3.3 Senior Clients of FSW

HIV prevalence among older clients of FSW (40 years of age or older) was 1.4% in 2012 and 2013. However, at some surveillance sites, this figure was as high as 5.8% in 2013. For those who were 60 years of age or older, HIV prevalence was

even higher—2.7% in 2012 and 2.5% in 2013. Self-reported condom use rates among clients aged 40 or above were alarmingly low at 30% in both 2012 and 2013. The availability of affordable medications for erectile dysfunction, in effect prolonging the period of sexual activity for older men, access to low-fee commercial sex, and inconsistent condom use, were all important factors in increasing the rate of HIV transmission among senior men (Liu et al. 2012).

31.2.3.4 Men Who Have Sex with Men

Guangxi started its intervention and prevention program targeting MSM in 2006. Although MSM accounted for a very small share of reported HIV cases in Guangxi, HIV prevalence for this group rose from 0.8% in 2007 to 5.0% in 2012 (Wang et al. 2014). HIV transmission for this group, to a large extent relying on clustering of people in urban areas, has resulted in large geographical variations, with the prevalence in some individual sites reaching 12.6% in 2013. It is also worth noting that this is a stigmatized group in China so there may be significant problems with cases being miss-reported (See Chap. 8 for more information).

31.2.3.5 Spouses of PLWH

Of 36,669 newly reported HIV cases during 2009–2011, 64.5% (23,664) had spouses. Around half of the spouses were tested for HIV, and 56.0% of those tested were found also have HIV infection. A survey of 382 spouses of PWID with HIV infection gave similar results; 51.8% of the spouses had HIV infection, 77.8% reported that they had been infected through sexual contact with their spouses, the remaining 21.2% through needle sharing or extramarital sex (Zhu et al. 2013).

31.2.3.6 Pregnant Women

The first prevention of mother-to-child transmission (PMTCT) project in Guangxi was funded by the United Nations Children's Foundation and was implemented in Hezhou and Pingxiang in 2003. In 2006, Guangxi officially launched the China-US Cooperation Global AIDS Program (GAP), and immediately thereafter, Guangxi expanded its PMTCT program such that by the end of 2007, 14 prefectures and 109 counties in the province were covered.

Free premarital screening has been offered since 2010, with HIV, syphilis, and hepatitis B virus infection testing being part of the general health check-up. The number of people taking part in this program has reached nearly 900,000 annually. Post-test counseling and referrals to follow-up services and treatment were also provided to diagnosed PLWH.

More than 90% of pregnant women with HIV received ART during their pregnancy. More than 90% of infants born to mothers with HIV are tested for HIV, and over 90% received ART to prevent HIV mother-to-child transmission. Data from the National Comprehensive AIDS Response Project (China CARE Project) gathered in four Guangxi counties from 2005 to 2007, indicates that PMTCT in Guangxi has helped to keep HIV prevalence among HIV-exposed infants below 5% (See Chap. 15 for more information).

31.3 Prevention and Treatment Strategies

31.3.1 Sentinel Surveillance

The initial HIV sentinel surveillance sites in Guangxi, targeting a few key populations, including drug users, FSW, and STI clinic attendees, opened in 1996, 1 year after the initial sentinel sites in China were set up (Zhu et al. 2006; Wu et al. 2007). In 2000, Guangxi, along with five other provinces, established a surveillance pilot targeting PWID, FSW, clients of FSW, and the general female population (Zhang et al. 2012). Later, some additional sites targeting other key populations at high risk were started. For example, the first sentinel sites targeting older clients of FSW (40 years of age or older) were set up in 2005, and the first sentinel sites targeting MSM were started in 2007. In 2010, China's national HIV sentinel surveillance program standardized the sentinel groups, covering eight groups, including drug users, FSW, MSM, STI clinic attendees, long distance truck drivers, migrants, pregnant women, and students. Further, the surveillance monitors HIV, syphilis, and viral hepatitis C. Within national sentinel surveillance program, there were 264 sentinel surveillance sites in the Guangxi region, including all eight groups involving all cities and counties in the Guangxi region (See Chap. 2 for more information).

31.3.2 Testing and Counseling

HIV voluntary counseling and testing (VCT) started in 2000, although in the early stages, counseling was mainly conducted by telephone. With the implementation of the "Four Frees and One Care" policy in 2003, VCT was scaled up and clinics were gradually opened in CDCs and general and maternity/children's hospitals. The number of HIV VCT clinics in operation in Guangxi reached 305 by the end of 2017. There were 88,587 subjects attending VCT clinics and 4324 screened HIV reactive and 2726 were confirmed to have HIV infection in 2017.

Provider-initiated testing and counseling (PITC) was initiated in Guangxi in 2010 and expanded quickly throughout the Guangxi Region. The PITC and combination of other testing strategies have facilitated HIV testing. The number of HIV tests provided has increased from 2,688,616 in 2010 to 7,716,436 in 2011, to 8,976,867 in 2014, and to 9,605,663 tests in 2017 (See Chap. 12 for more information).

31.3.3 Laboratory Capacity

HIV laboratory testing first started in Guangxi in 1985, and the central HIV screening lab, as well as nine additional screening labs, were set up in 1986. The first confirmation lab was established within the Guangxi CDC in 1992. CD4 testing was

first conducted in 2002, and viral load testing in 2007. By the end of 2012, 408 HIV screening labs, 19 HIV confirmation labs, and 1051 HIV rapid test sites had been established. Rapid test sites were operating in more than 80% of Guangxi's townships. CD4 testing labs covered all of the prefecture level cities and some of the hospitals providing ART for AIDS patients. As of the end of 2017, a relatively comprehensive network of laboratories has been established in the region, conducting HIV screening and confirmation testing, qualitative tests of HIV RNA, CD4, viral loads, HIV subtype and drug resistance detection (See Chap. 5 for more information).

31.3.4 Antiretroviral Therapy

In 2003, the Guangxi CDC began to treat clinical AIDS cases using ART. The first clinic devoted to this cause was set up later the same year. ART for children with HIV started in 2005 and was available throughout Guangxi beginning in 2007. Meanwhile, pregnant women with HIV became eligible for ART in 2006. Other key high-risk populations have also been exempted from traditional CD4 threshold requirements for ART eligibility. For example, since 2012, ART has been provided to all FSW with HIV infection regardless of CD4 count.

ART services are now available for all 111 counties in 14 cities in Guangxi by the end of June 2016. ART coverage for diagnosed PLWH reached 87% and the rate of virus suppression for those treated with ART for more than 6 months was above 98.3% by the end of June 2016, which is considered relatively high in the Chinese context. The mortality of patients on ART decreased from 5.6 per 100 person-years (PY) in 2009 to 1.9 per 100 PY in 2013.

31.3.5 "One-Stop Shop" Service Model Pilot Study

Sadly, a common problem in Guangxi was that a large proportion of PLWH were diagnosed at late clinical stages and a considerable number died before initiating ART. In 2012, a new service model to simplify HIV testing and treatment procedures for newly diagnosed HIV cases was piloted in Guangxi. Designed by NCAIDS, China CDC and Guangxi CDC, this so-called "one-stop shop" service model, involved a redesigned and simplified cascade of care intended to reduce the time for patients to proceed from screening to treatment. Within 1 year after implementation, the time between screening and treatment was shortened to a mere 11 days, and the ART coverage increased to 90%. Moreover, mortality was reduced from 27% to less than 10% (Wu et al. 2015). Following this pilot study, the one-stop shop service model was expanded to nine other Chinese provinces, and it has been adopted as a national strategy in China's 13th 5-year action plan for controlling HIV/AIDS in China in 2016–2020.

31.3.6 Other Policy Changes

From 2004 to 2010, the Ministry of Education requested all universities and colleges to provide in-class training covering HIV/AIDS for all students. Following 2010, these efforts have been strengthened further. In early 2010, the Guangxi Communist Party Committee and the Guangxi Regional Government jointly launched a 5-year project aimed at tackling the HIV/AIDS epidemic in the whole of Guangxi. This project included ten specific action plans for the implementation of specific programs for controlling HIV. One of the important programs is the AIDS awareness raising campaign, with great focus on households located in rural areas. Communities were organized for message diffusion. Local tailored educational materials were produced, posted, and disseminated. Traditional media and new digital media have been used for the campaign.

In July 2013, "Guangxi Regulation on the Prevention and Treatment of HIV/AIDS" was promulgated, providing a legal framework to support effective HIV intervention programs. This included legal requirements for PLWH in serodiscordant relationships to inform their partners of their HIV status.

31.4 Current and Potential Future Challenges

31.4.1 Slow Economic Development and Resource Constraints

Although Guangxi's economy has been developing at a rapid pace in more recent years, it is still one of the least developed regions in China, and a large proportion of the population depends on agriculture. HIV/AIDS prevention programs need to reach every corner of the region, particularly rural areas. Due to economic constraints, people living in rural areas often temporarily migrate to nearby cities for short-term manual labor jobs so that they can augment their income. In addition, there are issues of illiteracy among rural residents. These factors together have caused may challenges to HIV/AIDS prevention and intervention in Guangxi, making these efforts less effective than planned.

HIV prevention and control efforts also face financial constraints in Guangxi. For example, with the eligibility criteria for free ART being removed, the large number of additional patients requires additional financial support for the ART program. More medical professionals need to be trained to handle the logistics of the ART services program. Staff members working with HIV prevention have also commonly been forced to conduct a lot of routine intervention and prevention work, resulting in them having difficulties to find time to provide more communication with patients receiving ART or conduct in-depth research for improving care services. In addition, it has also proven difficult to attract or keep people working on HIV/AIDS in Guangxi, due to the relatively low level of social and economic development compared to other regions in China. As a result

of these financial constraints, the coverage of a variety of HIV interventions is still limited in many areas. For example, in Liuzhou, only 4% of entertainment venues provided condoms (Zhang et al. 2014a, b).

31.4.2 High Rates of Undiagnosed and Late-Presenting HIV Cases

In 2011, 35.5% of people newly diagnosed with HIV infection in Guangxi had already progressed to AIDS, a considerably higher proportion than the national average (27.9%). In part, this may be explained by a large proportion of PLWH in Guangxi acquiring HIV after the age of 50. This is quite unique in China. Methods for HIV detection for these groups may not be as developed and effective as for other groups. In addition to this, since people of higher age usually show signs of deteriorating health even without HIV, it may not be a clinician's first response to test them for HIV if they show mild symptoms. Hence, it may be worth considering more focused testing efforts for these groups in this particular region in order to make sure PLWH are diagnosed at an earlier stage. Among total 9,605,663 HIV tests performed in Guangxi, 5,850,613 HIV tests, 60.9% of overall tests, were conducted in hospital settings in 2017. Again, based on these HIV tests, there were 10,485 newly diagnosed with HIV/AIDS cases in Guangxi in 2017, among them 5680 (54.2%) were diagnosed in hospital settings. However, if individuals only seek or obtain HIV testing at hospitals after they are already symptomatic, then they clearly are being diagnosed late. It is important to diagnose HIV infection before they come to the hospital seeking care. Studies to understand the reasons for late diagnosis might be helpful for improving HIV testing strategies in Guangxi.

31.4.3 Case-Fatality Remained High

The HIV case fatality rate in Guangxi is among the highest in China. By the end of 2017, there were a total 239,289 AIDS-related deaths reported in China, among them 44,472 were reported from Guangxi, accounting for 18.6% of the national total (National Center for AIDS/STD Control and Prevention, China CDC 2017). The highest numbers of AIDS-related death were between 2010 and 2014, some 4000–5000 reported deaths in Guangxi each year. In 2010, 83.2% (4382/5265) of the individuals who died from AIDS-related causes had not received ART. Studies found that the complicated procedures from HIV screening to ART initiation was a major cause of these PLWH never accessing ART. The one-stop shopping intervention has simplified the procedure and significantly reduced case-fatality (Wu et al. 2015). Expansion of this model of HIV care services has prevented much mortality in Guangxi. The number of reported AIDS-related deaths in Guangxi was 3981 in 2015, 3739 in 2016 and 2600 in 2017. Though the number of deaths significantly reduced, over 2500 deaths in Guangxi each year is still unacceptably high. Studies have shown that ART-associated costs not covered by the free ART program (i.e., necessary medical tests,

transportation) was a major reason why diagnosed PLWH did not initiate ART. It is clear that Guangxi needs to further address HIV care services accessibility.

31.4.4 Commercial Sex Industry

The commercial sex industry in Guangxi is different from other provinces in China. A considerable proportion of FSW are low-fee FSW. A survey conducted among 7936 low-fee FSW throughout Guangxi in 2010 showed that 74% charged 50 RMB or less, and 85% of FSW with HIV infection (127/149) charged 50 RMB or less. The low-fee FSW had a higher prevalence of HIV infection, which ranged from 1.0% to 4.0% (Zhou et al. 2013a; Deng et al. 2017; Lai et al. 2018). HIV prevention programs for low-fee FSW have proven difficult for a variety of reasons. For example, compared to the rest of China, the structure of the sex industry in Guangxi is less venue-based. Rather, low-fee FSW in Guangxi commonly conduct business in temporary places, such as stalls in connection with markets on market days, or providing door-to-door services. This is particularly true for older FSW.

Another unique feature is that clients of FSW are often senior men, many over 60 or 70 years old, occasionally sometimes a few even over 80 years. A study of male clients in rural Guangxi reported that the average age of clients was 61.8 years old. The study sample had reported a very high rate, 83.7%, of unprotected sex with FSW in the last sex episode, and a very high rate of 95.9% of inconsistent condom use in the last 6 months (Zhang et al. 2014a). Surveillance data in Guangxi has shown that, among men in the sentinel sample aged 40 or above, 72% were clients of low-fee FSW, and condom use rates were as low as 22% (Guangxi CDC 2014).

Another challenge is that considerable proportion of FSW diagnosed with HIV infection continue to engage in commercial sex that makes their clients at great risk of HIV infection. It was estimated that, in Guangxi, over 30% of HIV-positive low-fee FSWs regularly provided commercial sex for clients after their diagnosis of HIV infection (Guangxi CDC 2014). What makes this group a salient issue for HIV prevention, compared to other groups, is the high probability HIV transmission (repeated high-risk sex plus low rate of condom use), combined with the high probability of onward HIV transmission from newly infected, as yet undiagnosed older male clients to their spouses or other partners.

31.4.5 Other Sexually-Transmitted Infections

A large number of studies have found links between syphilis and an increased risk for HIV acquisition (Flemming and Wasserheit 1999). Sentinel surveillance among 51,790 FSW conducted in Guangxi in 2010–2012 reported that the overall prevalence of syphilis was 6.7%, but was 10.5% among low-tier FSWs (Chen et al. 2015). Another survey conducted in a rural county of Guangxi targeting clients of low-fee

FSW found a syphilis prevalence of 18.4% (Zhang et al. 2014a). Given this high prevalence and that syphilis is a clear risk factor for HIV acquisition for older clients of FSW in the region (Chen et al. 2013), the potential gains from reducing syphilis prevalence in the region could be immense, also in terms of reducing HIV.

31.4.6 Men Who Have Sex with Men

Though a great majority of the reported cases in Guangxi were acquired via heterosexual contact, HIV prevalence among MSM has increased too, in some areas, at alarmingly high rates. Surveillance has monitored the rapid increase of HIV transmission among MSM in Guangxi, the prevalence of HIV infection had significantly increased from 1.7% in 2008 to 3.7% in 2012, to 6.6% in 2013, to 8.4% in 2014, and further to 11.2% in 2015. Clearly, the rapid spreading of HIV among MSM continues. More innovative and effective intervention strategies are required to slow down the HIV transmission in this group.

31.5 Conclusion

Guangxi is one of the regions in China most heavily affected by HIV and AIDS, and the epidemiological situation shows some unique patterns in the Chinese context. Guangxi has the highest rate of heterosexual transmission in China, the highest proportion of older citizens being diagnosed with HIV, a very large share of new cases diagnosed in a clinical late stage and hence, HIV-related mortality rates were the highest in China. This has made Guangxi the chosen location for many programs and pilots aimed at improving HIV treatment and care, such as the "one-stop service" program, that has shown great promise in reducing mortality rates. The response still needs to address the rising HIV prevalence among MSM and the already very high prevalence among the older population. In order to do this in an efficient manner, different approaches than the general national response may have to be considered, particularly efforts to target the older population and make sure PLWH are diagnosed at an earlier stage.

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HIV/AIDS in the Xinjiang Uygur Autonomous Region

32

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Abstract

The Xinjiang Uygur Autonomous Region (XUAR) in the northwest was ranked sixth in the numbers of reported cases of (HIV) in China up to the end of December 2017. By that time, HIV had affected 0.23% of the total population (56,588 cases had been reported since 1995), the province with third highest cumulative incidence in China. The HIV epidemic in XUAR has similar features to other provinces where the use of non-sterile injecting equipment by people who inject drugs (PWID) generated the development of the epidemic. These similarities included age and gender distribution. The majority of people living with HIV (PLWH) were 20–39 years of age at diagnosis, and women made up 36.7% of reported cases. Sexual transmission was the major transmission route for both women (85.4%) and men (60%) as of 2017. The scale of sexual transmission for women was a specific feature of the epidemic in XUAR. Interventions have had a positive impact. From 2002 to 2017, there were reductions in the numbers of HIV infection, in all of the sentinel surveillance groups. The most significant reduction was among PWID. In 2002, 52.6% tested positive, while in 2017, only 8.15% tested positive. FSW and clients attending clinics for sexually transmitted infections had low prevalence of HIV infection, less than 1% consistently. Male-male sexual transmission is becoming an important transmission route—7.4% of sexual transmissions for men were from male-male sex, and the annual sero-conversion rate in this group was about 5% by 2017. The major challenges in addressing prevention is targeting and focusing interventions to meet the specific needs of ethnic groups and to further extend interventions into key populations at higher risk.

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32.1 Introduction

The Xinjiang Uygur Autonomous Region (XUAR) is located in the northwest of China and borders India, Afghanistan, and Pakistan in the south; Russia in the north; and the former Soviet republic states of Kazakhstan, Uzbekistan, Tajikistan, and Kyrgyzstan in the west. XUAR covers one sixth of the landmass of China and is China's largest province. The population at the end of December 2017 was 24.8 million. It is a multi-ethnic population, with the majority of the registered population being Uygur, followed by Han Chinese and other ethnic groups. Around 10% of the population lives in Urumqi City located in the north of XUAR. XUAR is divided geographically by the Tian Shan Mountains, which demarcate the northern and southern parts of XUAR.

HIV was first discovered in XUAR in 1995, and through the end of December 2017, there had been 56,588 cases of HIV reported. This ranks XUAR as sixth among provincial-level administrative regions in China in the number of reported cases of HIV/AIDS. The cumulative incidence of reported HIV infection in XUAR is 0.23%, which ranks it third in China. In the early stages of the epidemic, the predominant route of transmission was through the use of non-sterile injecting equipment among people who inject drugs (PWID), and 80% of cases reported were men. From 2007 onwards, increasing numbers of reported cases were due to sexual transmission, and the gender distribution shifted. By the end of December 2017, 67% of cases reported were due to sexual transmission (and only 28% due to the use of non-sterile injecting equipment), and only 63% of cases reported were men.

There has been a major expansion of all aspects of HIV-related services in the last decade, and there are now extensive prevention and treatment and care services available. People living with HIV (PLWH) in XUAR are identified through voluntary counselling and testing (VCT) sites, home-based testing in key populations at higher risk, spousal testing, testing of all hospital in-patients, and the sentinel surveillance system. The surveillance system now includes the collection of behavioural information and is carried out in all 14 prefectures in XUAR. In addition to these testing systems, there are also periodic mass surveillance programmes in targeted communities and special studies. The results of special studies used in this chapter include a targeted screening programme in 2003 (Ni et al. 2004), a population screening programme in 2006 (XUAR Bureau of Health 2006), and a large cohort study to determine HIV incidence (National Science and Technology Major Research Program 2012).

Overall, the numbers of HIV tests performed have increased significantly, and not surprisingly, numbers of reactive test results and numbers of newly-diagnosed PLWH have increased as well. The number of tests undertaken in the 485 VCT clinics is increasing; however, this remains a small proportion of the total number of tests performed in XUAR. Of the 4.47 million tests done in 2012, 74,000 (1.6%) were done at VCT sites. Population-based HIV screening has increased significantly. From 2014–2017, more than 30 million tests were done through such

screening, and 22,298 new cases of HIV infection were detected, representing a significant burden of disease (Chinese National HIV/AIDS Testing Reporting System 2017).

The predominant HIV subtype in XUAR is CFR07_BC. This subtype has remained predominant through three periods of testing. The subtype was first identified in XUAR in 2006 as a result of a national molecular epidemiology study. At that time, the CFR07_BC was identified in 99.6% of samples. The high prevalence of this subtype (99.74%) was confirmed via of a cross-sectional study in 2010 (Wang et al. 2013). A new study in 2017 showed that the proportion of CFR07_BC was 92.23%, with 7.77% of subtypes now CRF01_AE and CRF_08BC.

In this chapter, we will examine the general and special features of the epidemic in XUAR based on HIV case reporting information. We will also report and analyse the current status of the epidemic in relation to key groups affected by HIV in the community. By reviewing these results, we will endeavour to summarize the progress in managing the epidemic within these groups and look towards the future to identify critical and emerging issues to be addressed in response to HIV in XUAR.

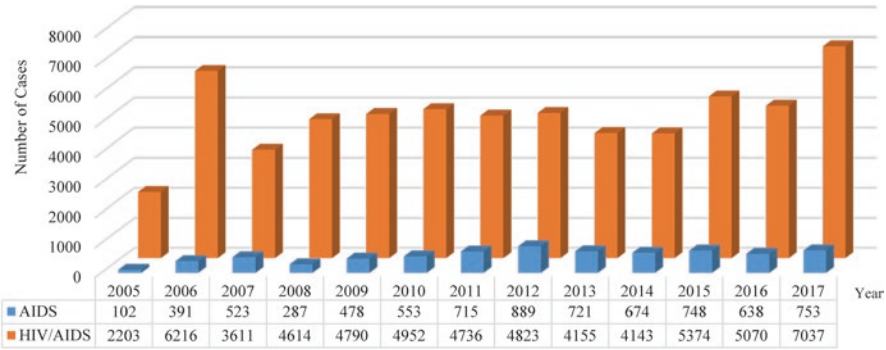
32.2 HIV Epidemic in XUAR

32.2.1 Reported Cases of HIV and AIDS

HIV prevalence (reported cases) increased slowly between 1995 and 2006. This is assumed to represent a period of concentrated epidemic where most people identified as PLWH were PWID in Urumqi City and Yili Kazakh Autonomous Prefecture. Through the expansion of HIV testing facilities, new populations are being tested, making case reporting increasingly representative of the epidemic. Increasing numbers of community-based programmes are facilitating more responsive approaches to testing that reach key at-risk populations in the community.

Beginning in 2008, there was increasing evidence of a more generalized epidemic. At that time, in addition to the increasing numbers of PWID being found to have HIV infection, there were also increases in the numbers of HIV infections detected among female sex worker (FSW), clients using clinics for the treatment of sexually transmitted infections (STIs), and pregnant women. In the more recent phases of the response to HIV, with deepening and targeting of interventions to reach key communities, reported cases have increased among men who have sex with men (MSM) and spouses and regular sexual partners of PLWH. Conversely, HIV prevalence reported among FSW and STI clinic attendees has declined (Chinese National HIV/AIDS Case Reporting System 2017).

By the end of December 2017, the total number of PLWH reported in XUAR was 56,588 (5.5% of the total number in China). Of these, 44,118 were and 12,470 had died. At that time, there were 32,562 in the “pre-AIDS” stages of the disease, and 11,556 were classified as having AIDS. The overall HIV infection rate in the



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AIDS	102	391	523	287	478	553	715	889	721	674	748	638	753
HIV/AIDS	2203	6216	3611	4614	4790	4952	4736	4823	4155	4143	5374	5070	7037

Fig. 32.1 The number of newly diagnosed cases of AIDS and HIV infection in Xinjiang, 2005–2017

province was 0.23%, and this ranked XUAR third nationwide (Chinese National HIV/AIDS Case Reporting System 2017).

Figure 32.1 shows a significant increase in the number of PLWH in 2006. From 2006 onwards, programmes to identify PLWH expanded significantly. In 2006, a programme of mass screening was undertaken, and the systems established as a consequence of this mass screening were subsequently maintained to continue wide-scale testing. As of December 2017, it was estimated that 87% of PLWH knew their status.

Reported deaths from AIDS now total 12,470 and have increased annually. In 1997, five AIDS-related deaths were reported, and in 2017, 1397 people died. Increases in deaths are due to a combination of factors including poor access to treatment programs in the early stages of the response to HIV, low levels of CD4 cells on entry to the treatment programme, and treatment failure. Vast expansion of the follow-up program has also led to more accurate reporting of AIDS-related deaths.

32.2.2 Geographic Distribution

32.2.2.1 Case Reporting

The number of reported cases varies geographically in XUAR. Of the cases reported, 48.3% came from the north and east of XUAR—the capital city Urumqi (20.2%), Yili Kazak Autonomous Prefecture (23.4%), and Turpan Prefecture (4.7%). Over one third of cases (38.8%) came from the southern areas of XUAR—Aksu Prefecture (17.5%), Kashgar Prefecture (14.4%), and Hetian (Hotan) Prefecture (6.9%) (Chinese National HIV/AIDS Case Reporting System 2017). Changes in the geographic distribution of new cases by prefecture have occurred over time (Fig. 32.2).

The Ministry of Health for the People's Republic of China established classification standards to determine prioritization and targeting of activities in 2010. XUAR

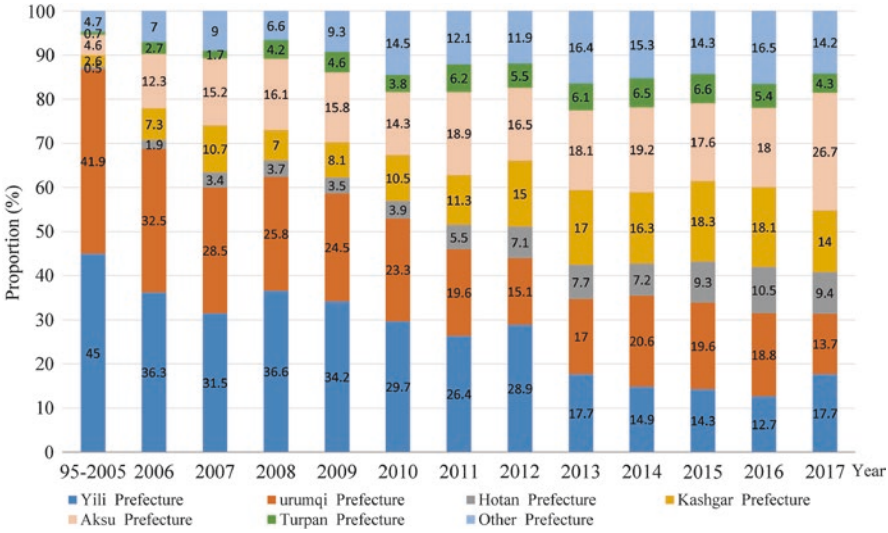


Fig. 32.2 The proportion of newly diagnosed HIV cases by prefecture, XUAR, 1995–2017

has five prefectures that are classified as Level 1 regions for action (Yili Kazakh Autonomous Prefecture, Urumqi City, Kashgar Prefecture, Aksu Prefecture, and Turpan City). These are areas where greater than 0.1% of the population are PLWH, and/or where there are more than 500 PLWH, and/or where prevalence is greater than 10% in a single key population or greater than 5% in two or more high-risk groups. PLWH in "Level 1" regions account for 81.3% of all PLWH in XUAR.

Six prefectures are classified as Level 2 regions. These are Kelamayi (Karamay), Hami (Kumul) cities, Changji Hui Autonomous Prefecture, Bayinguoling Mongolian Autonomous Prefecture, Kizilsu Kirghiz Autonomous Prefecture, and Hetian (Hotan) Prefectures. Level 2 regions are prefectures where 0.03–0.1% of the population are PLWH, and/or there are 100–500 PLWH, and/or prevalence in one key population is 5–10% or is 1–5% in two or more key populations. The remaining three prefectures, Altay Prefecture, Bortala Mongol Autonomous Prefecture, and Tacheng Prefecture, are Level 3 regions (Chinese Center for Disease Control and Prevention 2013). The location of the prefectures is shown in the map in Fig. 32.3.

BED HIV-1 enzyme immunoassay (BED HIV-1 EIA) testing is done on all newly identified cases annually to estimate the numbers of newly infected people since 2009. BED testing indicates that the number of new infections has increased significantly in Yili Kazakh Autonomous Prefecture (13.2/100 cases in 2009 to 22.4/100 cases in 2014), Aksu Prefecture (17.6/100 cases in 2009 to 25.4/100 cases in 2014), Urumqi City (16.2/100 cases in 2009 to 26.2/100 cases in 2014), Kashgar Prefecture (20.0/100 cases in 2009 to 23.7/100 cases in 2014), and Turpan City (23.5/100 cases in 2009 to 28.3/100 cases in 2014).

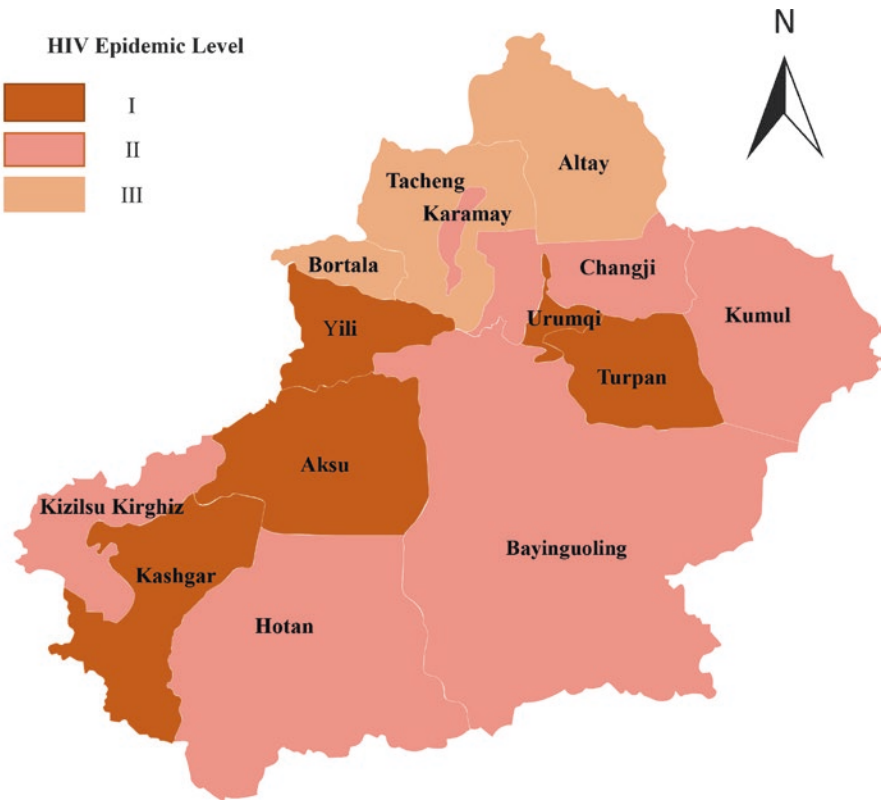


Fig. 32.3 Geographic distribution of HIV epidemic levels in XUAR

BED is also used in Level 2 areas with increasing numbers of cases reported on an annual basis. In Hetian (Hotan), there was an increase in the numbers of new infections as a proportion of cases reported (16.6/100 cases in 2009 to 27.5/100 cases in 2014).

While BED HIV-1 EIA is not an exact measure of new infections, it does give some indication of the reach of the testing services. The higher the proportion of new infections discovered indicates that the testing services are being better targeted and reaching key populations. This information could then ultimately result in better and more appropriate and focused services to prevent and treat HIV within these communities.

32.2.3 Demographic Characteristics of the HIV Epidemic

In presenting the demographic information for XUAR, there are several epidemic trends that are similar to the epidemic trends for the whole of China. These include the age groups for PLWH, the gender distribution, and the increasing impact in the

MSM community. Special features of the epidemic in XUAR include the extent of sexual transmission for women with HIV infection and the strong predominance of HIV within the Uyghur community.

32.2.3.1 Age Distribution

HIV in XUAR predominantly affects people between 20 and 49 years of age (85.8% of reported cases). New cases in those aged between 20 and 29 decreased from 60% of new cases in 2005 to 22% of new cases in 2017. The proportion of new cases reported in the 30–39-year age group slightly reduced from around 40% to 32.2% of newly reported cases during the same time period. There were increases in the proportion of cases reported in the 40–49-year age group, from 5% in 2005 to 27.4% in 2017. There has been a five-fold increase in the numbers of people aged 50 years and over. In 2005, this latter age group made up less than 1% of the new cases reported, while in 2017, 17.5% of the reported new cases were 50 years of age and older. It is possible that this latter trend is becoming more evident due to the expansion of testing for all hospital in-patients that began in 2010 (State Council of the People's Republic of China Gua Fa 2010 No 48 2011).

32.2.3.2 Sex Distribution

Of all the 56,688 HIV/AIDS cases reported in XUAR by the end of 2017, 63.3% were men. The numbers of women identified with HIV continued to increase each year, from 20% of all cases reported up to 2005 to 36.7% at the end of 2017. Among male cases, 50.5% were via heterosexual transmission and 5.7% via male-male sexual contact, both lower than the national average, while 38.8% acquired HIV via injecting drug use, which was much higher than the national average. Among females, 85.4% acquired HIV via heterosexual transmission, which was lower than the national average, while 8.3% acquired HIV via injecting drug use, which was higher than national average (Fig. 32.4).

32.2.3.3 Transmission Routes

For all cases of HIV reported in XUAR through the end of December 2017, the main reported transmission route was heterosexual transmission (50.5% for all men and 85.4% for all women). Figure 32.5 shows annual newly diagnosed HIV/AIDS cases by transmission route over time. There is a clear trend of gradually increasing heterosexual transmission from 16% in 2006 to 85.7% in 2017 while gradually decreasing injecting drug use from 67.9% in 2006 to 7.2% in 2017. HIV transmission among MSM has increased but has never exceeded 7.5% in XUAR, which is lower than the national average (National Center for AIDS/STD Control and Prevention, China CDC 2018).

32.3 Key Populations at Higher Risk and the HIV Epidemic

There are several key populations at higher risk of HIV in XUAR. These include PWID, spouses and regular sexual partners of PWID and PLWH, and MSM. FSW and their clients are groups of continuing interest as

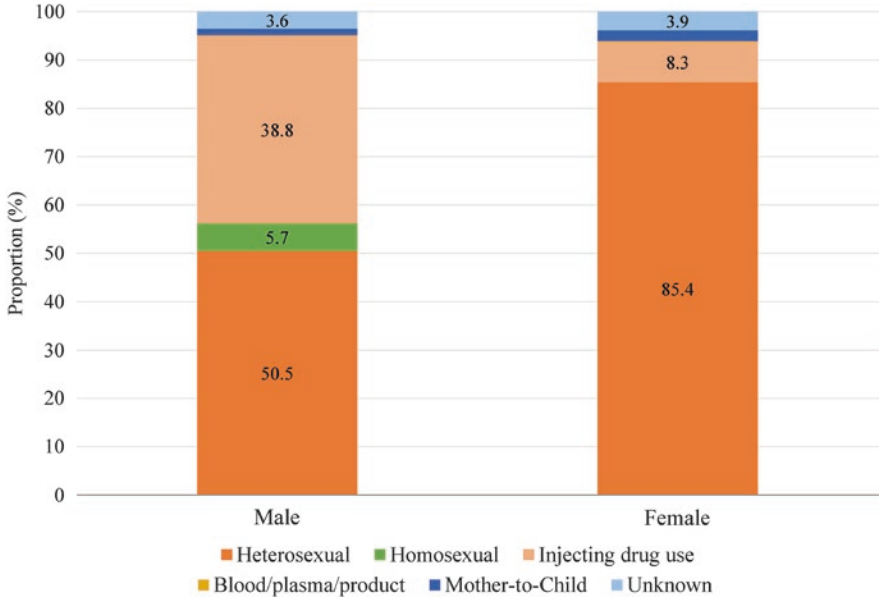


Fig. 32.4 Transmission modes by sex in XUAR as of 2017

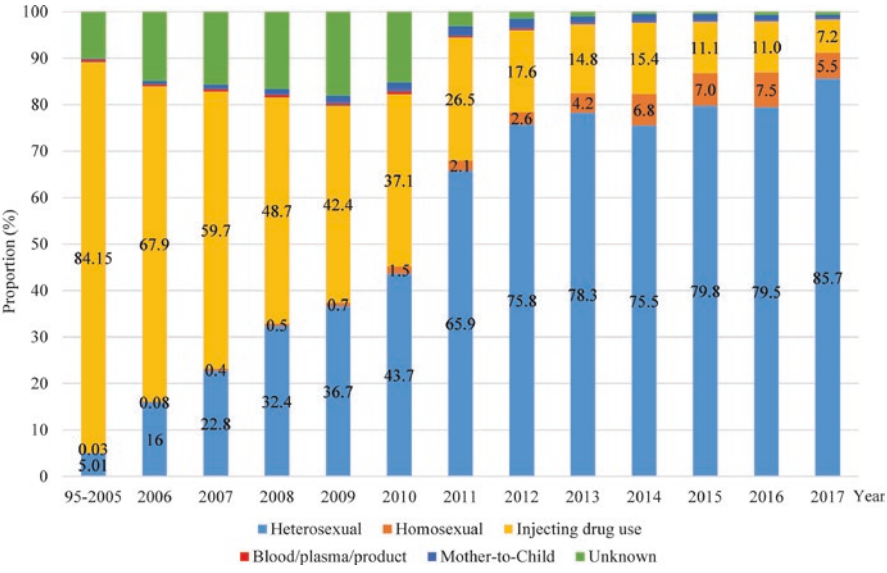


Fig. 32.5 HIV transmission mode among new cases in XUAR, 1995–2017

epidemiologically these groups are capable of "bridging" the HIV epidemic to the general population, although in XUAR, there is limited evidence of this. Pregnant women are an important population to monitor as an indicator of the extent of transmission to the general community and because of the risk of transmission of HIV to newborns. In China, MSM has become a risk group of increasing importance. In XUAR, transmission among MSM accounted for 5.5% of all infections in 2017.

To assess vulnerability within these groups, identify emerging issues, and promote the expansion of prevention and treatment and care services, HIV testing was expanded significantly. Systems of testing enabled a much more comprehensive understanding of the epidemic within each of the key populations (sentinel surveillance and special studies) and enabled assessment of new infection rates (BED HIV-1 EIA and LAg-Avidity EIA) (National Science and Technology Major Research Program 2012).

The surveillance system has developed extensively since its beginning in 1995. The establishment of the first national level sentinel surveillance site was at the detoxification centre in Urumqi (Public Security Bureau-managed site) in 1995. The second site was opened in a detoxification centre in Yining City in 1998. These sites provided access to PWID. After this, sentinel surveillance sites were established to assess HIV among FSW, pregnant women, and other groups such as STI clinic attendees as a proxy for clients of FSW. HIV testing was also a compulsory part of premarital health checks. These constituted the primary sentinel surveillance system.

As of the end of December 2017, 67 national level sentinel surveillance sites and 19 regional sites had been established in 38 counties or county-level cities of the 14 prefectures in XUAR. The target populations for the surveillance system are PWID (16 sites), FSW (35 sites), MSM (7 sites), STI clinic attendeess (10 sites), male long-distance truck drivers (4 sites), and pregnant women (13 sites). Several sites were also in place for male migrant populations, teenage students, and blood donors. From 2009, all sites were required to gather both serological and behavioural data. In 2017, about 35,000 tests were completed at sentinel surveillance sites.

To support the surveillance results, special studies have also been undertaken to give greater depth to understanding HIV in specific groups in the community. These special studies have been carried out sporadically and targeted at different groups. For example, between August and December 2010, 4493 PWID were included in a survey to assess prevalence based on demographics, and in 2006, population screening was carried out to assess prevalence in multiple at-risk groups. In addition to this, a cohort study for one million community residents was undertaken between 2012 and 2015, and incidence rates were determined.

In the following section, we will focus on the key groups that appear to have been at higher risk in the evolution of the epidemic in XUAR. These are PWID who use

non-sterile injecting equipment, spouses or partners of PWID and PLWH, and MSM. We will conclude the section with discussion of the surveillance results for FSW, STI clinic attendees, and pregnant women. Each subsection ends with a summary of the findings.

32.3.1 People Who Inject Drugs

32.3.1.1 Sero-surveillance

The proportion of PWID who tested HIV positive at surveillance sites as of December 2012 was 12.9%, and as of December 2017 was 6.5%. Overall, this represents a significant decline in HIV prevalence among PWID. Geographically, the range was extensive with the lowest (2%) found at a site in Hami in the east of XUAR, while the highest was found in Huocheng County (28.5%) in Yili Kazakh Autonomous Prefecture in the north of XUAR (Chinese National HIV/AIDS Sentinel Surveillance Reporting System 2017). These results are of concern because they appear to indicate a shift from predominantly urban centres to areas where prevention, testing, treatment, and care services are relatively less readily available.

Hepatitis C virus (HCV) infection among PWID is a serious issue with rates remaining high between 2009 and 2012. HCV impacts ART tolerance and effectiveness. In 2009, 53.8% of PWID tested had HCV, in 2010 38.3% tested HCV positive, and in 2011 and 2012, the rates were 40.7% and 44.5%, respectively. This represents a major challenge in managing PWID on ART, with the availability of second-line drugs being a very important component of the ART programme in the future. The high rates of HCV alone increase mortality and morbidity significantly in this group. Syphilis rates were also high in PWID, with 7% of PWID being found positive for syphilis annually. These high rates are mirrored in syphilis rates of spouses and regular partners of PWID.

32.3.1.2 Behavioural Surveillance

Most drug users (62.8%) report having started using illegal drugs between 16 and 25 years of age, and another 30.3% report having started between 26 and 35 years of age. The vast majority (84.49%) of drug users start by smoking/inhaling; subsequently 60% of them switch to injecting behaviours.

Using non-sterile injecting equipment was more common among PWID in the early stages of the epidemic. As prevention programmes have developed, the use of non-sterile injecting equipment appears to have declined. In 2001, 64.2% of PWID used non-sterile injecting equipment according to behavioural surveillance information. This has declined to around 20% in recent years.

Safe sex practices are extremely important given the expansion of sexual transmission from PWID and PLWH to their spouses. More than 50% of PWID reported having spouses or long-term sexual partners. Safe sexual practices with regular partners or spouses did not change significantly, and condom use remained low between 2009 and 2017, with around 30% of PWID reporting having used a condom in their

last sexual encounter with a spouse or regular partner. Around 20% of PWID report buying and/or selling sex. Condom use in these circumstances was low but had increased to around 50% in 2017, indicating that programmes of condom promotion among PWID and FSW may be having some impact on behaviour change. However, these findings demonstrate the need for significant scale-up of the promotion of safe sex practices with spouses and regular partners. The target of these interventions would have to be couples, and this relies heavily on disclosure and confidentiality, which is challenging in the XUAR setting environment due to the stigma.

32.3.1.3 Results of Special Studies

In addition to being a key target group for surveillance, PWID have been included in all of the special studies for HIV in XUAR. In 2003, 1042 PWID from high prevalence sites in XUAR participated in a screening programme. The percentage of PWID with a positive HIV test result was 26.4%. Of the 18.8% of PWID who said they recently used non-sterile injecting equipment, 63.9% had HIV infection and 85.6% had HCV infection. However, those who said that they did not use non-sterile injecting equipment also had very high rates of HIV and HCV, 38.9% had HIV, and 75.7% had HCV. Condom use was very low among the group, with 75% of PWID reporting they had never used a condom, 19.5% had sometimes used a condom, and 5.5% had always used a condom (Ni et al. 2004).

A total of 10,324 PWID living in the community were part of the 2006 population-based HIV screening programme. Of this group, 17.5% were found to have HIV infection. This result was lower than the findings from surveillance sites in 2006 (where 24.2% of PWID were living with HIV), which suggests that there is a higher proportion of PWID who are PLWH in closed settings such as detoxification centres as compared to in the community. In this 2006 study, 16.8% of participants said they recently used non-sterile injecting equipment the last time they injected, while 26.9% said they used non-sterile injecting equipment "sometimes" during the previous 6 months (XUAR Bureau of Health 2006).

A total of 4493 PWID were included in a special study undertaken in 2010 to understand the status of the epidemic among sub-groups of the PWID community in Urumqi City and Ili Kazakh Autonomous Prefecture. This study found that HIV prevalence was higher among women who injected drugs than men. A total of 31.1% of female PWID had HIV infection as compared to 21.4% of male PWID.

In this 2010 study, reported condom use by PWID in their most recent sexual contact with their regular sexual partner or spouse was low (29.4%) and relatively consistent with the behavioural sentinel surveillance results. Less than 15% of PWID reported having had sex with a sex worker; however, condom use rates with sex workers ranged from 62.9% among Han Chinese PWID to 39.1% among PWIDs of other ethnic groups, significantly higher condom use rates than with regular partners.

Blood samples from PWID analyzed by BED HIV-1 EIA enabled determination of the rate of new HIV infections among the new cases reported annually. The results of this analysis showed that the rate of new cases in the PWID group had stabilized and was possibly decreasing in the period 2011–2015 to around 10% (National Science and Technology Major Research Program 2015).

Incidence appears to have stabilized at around 3% in the PWID community in XUAR. However, there is significant variability in these results based on geography. The incidence rates for PWID are much higher in areas like Shuimogou District (12.5%) in Urumqi City and Kuche County in Akesu Prefecture (5.43%). Previous studies of incidence have put the rates of sero-conversion in Urumqi City at 8.8 per 100 person-years (Zhang et al. 2007).

32.3.1.4 Summary of the Findings

The status of the epidemic within the PWID community has been monitored extremely closely. There are multiple sources of information that indicate that this group continues to be one of the main contributors to the ongoing expansion of the epidemic in XUAR. The estimated HIV prevalence in the PWID community has declined from 36.9% (24,629 PWID with HIV infection) in 2010 to 12.5% infection rate (13,073 PWID with HIV infection) in 2017. The stabilization of reported prevalence and incidence may have been due to HIV prevention services such as needle-and-syringe substitution therapy. However, there is still cause for significant and ongoing focus on this group, particularly in relation to targeted intervention programmes in high incidence and Level 1 Prefectures. Strong emphasis must be placed on promoting condom use and/or promoting early entry to the National Free ART Programme for PLWH in serodiscordant relationships.

32.3.2 Spouses and Regular Partners of PLWH and PWID

32.3.2.1 Sero-surveillance

Sero-surveillance of spouses or regular partners of PLWH was supported by the regional government surveillance system. The HIV infection rates in this group were the highest of all groups as of the end of 2011. Transmission of HIV from PLWH to spouses and regular partners has become one of the main routes of transmission in XUAR (Chinese National HIV/AIDS Sentinel Surveillance Reporting System). HIV infection rates varied significantly between 2009 and 2011. In 2009, of the 664 spouses or regular partners of PLWH tested, 9.2% had HIV infection; in 2010, this rose significantly to 22.8% and dropped to 12% in 2011. Syphilis rates increased steadily with 2.7% of partners having syphilis in 2009 and 6.5% having syphilis in 2011. After 2011, the site was subsequently closed, and the programme was subsumed into the spousal follow-up programmes for sero-discordant couples.

32.3.2.2 Special Studies

Spouses and regular sex partners of PLWH and PWID were included as a target group in the 2003 study and 2006 population-based HIV screening. In the 2003 study, 495 people from this risk group participated. Of the participants from Ili Kazakh Autonomous Prefecture, HIV prevalence was 18.9%, while HIV prevalence among those in Urumqi was 7.9%. Reported condom use was very low, with 84.4% of participants having reported to never have used a condom (Ni et al. 2004).

Of the 709 people included in the 2006 population surveillance, 194 or 27.4% had HIV infection. Infection rates were also determined in the 2010 study, and 22.5% of the 856 participants had HIV infection, 0.9% had syphilis, and 6.7% were infected with HCV. The HIV infection rate was the same as that found during sentinel surveillance; however, syphilis rates were lower than the sentinel surveillance findings (6.5%) in the sero-surveillance component (3.6%) of this study (XUAR Bureau of Health 2006).

The annual sero-conversion rates for uninfected spouses of PLWH as determined in the National Science and Technology Major Research Program (2012) was 1.6% for XUAR. However, as with PWID incidence, the incidence rates for spouses and partners were much higher in areas like Shuimogou District (7.1%) in Urumqi City and Akesu City (6.3%) in Akesu Prefecture. While these are somewhat lower than the incidence rates for PWID, targeted approaches are clearly still necessary to reduce these incidence rates.

32.3.2.3 Summary of Findings

Women experience particularly high risk of HIV due to sexual transmission in XUAR, many acquire HIV during sexual contact with their spouses. A majority of women living with HIV (72%) became infected through sexual transmission (Chinese National HIV/AIDS Case Reporting System 2017). The sero-conversion rate among spouses and long-term partners of PLWH was lower than that of PWID and MSM in the national cohort study, which would tend to indicate that programmes of spousal follow-up to maintain sero-negative status were reducing transmission risk to some extent in those participating consistently (National Science and Technology Major Research Program 2015).

32.3.3 Men Who Have Sex with Men

32.3.3.1 Sero-surveillance

Monitoring of HIV among MSM began in 2009, and since that time, there has been a significant increase in access to the MSM community. This has resulted in the number of MSM participating in surveillance increasing from 621 in 2009 to 1574 in 2017. The proportion of MSM who had an HIV positive test result at surveillance sites as of December 2012 was 2.7%, and as of December 2017 was 5.2%. Syphilis and HIV detection rates were alarming in 2012 (7.3% and 6.9%, respectively). However, HCV infections appear to be fairly consistent and low at less than 2% over the same time period. Risk of HIV prevalence rising among this group is significant as wide-scale activities have only just begun in the last 3 years (Chinese National HIV/AIDS Sentinel Surveillance Reporting System).

32.3.3.2 Behavioural Surveillance

Of the men who participated in surveillance, condom use rates were consistently low (less than 70%), with little change as programmes for prevention have been scaled up. MSM in the surveillance group who had female spouses had increased to

just under 20%, and bisexual behaviors had also increased. The majority (95.5%) of MSM indicated that they had had male-male sexual contact in the previous 6 months, and around 20% had had heterosexual contact.

32.3.3.3 Special Studies

MSM participated in the 2010 research study. Of the 1212 participants, 7.8% had HIV infection, 3.9% had syphilis, and 1.9% had HCV. Of the total participants, 95.5% reported having had anal sex in the previous 6 months, and 73% reported having used a condom in the last sexual contact with a male partner. However, only 44.8% of MSM used a condom consistently in the previous 6 months.

The 2010 study also revealed a small but potentially significant number of men indicating that they had paid for sex in the previous 6 months. Of the 8.1% of participants that had paid for sex, 66.3% reported having used a condom during sexual contact with a male sex worker. During this study, it was found that 9.7% of participants had heterosexual contact, and 57.6% of these men reported having used a condom consistently with their female partners.

The National Science and Technology Major Research Program results (2012–2015) found that MSM had the highest annual incidence rates of 4.3% in 2012 and 6.3% in 2014 as compared to other key populations.

32.3.3.4 Summary of Findings

The scale and scope of the HIV epidemic among MSM was only just beginning to be evident at the end of 2012. Even within this relatively short period of surveillance, there were encouraging signs to indicate that MSM networks were being activated and MSM were participating in mobilization of their community to respond to HIV in XUAR. However, this group appears to be at the highest risk of HIV transmission due to low condom use rates and significant incidence rates.

Population estimates are potentially low given the lack of access to the whole MSM community and the high levels of stigma and discrimination linked to MSM behaviour. In 2010, it was estimated that 3.4% (4321) of MSM living in urban areas had HIV infection, while in 2012, the prevalence had risen to 4.3% (3179 men). In rural areas, estimated MSM HIV infection rates rose from 2.8% in 2010 to 3.5% in 2012. In most societies, MSM tend to gravitate towards larger urban communities where there is a greater opportunity for anonymity, so it is possible that the actual situation of MSM in XUAR is underestimated. Given the population estimates and the results of special studies, it appears that the actual scale of the epidemic in this key population is still largely unknown.

32.3.4 Female Sex Workers

32.3.4.1 Sero-surveillance

HIV infection rates among FSW have generally remained below 1%. However, rates reached 1.1% in 2009 but declined in subsequent years to 0.84% in 2012 and 0.74% in 2017 (China National HIV/AIDS Sentinel Surveillance Reporting

System). Syphilis rates among FSW have risen in the last several years. In 2009 and 2010, the rate was around 3%, while in 2017, this rate had increased to 4.2%. This raises concerns about vulnerability to HIV for this group.

32.3.4.2 Behavioural Surveillance

Condom use with clients was inconsistent. During the period of behavioural surveillance, results indicated that condom use in the last sexual contact with a client was high (greater than 80%), but only 75% used a condom consistently during the prior month (Chinese National HIV/AIDS Sentinel Surveillance Reporting System).

32.3.4.3 Special Studies

As with PWID, FSW have been monitored closely as a key group in XUAR. A total of 2154 FSW were included in the 2003 special study (Ni et al. 2004). The participants came from the seven largest cities in XUAR. HIV prevalence was 1.25%, and 3.95% of participants were infected with syphilis. Nearly three quarters of the group (73.4%) reported having used condoms.

FSW were included in the 2006 population screening, and of the 19,545 women participating in this screening programme, 1.1% had HIV infection. This result is higher than that found during surveillance in 2006 (0.8%). This significant difference may be due to the sites where information was collected. The surveillance information tends to come from women working in formal entertainment places such as hotels and karaoke bars, while the population surveillance information may include FSW from more informal settings and at the street level. In fact, the 2006 study found that women working in entertainment places such as hotels and karaoke bars had a prevalence of around 1%. Women working from small shops such as hairdressers had a prevalence of 2.1%, while women working on the streets had a prevalence of 5.9%. In this study, condom use was low, with only 64.8% reporting having used a condom in the last sexual encounter. This rate dropped when the women were asked about consistent condom use. Around one third of the group said they always used a condom with a client in the last month, 25.2% reported having used a condom sometimes, and 26.2% said that they never used a condom (XUAR Bureau of Health 2006).

The 2010 study revealed detailed information about FSW. As with other studies, HIV prevalence was low. However, information on their working setting was not collected. Of the 7359 FSW participating in the study, 0.5% had HIV infection. Syphilis and HCV rates were under 1%, with 0.86% of FSW having had a diagnosis of syphilis and 0.99% having HCV. In this same study, behavioral information revealed that reported condom use was relatively high. In the last sexual contact with a client, participants indicated that 89.9% had used a condom. This dropped to 70.3% having used a condom consistently in each sexual contact with their clients in the previous month (National Science and Technology Major Research Program 2011).

32.3.4.4 Summary of Findings

It would appear that the HIV epidemic has had some impact among FSW; however, there has been very limited transmission from this group to the general community based on the proxy surveillance group of male STI clinic attendees. However, it is

possible that the most high-risk FSW (low income, street level, and casual) are not being included in monitoring and prevention programmes due to inaccessibility to these subgroups. The monitoring of FSW in XUAR is mostly carried out through entertainment establishments, and the majority of women working in these institutions are from other provinces of China. Turnover is high at these sites; therefore, the results may not necessarily approximate the actual situation. The estimated infection rate declined from 1.62% to 0.96% in 2017. However, this may be an underestimation of the situation due to the reasons stated above; low-income, street-level, and casual FSW are not being reached consistently and participating in testing programmes.

These results coupled with the prevalence of HIV among PWID and their spouses suggested that while the epidemic evolved and developed within the PWID community through the use of non-sterile injecting equipment, sexual transmission outside of this group appears to have been mostly generated through spousal transmission rather than through the sex worker community.

32.3.5 HIV and People with Sexually Transmitted Infections

32.3.5.1 Sero-surveillance

HIV prevalence among STI clinic clients has declined in recent years. The levels reached a peak in 2006 (1.6%) but has decreased to less than 1% since then.

32.3.5.2 Special Studies

A total of 19,416 clients from STI clinics were included in the 2006 population screening program. Of these, 177 or 0.91% had HIV infection. HIV infection rates were much lower in the 2010 study. Of the 4550 people included in this group, 0.29% had HIV infection, 1.2% had syphilis, and 0.8% had HCV.

32.3.5.3 Summary of Findings

The results appear to indicate that STI clinic attendees have a generally lower infection rate as compared to groups such as PWID, MSM, and partners and spouses of PLWH and PWID. The estimated HIV infection rate in the STI clinic client group was 1.62% (8849) in 2010, dropping to 0.96% (8451) by the end of 2012.

The results indicate that this group does not contribute significantly as a bridge to the general population and to the generalization of the epidemic. The bridge to the general population appears to have been through sexual transmission among the predominantly male PWID population and their female sexual partners and those MSM who had bisexual behaviours.

32.3.6 HIV and Pregnant Women

32.3.6.1 Sero-surveillance

HIV infection rates among pregnant women in XUAR exceeded 1% in 2007. This rate dropped significantly to 0.47% in 2012 and 0.17% in 2017. Rates are high in

areas where the overall HIV prevalence is high, such as Yining City (Yili Kazakh Autonomous Prefecture in the north of XUAR). In Yining City, the HIV infection rate among pregnant women has remained consistently at 2% since the end of December 2012 (Chinese National HIV/AIDS Sentinel Surveillance Reporting System).

32.3.6.2 Special Studies

Pregnant women were included in the 2006 population screening program. Of the 14,833 women in the screening program, 0.32% were found to have HIV infection (XUAR Bureau of Health 2012). This result was consistent with the results of the 2010 special study. In this latter study, 0.28% of the 4235 participants were found to have HIV infection, 0.24% had syphilis, and 0.3% had HCV. These results are the lowest among the key populations (National Science and Technology Major Research Program 2011).

32.3.6.3 Summary of Findings

Pregnant women with HIV are generally thought to be a means of the transition of HIV into the general community. The results to date do not seem to indicate that the HIV epidemic has reached this group of women to a significant extent (except in Yining City). However, the persistent evolution of the epidemic in people aged between 20 and 39 years of age would tend to indicate that infection rates among pregnant women may rise in the future if prevention measures are not implemented for serodiscordant couples.

32.4 Prevention of HIV in XUAR

XUAR has expanded prevention interventions over the last 20 years. The core interventions have included a focus on health sector development and community mobilization through the engagement of multi-sectoral government organizations. The main focus of the social mobilization programs has been in reducing stigma and discrimination and, through this, increasing access to testing and care and support. Community interventions have included the engagement of women's groups and youth groups to promote care and support for key populations and for those living with HIV, and HIV education in schools and universities for teachers and students.

Prevention, treatment, and care programs are delivered in the community, through hospital-based health systems, and in closed settings. Interventions in the community, targeting key populations, such as those designed to reach PWID, include needle-and-syringe programs and opioid substitution therapy, specifically methadone maintenance. These harm reduction programs also include condom promotion. Interventions for FSW are delivered in entertainment venues and, to some extent, on the streets. Discordant couples are followed up in the community. There has been a major escalation of early treatment to maintain the health of PLWH and reduce transmission. These comprehensive services have developed over the last 15 years and are now available in most cities in XUAR (Chinese National Methadone Maintenance Reporting System 2017).

32.4.1 Government Leadership and Policy Framework

The XUAR government and technical agencies have been extremely active in supporting and expanding HIV-related prevention, testing, treatment, and care services. The first government-wide steps were taken in 1997 when the "Xinjiang Uygur Autonomous Regional HIV/AIDS Prevention and Control Leading Group" was established. This group included multi-sectoral government agencies with a role in reaching key community groups.

As awareness of the scope of the impact of HIV on the economic and social development of XUAR grew, the XUAR government established the regional HIV/AIDS prevention and control committee in 2003 to strengthen the government's leadership in HIV/AIDS prevention and control. This group was established as part of the response to HIV as documented in the "XUAR HIV/AIDS Middle to Long-Term Plan" (XUAR Government Office 2002).

The response to HIV was supported by several key national policies and regional plans. National policies such as the "Four Frees and One Care" Policy (State Council of People's Republic of China 2004) and "Five Expands and Six Strengths" (State Council of People's Republic of China 2008) were integrated into planning and implemention. The government also initiated a program of multi-sectoral involvement based on the "Duties and Responsibilities of Member Agencies of Regional HIV/AIDS Prevention and Control Leading Group". This multi-sectoral engagement was important in community mobilization and promoting HIV awareness and supporting a reduction in stigma and discrimination in communities.

To ensure HIV/AIDS prevention and control remained a priority, policy documents such as the "Regional Action Plans (2006–2010) (2011–2015) (2016–2020)" (XUAR Government Office 2007, 2012, 2017) were developed and issued.

In October 2010, "Regional Regulations for HIV/AIDS Prevention and Control" (XUAR Government Office 2010) was released to provide a legal basis for standardized HIV prevention and control. Also in 2010, HIV/AIDS prevention was included as one of the criteria to evaluate government worker performance. In addition, HIV/AIDS prevention and control committees have been established in all 14 prefectures (cities), and the government has allocated dedicated human resources as a response to the epidemic.

The importance of the role of government-led, multi-sectoral engagement should not be underestimated in XUAR's response to HIV. The low levels of community involvement in the initial stages of the epidemic and the near absence of non-governmental organizations and community-based organizations meant that primary mobilizers were the community-based government health workers. In the highly stigmatized community environment, health workers had little capacity to work effectively. Extensive mobilization of multi-sectoral organizations was championed by government and health sector leaders, and this resulted in an active and comprehensive response to the epidemic at the community level which supported and strengthened the health effort.

32.4.2 The HIV Prevention Infrastructure

The comprehensive HIV prevention and control implementation network has grown and developed in XUAR. At the end of 2017, there were 110 prevention and care organizations, 92 designated hospitals for HIV and AIDS treatment, one central HIV confirmatory laboratory, 21 sub-regional confirmatory laboratories, 314 screening laboratories, 523 screening sites, 485 VCT clinics, 80 laboratories with capacity to undertake CD4 testing, and 15 laboratories with capacity to undertake viral load measuring. It is estimated that there are more than 800 full-time professionals and 1000 part-time workers engaged in HIV/AIDS prevention in XUAR. In addition to this, harm reduction services included 83 needle-and-syringe exchange sites, and methadone maintenance services were offered through 28 stand-alone clinics and 35 extended sites offering methadone as a component of services.

Capacity building for prevention, clinical care, testing, treatment, and care staff was undertaken annually, and the training programme included training in reporting mechanisms, methodologies for follow-up visit interventions, methadone maintenance therapy, needle-and-syringe program implementation, VCT, laboratory testing and quality control, clinical implementation of antiretroviral therapy (ART), and opportunistic infection (OI) prevention and treatment. Around 10,000 people have had the opportunity to attend these training sessions.

32.4.3 Prevention Services and Activities

HIV prevention and transmission knowledge dissemination was undertaken through multiple mechanisms. Methods included mass publicity and education (televisions, radios, and billboards) with inclusion of basic HIV transmission and prevention knowledge into university, middle school, and primary school curricula. Community popular opinion leaders have been engaged to disseminate messages (Wheeler et al. 2007). Multi-sectoral agencies are engaged through the working committees and facilitate much of this work in the community.

In addition to the supportive government frameworks and the surveillance and testing network, other services have evolved and are operating for the purpose of preventing further spread of HIV. These services are targeted at key populations in the community. It is difficult to determine the coverage of these programs due to high mobility of the key populations at higher risk and an incomplete understanding of the actual population size (the denominator). It was however clear that services were being utilized in most prefectures and counties, suggesting improved accessibility.

The compelling need to reduce the risk of transmission between sero-discordant couples has also led to the development of extensive programs to identify these couples, and to establish counseling and support programs for this group. Early entry to the ART program, which began in earnest from 2009, was also thought to be a major contribution to the prevention of HIV transmission.

32.4.4 Behaviour Change and Key Populations

Behaviour change appears to have occurred in relation to transmission prevention, such as using sterile injecting equipment among PWID and condom use by FSW. There appear to be opportunities to make these services more comprehensive and targeted, as is evidenced by the low rate of condom use by PWID that has clearly contributed to sexual transmission of HIV to their spouses and sexual partners. The low rate of condom use for MSM is also a significant issue and is reflected in the progression of the epidemic within this group.

32.4.5 Future Opportunities for Prevention Service Expansion

While prevention services are available and accessible, there appear to be significant gaps in these services. These gaps present opportunities to expand the reach of services and actively promote HIV prevention. For example, the 2010 study in Ili Kazakh Autonomous Prefecture and Urumqi City showed that only 29% of all PWID participants had received peer education and only 53% had had an HIV test in the previous year. Only 35.5% of FSW had had peer education, and just 44.5% had been tested for HIV in the last year. For MSM only 42.0% had had an HIV test in the previous year (Chinese National Ministry of Health Research Project 2010). Targeting and expansion of services by government and non-government community-based organizations to reach a greater number of people in these key populations with testing and promotional activities to change behaviors may increase the effectiveness of programs and contribute to controlling the transmission of HIV.

It is also very clear that targeted condom promotion programs are required particularly for PWID and MSM. In addition, programs targeting street-level FSW would also appear to be a priority given the prevalence of HIV in this group (5%) (Chinese National Ministry of Health Research Project 2010). The strong social and cultural barriers between ethnic groups add significant complexity to addressing particular subgroups within key populations at higher risk, such as Uygur MSM and groups with multiple risk behaviours such as PWID who are male sex workers. The extensive reach of the current prevention programs, further sensitization of workers, and establishment of community networks will facilitate the expansion of this effort and enable future targeting of programs into these key groups.

It is very obvious that continuation and expansion of successful programs particularly tailored to further raise awareness in certain communities are essential. Utilization of popular opinion leaders such as women's leaders in the community is important. Continued promotion of confidential services by and for ethnic groups is critical in enabling people to seek testing and care and treatment services. Promoting skills for personal disclosure of HIV status and safe sex appear to be essential elements in reducing transmission between spouses.

32.5 Treatment and Care

32.5.1 Treatment and Care Service Framework

Treatment and care in XUAR is guided by the "Four Frees and One Care" Policy (State Council of the People's Republic of China 2004). The free ART program started in XUAR in 2004. From that time, ART centers were established in all prefectures and counties with high prevalence. At the end of December 2017, the XUAR HIV/AIDS healthcare system had more than 1000 healthcare workers with skills to implement treatment programs in 92 designated healthcare agencies (Chinese National Free ART Reporting System 2017).

32.5.2 Treatment Services

The government's free ART program began in 2005. The core of the treatment service is provided at designated sites and includes testing, prescribing, and side-effect management. ART is generally started in the community and monitored by the government's community-based follow-up programs, which aim to follow-up all PLWH on ART at least quarterly.

At the end of December 2017, 70.3% of PLWH were on treatment. It is anticipated that more than 90% of all diagnosed PLWH in XUAR will receive sustainable ART in 2020.

In 2017, 7175 people started ART. Anecdotal reports indicate that symptoms had been controlled and quality of life of most patients had improved and some people were able to return to work after they were established on treatment.

The coverage of the PMTCT program has improved, with 88% of pregnant women with HIV and 96.8% of HIV-exposed infants receiving ART as of the end of December 2017 (XUAR Health and Family Planning Commission 2017). The proportion of infections due to maternal-child transmission was 8% in 2012, dropped to 5%, and is now about 2% in Yining City (Yili Kazakh Autonomous Region) by the end of 2012 (XUAR Health and Family Planning Commission 2017).

Care programs for PLWH also expanded. There was a small home-based care network for PLWH at the beginning. However, with the development of multiple sites for care and hospital-based services provided for free, home-based care programs have been superseded. Growing numbers of people are now treated in hospitals.

32.6 Challenges

In many respects, the key challenges in HIV prevention and control in XUAR are similar to those in other provinces in China. Strict social norms in relation to what constitutes "good behavior" translate in HIV prevention and control terms into a

lack of recognition of risk behaviors and fear of exposure to the community. Behavior change is most often presumed to be "not using drugs" and maintaining a relationship with a "trusted partner" when essentially, the most important behaviors requiring change to prevent and control HIV are using sterile injecting equipment and consistently using condoms. These latter behavior change initiatives, in the highly stigmatized and in some cases punitive environment faced by people who admit to injecting drugs, selling sex, having casual sexual partners, or having HIV infection, require a very confidential and personal approach. Training and maintaining skilled and committed workers to provide basic de-stigmatized services is a significant challenge.

Promoting HIV knowledge in an effort to reduce stigma and discrimination requires engagement at the community level. Mass publicity campaigns undertaken to increase awareness of the risk of HIV transmission do not necessarily get translated into reduced stigma and discrimination. However, interactive community-based programs may have some impact. In XUAR, community-based quizzes and street dramas were held to increase knowledge and awareness, and these appear to have increased people's understanding of the impact of stigma and discrimination in key populations.

The coverage of sustainable ART for all PLWH and the mother-to-child transmission rate are still falling short of expectations (90% and less than 4%, respectively). Supply-driven testing and screening programs are being implemented in XUAR to attempt to fully understand the scope of HIV in different communities and to link people with treatment and care services. From a time and cost perspective, these approaches are less sustainable than targeted demand-driven services such as VCT. However, given the challenges in the current context, supply-driven programs in all aspects of the HIV response may be the most appropriate option.

Targeting is also challenging and is required to expand the reach of prevention services and gain access to subgroups with specific needs such as MSM, street-level and casual FSW, and PWID who also sell sex. The mobilization of government and non-government community-based organizations is particularly important in addressing transmission (prevention and control) among MSM and women; however, few of these organizations were operating on an ongoing basis.

Implementing consistent and ongoing community-based activities has been challenging in XUAR due to a lack of organizational capacity and funding. Multisectoral agencies were funded by a small pool of funds (about one million RMB each year) managed by the XUAR Health and Family Planning Commission. In addition, XUAR was beginning to build a group of community-based networks to enable implementation of key activities, such as peer education, and a few community-based organizations were beginning to form, supported and supervised by the XUAR HIV/AIDS Association and the National Special AIDS Fund for Civil Society. Community-based organizations had difficulty operating on an ongoing basis in XUAR as organizational funding was difficult to access and only available sporadically. This meant that there were gaps in the comprehensive response which, when addressed, may enable more people from key populations to access prevention, testing, care, and treatment services.

32.7 Conclusion

The HIV epidemic in XUAR was still expanding at the end of December 2017. The main features of the epidemic are that the infection rate among PWID is stabilizing and showing a slight reduction. Infection prevalence among FSW is below 1%. The predominant transmission route is heterosexual transmission. Measures of incidence showed that MSM are at the highest risk of transmission with an annual incidence rate of 6.3%. There are some distinctive geographical characteristics to the epidemic, and these have assisted in developing targeted programs to areas of highest need.

Prevention programs have developed within communities where there are key populations, and in general, these appear to be supporting changes in behavior and a reduction in infection rates among PWID and FSW. Additional programs are required to promote condom use among PWID, sero-discordant couples, and MSM to address the escalation of sexual transmission. Continuation and expansion of mass screening, follow-up visits and ART supply for all PLWH, peer education, self-testing and pre-exposure prophylaxis pilots for MSM, spousal transmission prevention programs, and PMTCT will be the core of services in the future. These programs will also assist in linking greater numbers of people in key populations, with testing and other services being essential in addressing gaps in service delivery.

Treatment and care programs appeared to be addressing the majority of ART treatment needs as of December 2017. However, it is anticipated that as population screening programs escalate over the next several years, the demand on the ART program will also increase significantly.

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Comprehensive HIV/AIDS Programs in Sichuan

33

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Abstract

By the end of 2017, a total of 110,872 people living with HIV (PLWH) had been diagnosed in Sichuan, including 42,496 AIDS patients, making Sichuan one of the provinces heavily affected by the HIV/AIDS epidemic. The male/female ratio was 2.8:1; the 20–49 age group accounted for 68.5% of infections; and the Han ethnic majority accounted for 68.1% and the Yi ethnic minority accounted for 30.3% of the total cases. PLWH have a wide range of occupations, with farmers, unemployed, and rural migrant workers taking up the majority. Transmission by injection drug use accounted for the majority of cases until 2010, with sexual transmission rapidly expanding in the last decade. By the end of 2017, nearly 79,000 PLWH were receiving antiretroviral treatment in Sichuan province. Mortality greatly declined in recent years among those who received treatment. The number of HIV-related deaths surpassed 5000 in 2017. A comprehensive surveillance network has been set up composed of routine screening, case reporting, sentinel surveillance, specific epidemiological investigation, estimation of the HIV epidemic, and analysis of the incidence rate in different risk groups. Education activities targeting different groups have been carried out from provincial level to prefecture level and communities. Free antiretroviral treatment during the past decade has reduced the mortality rate among PLWH and has improved the quality of their life. Tailored behavioral interventions were implemented to effectively change high-risk behaviors among key populations. Prevention of mother-to-child transmission (PMTCT) has covered all 21 prefectures and 181 counties. A comprehensive prevention and treatment system that takes the community as its basis, health departments its mainstay, and professional institutes its backbone, with the coordination of security, civil administration and education, and the general public have been established. Remarkable progress has been made, but a great challenge lies ahead to control HIV sexual transmission, particularly in minorities.

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33.1 Introduction

Sichuan is located along the upper reaches of the Yangtze river, the southwest hinterland of China. Covering a total area of 485 thousand square kilometers, Sichuan is a pivotal transportation hub in Southwest China and borders seven provinces. Sichuan governs 21 prefectures, 181 districts (cities) and counties, including 3 ethnic minority autonomous prefectures. The total registered population of Sichuan reaches over 90 million, 73.8% of which are rural residents, and a male/female ratio of 107:100. There are 36 key counties recognized by the national poverty alleviation plan with three million people living in poverty-stricken areas. The Han ethnic majority population accounted for 94% of the total population. Sichuan is home to 14 ethnic minority groups. It has the largest enclave of the Yi ethnic minority people, the only enclave of the Qiang people and the second largest enclave for the Tibetan people. At least ten million people from Sichuan have migrated to other provinces.

There are 74,311 health facilities in Sichuan, including 207 agencies for disease control, 832 comprehensive hospitals, 221 specialized hospitals, 203 maternal and child health care agencies, and 750 community health service centers. For every thousand citizens, there are 3.4 health technicians and 3 beds in medical facilities. More than ten million people have been covered by the medical insurance scheme for urban and rural residents and over 63 million people were covered by the new rural cooperative medical care scheme.

Sichuan borders Yunnan province, the transportation channel, and distribution center for imported illicit drugs such as heroin. Initially, HIV infection spread very rapidly among persons who inject drugs (PWID) in most of Sichuan's prefectures, but especially in the Liang Shan Yi minority region.

33.2 The Spread of HIV Infection in Sichuan

The first persons living with HIV (PLWH) were found among returned workers from Africa or elsewhere and had become infected through sex. In 1995, new cases were found among paid blood donors and among PWID. From then on, HIV prevalence has been on the rise, and many cases have been found among CSW (commercial sex workers) and patients of sexually transmitted infection (STI) clinics, demonstrating the increasingly diversified transmission routes. In 2000, the first MTCT (mother-to-child transmission) case was detected, and in 2004, the first case among men who have sex with men (MSM) was discovered. Since then, HIV prevalence has increased, especially among MSM.

By the end of 2017, the reported number of PLWH in Sichuan totaled 144,721, including 42,496 AIDS patients (Fig. 33.1), making Sichuan one of the provinces most heavily affected by HIV/AIDS epidemic.

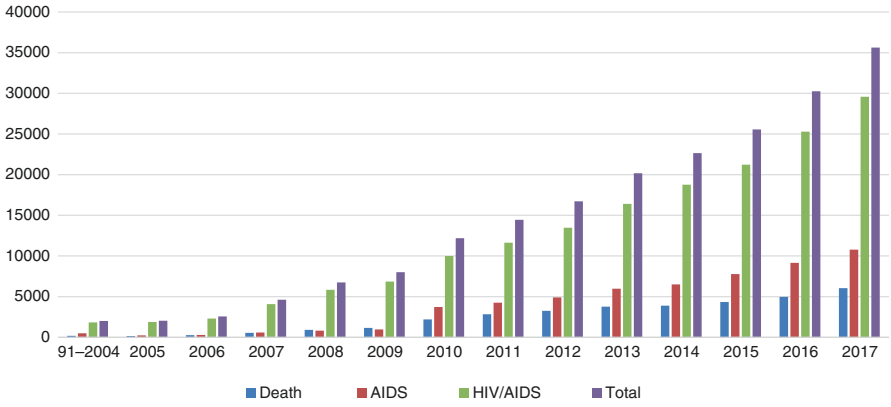

Fig. 33.1 The number of annual reported HIV/AIDS cases in Sichuan, 1991–2017

The number of newly diagnosed HIV/AIDS cases reported in Sichuan has continued to rise year to year, for example, from 11,895 in 2010 to 25,165 in 2017, increasing by 111.6% (National Center for AIDS/STD Control and Prevention, China CDC 2018; Sichuan CDC 2018). The number of HIV-related deaths has stabilized in recent years at nearly 5000 per year.

33.2.1 Geographic Distribution

In 1991, HIV/AIDS cases were only found in one county in Sichuan. Since then, the reach of HIV has been rapidly expanding. By 2004, the epidemic spread to half of the counties and districts, and by 2005, three-quarters of Sichuan's geography had been impacted. By 2012, HIV cases had been found in all 21 prefectures and 181 counties. There were 46,298 reported cases in Liangshan prefecture, accounting for 32% of the total PLWH by the end of 2017, 28,292 cases in Chengdu, representing 19.6%, 7940 cases in Yibin, representing 5.2%, and 7141 cases in Dazhou, registering 4.9% of the total. HIV prevalence in four rural counties (Butuo county, Zhaojue county, Yuexi county, and Meigu county) in Liangshan prefecture exceeded more than 1% of the permanent population (Fig. 33.2, Sichuan CDC 2018).

33.2.2 Sex Distribution

The number of newly diagnosed female HIV cases increased rapidly, from 2927 in 2010 to 8565 in 2017, while the proportion of female cases overall increased slightly from 24.6% in 2010 to 29% in 2017 (Fig. 33.3). The male/female ratio decreased slightly from 3:1 to 2.4:1 (Sichuan CDC 2018).

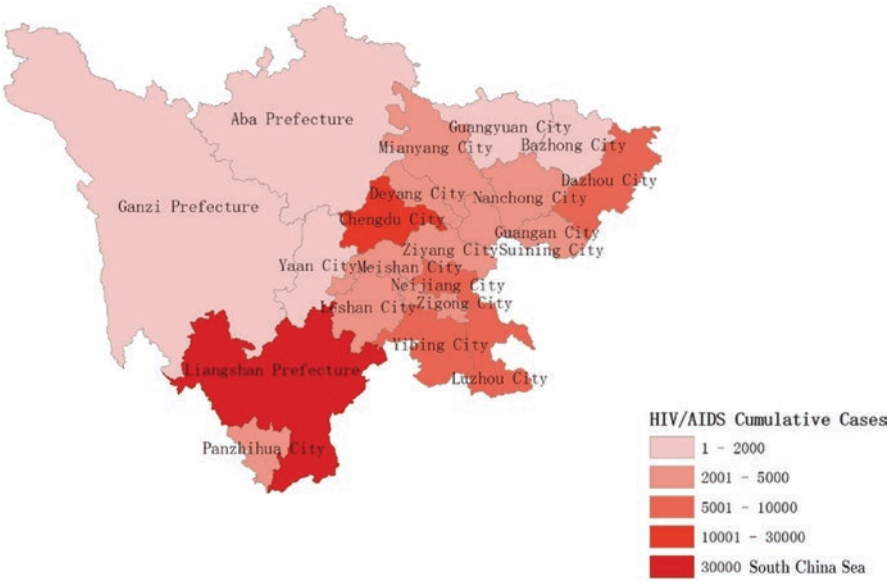

Fig. 33.2 Geographic distribution of the cumulative number of HIV/AIDS cases in Sichuan province by the end of 2017

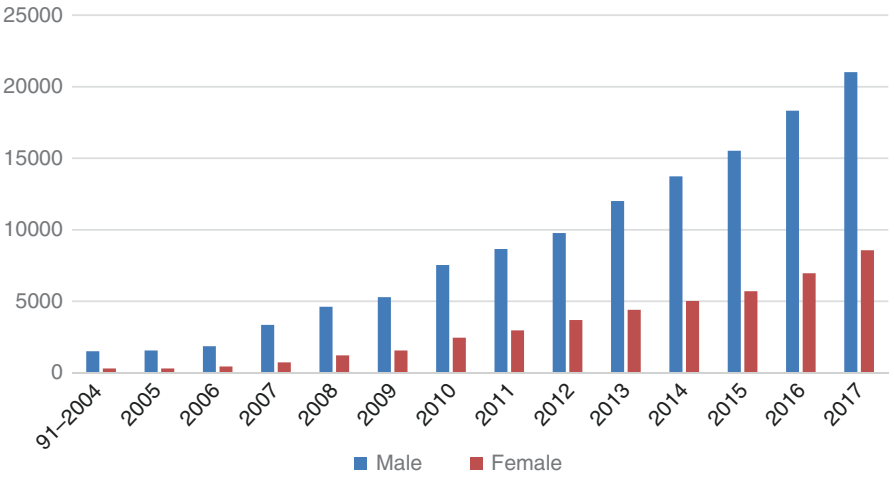

Fig. 33.3 Sex distribution of the total HIV/AIDS cases in Sichuan province

33.2.3 Age Distribution

The age distribution changed over time. In the initial epidemic, the most affected age group was 20–39, accounting for over 80% of cases in 2005, but less 40%

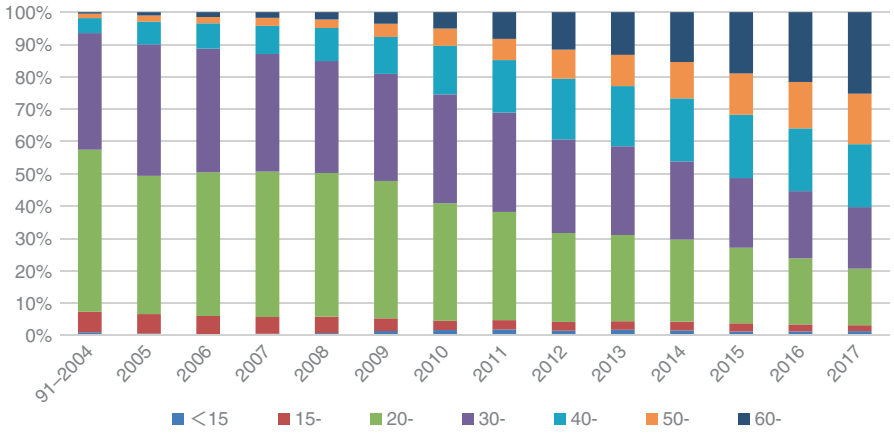

Fig. 33.4 Age distribution of the total HIV/AIDS cases in Sichuan province

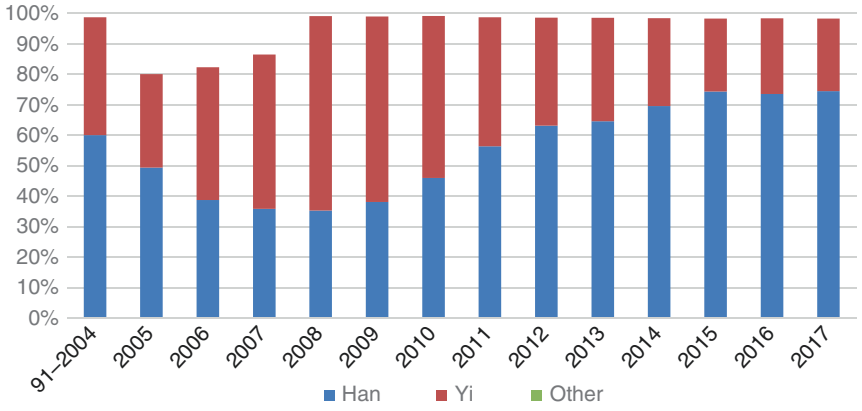

Fig. 33.5 Distribution by ethnic groups of the cumulative number of HIV/AIDS cases in Sichuan, 1991–2017

in 2017. HIV among senior adult age groups increased significantly, for example, those over 50 years accounted for less 5% of cases in 2005, but over 40% in 2017 (Fig. 33.4, Sichuan CDC 2018).

33.2.4 Distribution by Ethnic Group

Among 34 ethnic groups in Sichuan, Han and Yi are the two major ethnic groups most affected by HIV/AIDS. The HIV epidemic in Sichuan has been particularly severe among the Yi ethnic group, primarily because of the rapid spread of HIV

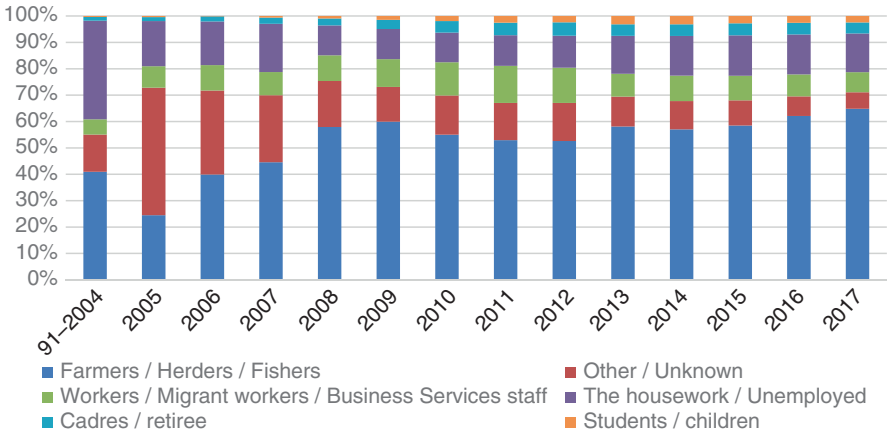

Fig. 33.6 Occupational distribution of the total HIV/AIDS cases in Sichuan province

among PWID in this group. HIV prevalence among the Yi people have been increasing for many years. In 2004, the Han and the Yi each accounted for about half of the total cases respectively, and then until 2011, more cases were identified among the Yi. In 2008, it reached a peak of 64%, with 35% among the Han people.

In the past decade (until 2017), as there have been more sexually transmitted cases, the prevalence among the Han people has increased, while prevalence among the Yi people has decreased. By the end of 2017, the Han and the Yi accounted for 68.1% and 30.3% of the total cases, respectively (Fig. 33.5).

33.2.5 Occupational Distribution

PLWH diagnosed in Sichuan hold a wide range of occupations, with farmers being mostly affected, accounting for over 50% of HIV infections since 2008. By the end of 2017, farmers accounted for 65% of the total HIV cases, housework or non-employed, 14.7%, and rural migrant workers, 7.6% (Fig. 33.6, Sichuan CDC 2018).

33.2.6 Transmission Modes

The HIV transmission mode changed over time in Sichuan (Fig. 33.7). In the beginning, PWID were the key population most affected, accounting for 63% of total reported cases in 2005, but declining gradually to 11.5% in 2017. The proportion of all HIV cases among PWID was still the highest over all other provinces in China by 2017, the countrywide average was 3.4%. The proportion of cases attributed to heterosexual transmission increased from 14.6% in 2005 to 77.7% in 2017, while male-male sexual transmission increased from almost zero in 2005 to 13.2% in 2015, and then declined to 8.6% in 2017. MTCT consistently remained very low, at approximately 1% (Sichuan CDC 2018).

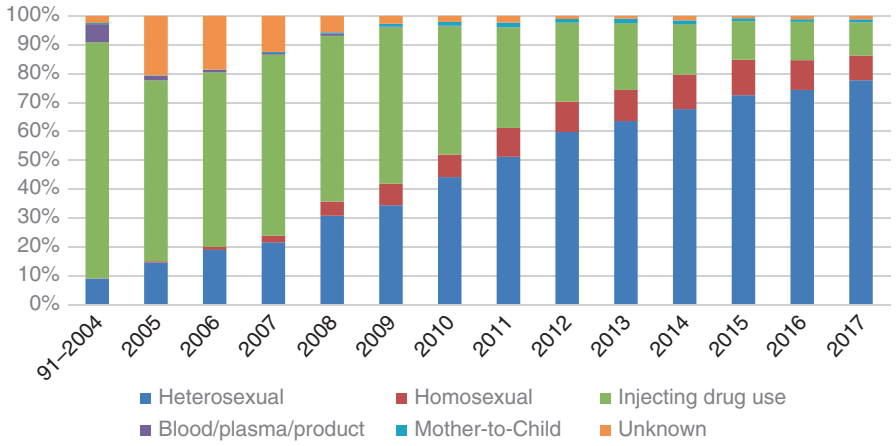

Fig. 33.7 Annual distribution of HIV cases by reported HIV transmission mode in Sichuan, 1991–2017

33.3 Comprehensive HIV/AIDS Programs

In the face of challenges, Sichuan province performed its duty in seven aspects: surveillance and testing, publicity and education, care and treatment, behavioral intervention, PMTCT (prevention of mother-to-child transmission), mechanism building, and model exploration; and blazed a "Sichuan trail" in tackling key and major difficulties in HIV/AIDS prevention and control.

33.3.1 Improving Surveillance Network on HIV/AIDS

Since 1987, Sichuan province launched routine surveillance and case reporting on HIV/AIDS among different groups and started to establish HIV/AIDS serology sentinel surveillance in 1995, HIV/AIDS behavior surveillance stations in 2002, and combined them into HIV/AIDS sentinel surveillance in 2009. At present, a comprehensive surveillance networking composed of routine screening, case reporting, sentinel surveillance, specific epidemiological investigation, estimates on the HIV/AIDS epidemic, and analysis of the incidence rate were set up.

33.3.1.1 Routine Screening

By the end of 2017, a network of HIV/AIDS testing laboratories covering 21 prefectures has been established, including 27 confirmation labs, 557 screening labs, and over 1400 testing stations. Center for Disease Control and Prevention (CDC) sites, comprehensive hospitals, maternal care hospitals, blood stations, surveillance places, military installations, and quarantine bureaus conducted routine HIV/AIDS screening on high-risk groups, spouses and children of PLWH, patients requiring

surgery of other invasive procedures or blood transfusions, patients who display symptoms suggesting clinical need, pregnant women, blood donors, detainees, conscripts, and entry-exit personnel.

33.3.1.2 Case Reporting

Before 2005, cases were reported from local CDCs to the provincial level CDC in Sichuan province. Since March 2005, a confidential, real-name, web-based reporting system on HIV/AIDS has been used. All lower level CDCs conduct regular analysis on epidemic indicators and the provincial CDC carries out monthly, regular analysis. Periodically, reports on these analyses would be written and submitted to the Ministry of Health to guide the formulation of policies and strategies.

33.3.1.3 Sentinel Surveillance

Sichuan was among the first provinces to establish serology sentinel surveillance. The year 1995 witnessed the establishment of three groups of sentinel sites for PWID, commercial sex workers (CSW), and male attendees of STI clinics. Since then, regions, population groups, and number of sites under the coverage of sentinel surveillance have continuously increased (Liu et al. 2000).

In the following years, improvement and integration on different types of surveillance stations have been implemented. In 2007, behavior surveillance stations and comprehensive surveillance stations were integrated to ensure that there was only one type of surveillance station targeting key populations in each region. Meanwhile, surveillance methods for MSM and CSW clients were improved and innovated. In 2009, serology surveillance and comprehensive surveillance stations were integrated into a sentinel surveillance system. In 2010, the system was improved for male STI clinic attendees and pregnant women in the whole province in response to the growth of sexual transmission. By the end of 2017, 148 HIV/AIDS surveillance sites for 11 groups of people covering 21 prefectures were established. Sichuan Province ranks first for both the number of sites and number of groups of people, including 38 sites for PWID, 34 for CSW, 10 for MSM, 24 for male STI clinic attendees, 2 for long-distance truck drivers, 27 for pregnant women, 2 for young students, 4 for migrants, 3 for customers of CSW, 3 for communities, and 1 for entry-exit personnel. Liangshan prefecture, Chengdu city and other competent cities (prefectures) set up their own surviellance sites according to local prevention and control needs.

33.3.1.4 Specific Epidemiological Investigation

Specific epidemiological investigations have been conducted in areas and among groups with uncertain prevalence or drastic changes in prevalence to complement and improve the surveillance system. Sichuan province has often carried out pilot projects to estimate the size of the epidemic among PWID, CSW and their customers, and MSM. In 2007, for the first time, an investigation into the state of the HIV/

AIDS epidemic and the status of prevention and treatment responses in Liangshan prefecture was carried out. From 2008 to 2009, routine HIV screening and testing was implemented in Butuo county and Zhaojue county, and the epidemiological survey on HIV/AIDS in 14 counties in Liangshan prefecture and Xichang was conducted. In 2010, investigations on the reasons for the increasing numbers of PLWH among those above 50 years old and for the rise in heterosexual sex transmission were carried out.

33.3.1.5 Estimate on HIV/AIDS Epidemic and Research on New HIV Infections

Since 2005, Sichuan province has estimated HIV prevalence in the province once every 2 years. From 2007 to 2008, the Asian Epidemic Model was employed to estimate and project the size of the HIV epidemic, especially in Liangshan prefecture, which has a more generalized HIV epidemic. Since 2008, Sichuan independently launched an annual investigation into AIDS prevalence using the workbook method in every city (prefecture). The Spectrum Model has been used to estimate new infections and associated mortality in the province since 2010 (Liu et al. 2014a).

In 2005, Sichuan launched research on the estimation of incident HIV infection by BED HIV-1 Capture EIA. At first, testing was implemented on samples from sentinel surveillance for PWID and MSM in Chengdu as well as all the samples from the large-scale screening and testing campaign in Butuo county and Zhaojue county. Since 2009, testing was carried out on samples of newly reported cases from the first quarter of every year. In 2011, samples from the first half of the year were included in the testing. And in 2012, samples of newly reported cases throughout the whole year were included in testing and the range of samples was extended to CSW, MSM, and male STI clinic attendees.

33.3.2 Various Publicity and Education Activities in Different Groups Were Implemented

Sichuan has considered publicity and education a major method for HIV/AIDS prevention and control. Distinctive publicity and education activities targeting different groups have been carried out from provincial level to prefecture level to mobilize public participation in HIV/AIDS prevention and control.

33.3.2.1 Training of Leaders

Since 1995, Sichuan began to organize HIV/AIDS prevention and control speaking tours among government officials and actively launched training aimed at improving HIV/AIDS prevention and control knowledge among leaders of various levels. The Provincial Party School, since 2003, began to integrate HIV/AIDS prevention and treatment knowledge and policy into the education of leaders and cadres as a compulsory course.

33.3.2.2 HIV Awareness and Education

Key populations targeted for HIV/AIDS prevention and treatment in Sichuan province include students, out-of-school youth, migrants, and groups having multiple sexual partners in ethnic minority regions. According to the features of different groups, HIV/AIDS prevention and treatment activities are conducted with special attention paid to ensure these interventions are socio-culturally sensitive and approprite for each group.

The Health Department of Sichuan Province united with education departments at all regions and prefectures to organize the secondary vocational schools, middle schools, and primary schools to raise awareness of HIV/AIDS and improve knowledge among students through various publicity activities such as experts' lectures, publicity paintings, bulletin boards, speaking contests, and writing and drawing competitions. Efforts have also been made in hosting "face to face communication: the red ribbon activity among youngsters," training programs for young volunteers for popularizing knowledge of HIV/AIDS, and establishing advocacy teams to promote health education in colleges and universities.

In the recent 10 years, more and more people from Sichuan seek jobs outside the province, which leads to the gradual increase in mobile populations. According to the sixth census, in 2010, there were 11.5 million migrants in Sichuan, including 10.5 million emigrants and one million immigrants. Most of the mobile population is sexually active, and typically have multiple non-marital and/or commercial sexual partners. Besides providing publicity brochures, hosting lectures and knowledge promotion trainings, Sichuan province fully implements health education within the public transportation system as a major means of disseminating knowledge. For example, HIV/AIDS prevention publicity programs used the train system to reach mobile populations in major areas for labor export during the period when rural migrant workers go back to their hometowns to visit their families. Since 2007, Sichuan province has been testing these mobile populations for HIV. In recent years, the detection rate has been under 0.25%. Condom use has been on the rise—with use with temporary partners increasing from 29.40% in 2007 to 48.28% in 2012, and among CSW, from 3.8% to 49.48% (Sichuan CDC 2013).

In some enclaves of ethnic minorities, due to traditional beliefs on marriage and open attitudes toward sex, having multiple casual partners is common. In an enclave in Liangshan Yi ethnic minority region, there exists broad and casual non-marital sexual behaviors. Most of the people in this region have little education, low rates of condom use, and have no awareness of risks. For instance, according to the special survey on casual sex behaviors of the Yi people in Meigu county of Liangshan Yi ethnic minority region, 82.4% of the young people had casual sex behaviors, 54.9% of which never used condoms and 25.5% only occasionally. In light of this situation, many brochures, videos, and other materials in popularizing HIV/AIDS control and treatment were distributed to villagers in this region.

33.3.3 Enhance Treatment and Management of PLWH

The free ART pilot project was launched in 2003 in Zizhong, Nanjiang, and Dazhu counties. It has been gradually scaled up and expanded to the whole province since 2005. In 2008, children were provided ART. In 2010, surveillance on drug resistance was launched. And in 2011, treatment for serodiscordant couples was initiated.

33.3.3.1 Policy and Funding

In 2004, in "the Opinion on Further Strengthening HIV/AIDS Prevention and Treatment by Sichuan Provincial People's Government", it was emphasized that efforts should be made to strengthen management of PLWH and AIDS patients and eliminate social discrimination by medical and community services and care from society and families. In "the Management on Antiviral Treatment on HIV/AIDS in Sichuan Province", formulated by the Health Department of Sichuan Province, the responsibilities of the medical agencies for treatment and care of PLWH are described. A four-tier HIV/AIDS treatment system by medical and health care agencies of province, city, county, and township was asked to be established. The treatment principle was formulated as "home-based treatment with localized management" and eligible mobile populations were requested to receive ART from designated medical and health care agencies in their current residences.

Sichuan province offers free ART to poor PLWH who lack basic medical insurance and other medical mechanisms, and are exempted from paying for treatment for opportunistic infections associated with AIDS. Free treatment and CD4 and viral load testing have been provided to eligible patients in Liangshan prefecture to improve timely initiation of treatment. In recent years, free ART for PLWH has been provided thanks to the support of national and local funding, which reached more than 100 million RMB per year in Sichuan province.

33.3.3.2 Establish Treatment Mechanisms

In the early stages, the management of PLWH on ART was the responsibility of the CDC system. With the rise in people receiving treatment and the demand for HIV treatment and care services, free ART and associated services was gradually transitioned to the health system according to the national regulations on management of ART.

(a) Chengdu Infectious Diseases Hospital was appointed the provincial designated hospital for HIV/AIDS treatment and the guidance center for clinical training to take charge of the diagnosis and treatment of all severely ill patients in the province, analyze treatment information, offer technical guidance to and supervision over local designated medical agencies, store and distribute ART drugs, and host professional training and education programs.

(b) Designated hospitals were appointed in 21 prefectures and counties (cities and counties) to be responsible for ART and treatment of opportunistic infections within their jurisdiction. There are 193 designated hospitals, including 1 of provincial level, 27 of prefectural or municipal level, 157 of county level, and 8 medical agencies.
(c) In Liangshan prefecture and other targeted counties (districts), three-tier medical service networks were established with county-level designated hospitals, township (town)-level health centers and village-level medical stations. In urban areas of Chengdu, Zigong, and other cities, community medical service centers carried out follow-up visits and supervision of ART. A provincial ART network system was set up.

33.3.3.3 Enhancing Capacity Building

Since 2003, with the support of the central government, 160 community clinical professionals have been selected and dispatched to study and receive training at the national HIV/AIDS clinical training base. Medical staff have received a total of 12,000 person-times in provincial ART training courses. A total of 133 treatment expert panels were set up in cities, prefectures, counties, and regions in the province to take charge of the policy consultancy and coordination of treatment on local HIV/AIDS cases and opportunistic infections, collect and analyze treatment information, offer suggestions to policies, and guide and supervise the treatment work in the whole province.

33.3.3.4 Management of Antiretroviral Medicines

ART drugs have been purchased by the MOH after the central tendering of the National Center for AIDS/STD Control and Prevention (NCAIDS) of the Chinese Center for Disease Control and Prevention (China CDC). All designated medical institutes/CDCs personnel take charge of the planning, storage, and distribution of the drugs. The management of drugs is arranged every year. The distribution of drugs is completed through application to guarantee the supply. Agencies for drugs management at all levels set up a working system, standardize drug application procedures in the province, and register warehousing and inventory system to guarantee the supply in accordance with the management standards of ART drugs of the "National Guideline for Supply and Management of Free HIV/AIDS Antiviral Treatment Drugs".

33.3.3.5 Surveillance and Evaluation

Virological and immunological tests are important laboratory indicators for evaluating the clinical effect of treatment. Sichuan province offers CD4 testing 1–2 times per year for free for all patients on ART, and viral load testing once per year for assessment of possible viral failure so that ART regimens can be adjusted.

In 2005, a pilot project on drug resistance tests was initiated under the support of an international cooperative project. Since 2010, drug resistance tests on patients

with viral failure were implemented. In the meantime, sentinel surveillance sites for drug resistance were established in targeted areas to better understand influencing factors for HIV drug resistance among patients receiving ART. The proportion of patients on ART for more than 6 months who had viral load test was 93% in Sichuan by 2015 (National Center for AIDS/STD Control and Prevention 2017).

33.3.3.6 Treatment Progress and Achievement

By 2017, free ART had been implemented in 171 counties in all 21 prefectures. A total of 77,408 adult cases and 894 pediatric cases were on treatment.

With many years of arduous efforts, the coverage of ART has been expanding. Counties covered by the free ART program surged from 3 in 2003 to 171 by 2012, and to 181 by 2017. ART coverage of diagnosed PLWH increased from 58.2% in 2010 to 80.6% in 2012, to 70.6% in 2017 (Fig. 33.8, National Center for AIDS/STD Control and Prevention, China CDC 2018; Sichuan CDC 2018). The drop in 2017 was mainly because of changing eligibility criteria to all PLWH regardless of CD4 counts level since 2016.

In recent years, management of treatment and follow-up visits has improved continuously. As a result, the proportion of patients receiving follow-up visits, CD4 tests, and viral load tests among all patients on ART reached 98%, 93%, and 93%, respectively, up by 30 percentage points compared with those figures in 2008. Quality follow-up visits and tests for patients on ART are guaranteed.

The proportion of patients on ART for more than 6 months and virally suppressed (viral load less than 400 copies/ml) increased from 64.3% in 2011 to 75.4% in 2012, and to 82.6% in 2015 (National Center for AIDS/STD Control and Prevention, China CDC 2017). Mortality decreased from 9.96% in 2008 to 4.39% in 2012, to 2.6% in 2015 (Fig. 33.9) (Lai et al. 2011a).

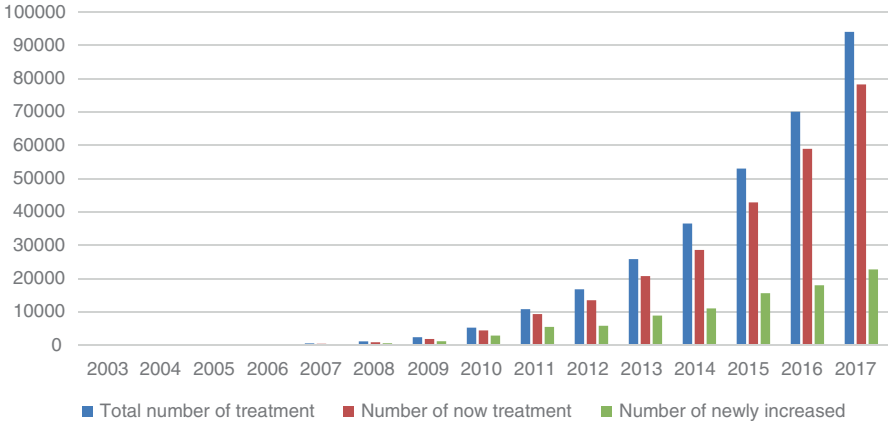

Fig. 33.8 People receiving ART in Sichuan province, 2003–2017

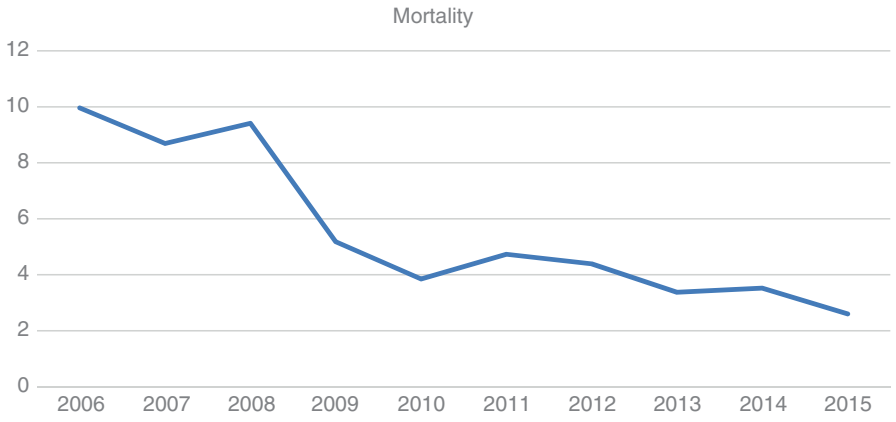

Fig. 33.9 Annual mortality among patients receiving ART in Sichuan province, 2006–2015

33.3.4 Comprehensive Intervention for High-Risk Groups

33.3.4.1 Persons Who Use Drugs

Before 2000, drug users in Sichuan province were mainly heroin users. They change from inhalation to intravenous injection. In recent years, traditional drugs have been gradually replaced by new drugs, such as ecstasy, methamphetamine, and ketamine. Intervention among drug users has been the focus of HIV prevention and control work in Sichuan province. Since 1999, Sichuan province has committed to publicity and education on HIV/AIDS prevention knowledge in the key areas of the epidemic, including relevant communities, prisons, and compulsory treatment centers, making Sichuan one of the first provinces to implement interventions among people who use drugs. Specific interventions include outreach activities, peer education, needle exchange, condom promotion, and methadone maintenance treatment.

Publicity and education campaigns on harm reduction and HIV prevention have been organized for people who use drugs in a range of settings, including communities, compulsory rehabilitation centers. HIV counseling and testing have been offered to people who use drugs in communities and closed settings.

Provision of clean needles and syringes is an integral part of the outreach program to reduce harm to PWID. Specific implementation includes: (a) Establishing supply centers including CDC and major public hospitals to provide free or low-cost disposal of needles and syringes to PWID; (b) Establishing needle exchange networks to carry out needle exchange activities and sterilizing and disfiguring recycled needles; and (c) Conducting HIV prevention and control, safe injection and clean needle education for PWID.

Meanwhile, all levels of the health system have joined hands with the family planning, industry and commerce, culture, public security, drug watchdog, quality supervision, radio and television, tourism, and other departments in developing a usage management plan to promote the use of condoms.

Sichuan province first launched the methadone maintenance treatment (MMT) pilot project in Leshan City and Xichang City in 2004. Additional MMT clinics were opened in 2005 and in 2007. In 2009, the Sichuan Provincial Working Group held a meeting and urged all regions to vigorously extend the MMT sites to engage people who use drugs in remote areas and increase the coverage of treatment services. In 2010, Sichuan Provincial Health Department, Public Security Department, and the Food and Drug Administration jointly issued the Guidelines for Methadone Maintenance Treatment Extension Clinics in All Community in Sichuan province to regulate relevant management.

In 2013, Sichuan province had established 48 community-based MMT sites, covering 46 districts and counties in 17 cities and prefectures. Eleven clinics have been opened in the seriously affected Liangshan region, accounting for 23% of the total. Cumulatively, 35,051 people who use drugs have been treated, including 3754 PLWH, accounting for 10.7%, higher than the national average of 8.2%. Different regions are actively exploring appropriate modes, such as opening extension sites in compulsory rehabilitation centers to expand MMT coverage, carrying out night service for the convenience of commuters, exploring the establishment of inter-regional extension sites, and start the family member compassion club to supervise the medicine-taking of people abstaining from drugs. Multiple methadone clinics were awarded National Outstanding Clinic awards.

Intervention coverage has been further expanded and high-risk behaviors have been addressed. Survey results showed that HIV among PWID continued to rise between 2002 and 2008, peaking at 15.68% in 2008 and then presenting a steady downward trend (Fig. 33.10). In 2012, HIV detection rates stood at 5.4% and dropped to 4.6% in 2017. The proportion of PWID sharing drug injecting equipment displayed a downward trend, from 58.2% (the highest value) in 2001 to 30.6% in 2012, declining to 2.4% in 2015. New infection rates based on BED HIV-1

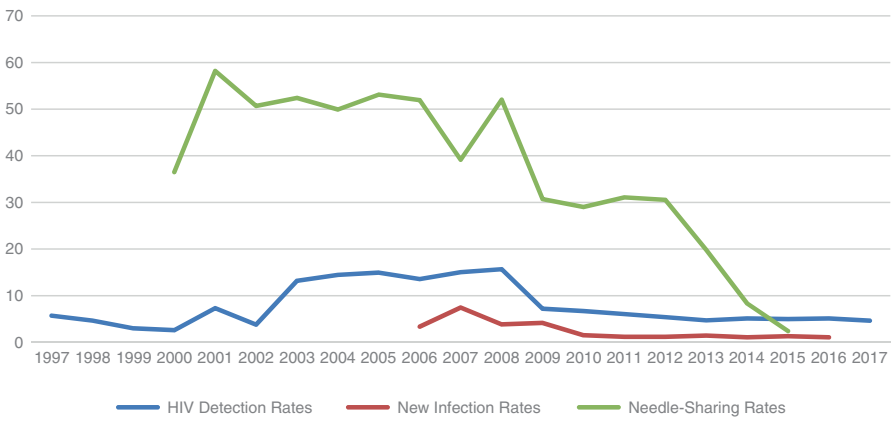

Fig. 33.10 HIV prevalence, needle-sharing rates and new infection rates among PWID in Sichuan province, 1997–2017

capture enzyme-linked method declined from 7.5% in 2007 to 1.2% in 2012, and to 1.1% in 2016 (Sichuan CDC 2018).

33.3.4.2 Interventions Among Female Sex Workers

Sichuan province started interventions early among FSW. Since the early days of the HIV/AIDS epidemic, publicity and education were the highlights of interventions, covering 181 counties (cities and districts) of the whole province currently.

Since 2006, the number of FSW in traditional entertainment venues decreased and their activities became more secretive. In response to this change, Sichuan province has been actively exploring more effective interventions. Firstly, there was change from the model of unilateral intervention effort from disease control departments to joint efforts from various departments including community health centers, rural health centers, grassroots organizations directing at entertainment venues and where the flowing population is concentrated. Intensive prevention interventions should be carried out at least once a month. Secondly, peer educators and entertainment venue owners were engaged to conduct in-depth AIDS prevention education and skills training. Thirdly, health departments and community organizations jointly mobilized FSW to get tested for HIV and receive standardized STI clinic services. STI clinics provide prescriptions and free condoms. Fourthly, cooperation was strengthened with relevant departments in intervening in AIDS through sexual transmission. For example, parts of the county (district) establish women's health education center based on the Women's Federation for preventing STI and launching AIDS interventions and education outreach activities.

Health education of FSW is carried out by trained staff. By delivering lectures, telling stories, playing games, sharing DVDs, and providing on-site consulting, health staff impart knowledge of STIs and HIV/AIDS, reproductive health, persuasion techniques, proper usage of condoms, and seeking medical treatment, so as to raise awareness and capabilities of self-protection of the target group. Meanwhile, a variety of channels and forms have been used to promote condom use among the target population in order to strengthen their awareness and skills of condoms usage. We rely on health education, peer monitoring activities, outreach services, medical follow-up, STI clinic services, and VCT sites to offer free condoms.

In recent years, factors like population mobility, and social and cultural diversity facilitates the transmission from high-risk groups to the general population, especially through sexual transmission. Reducing the spread of HIV through sexual transmission has become vital and urgent work. Sichuan province has vigorously put forward strategies to promote the use of condoms. All regions are required to fully realize the importance and urgency of promoting the use of condoms in public places. The definition of "public places" is documented in the Notice of Strengthening Condom Promotion Work in Public Places jointly issued by seven departments including Sichuan Provincial Health Department, Chamber of Commerce and Tourism Bureau. *Public Places* include accommodation venues like hotels, restaurants, hotels, guest houses, and resorts; public entertainment venues like dance halls, music cafes, discos, massage parlors, sauna rooms, foot massage centers, and bath centers; places with concentrated migrant populations like stations and

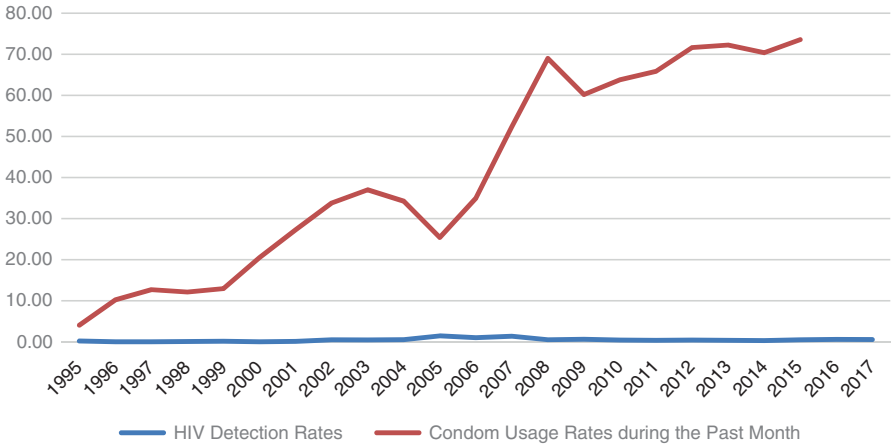

Fig. 33.11 HIV Prevalence and condom use during past month among FSW in Sichuan province, 1995–2017

airports; and medical institutions engaged in HIV/AIDS and STI treatment, and drug rehabilitation services.

Between 2008 and 2012, intervention coverage among FSW continued to rise, from 15% in 2008 to over 90% and remained high thereafter. High-risk behaviors among sex workers have also been significantly curtailed. Condom usage in the past month exhibited a remarkable upward trend, from 4.0% in 1995 to 71.6% in 2012, and further to 73.6% in 2015 (Fig. 33.11). Prior to 2007, HIV among FSW has slowly increased, reaching 1.34% in 2007 from 0.20% in 1995. Since 2008, the detection rate has declined, fluctuating between 0.33% and 0.60% as of 2017 (Sichuan CDC, 2018). The estimation of HIV incidence among this group was also low, 0.2% in 2011–2015 (Yang et al. 2017).

33.3.4.3 MSM

MSM in Sichuan are relatively active and travel frequently. Chengdu is among the largest gathering venues for MSM throughout China. In 2017, the size of the MSM population in Sichuan province was estimated to be over 200,000 people. In 2002, Sichuan province first attempted to carry out MSM interventions in communities and gradually built an overarching intervention network radiating to 21 cities and prefectures in the province.

The "Everyday Life Peer Education" approach was adopted to encourage peer educators to conduct friendly and natural discussions and exchanges with companions in the right place at the proper time in a bid to promote their companion's understanding of HIV/AIDS and safe sex.

Fun Health Counseling Center in Chengdu opened the country's first MSM hotline on a daily basis in 2002 to provide local communities and MSM around the country with information concerning HIV/AIDS prevention and treatment, sexual health, mental health, and gay culture. CBOs and NGOs initiated by MSM

shouldered responsibilities of counseling and testing, which yielded fruitful achievements.

A gay-friendly service model was established in community hospitals and Sichuan Building Hospital was made the designated outpatient clinic for MSM seeking STI care. By training medical personnel and community groups, we are able to provide standardized and friendly STI services for MSM and promote their habit of seeking STI-related medical advice, thus reducing the harm of STIs on the population and the chances of HIV infection. Meanwhile, diverse community activities are being organized, like art performances, knowledge contests, fitness campaigns, gay weddings and anniversaries, outings, and gay fellowship. Extensive publicity and education in the gay communities are highlighted to build healthy communities.

The training of network intervention personnel has been prioritized. Network intervention personnel disseminate STI and HIV/AIDS information, and promote condom usage and safe sex. CDC staff are in charge of quality control for network intervention, such as saving relevant intervention chat screenshots as records.

The fact that MSM often conceal their activities makes it more difficult to connect with them and to help bridge the gap between their knowledge and actual risk behaviors. Although Sichuan province has launched large scale, specific interventions, MSM HIV infection rates continue to increase. Since surveillance sites were set up in 2004, HIV detection rates among MSM increased rapidly, rising from 1.1% to 11.1% in 2009, remaining at around 11% after 2009, and 9.2% in 2017 (Fig. 33.12). The estimated incidence of HIV infection remained as high as 5.2% in 2011–2015 (Yang et al. 2017). From 2004 to 2007, the condom usage rate during most recent MSM sexual behavior fluctuated between 8.0% and 27.3%. From 2008 to 2012, this figure fluctuated between 62.0% and 73.9%, and further increased to over 90% in 2015 (Fig. 33.12, Sichuan CDC 2018).

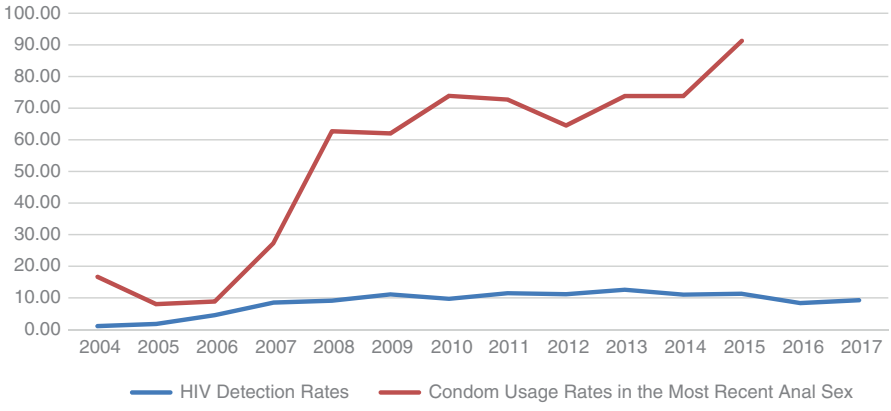

Fig. 33.12 HIV Prevalence among MSM and condom use during most recent male-male sexual contact in Sichuan province, 2004–2017

33.3.5 Prevention of Mother-to-Child Transmission

In 2004, Sichuan province first launched HIV prevention of mother-to-child transmission (PMTCT) intervention in five counties. With the joint efforts at the provincial, municipal, county, township, and village levels, PMTCT work gradually covered the entire province by 2010. At the same time, this work was integrated with efforts to elimiate MTCT of syphilis and hepatitis B virus. At present, the coverage of HIV, syphilis, hepatitis B virus testing and counseling for pregnant women in Sichuan exceeded 95% (Sichuan Provincial Maternal and Child Health Hospital 2013). MTCT transmission rates for all three infections are on an overall downward trend.

33.3.6 Strengthen Government Leadership and Support NGO Participation

Since the first cases of HIV were identified, Sichuan province has issued a series of policies and regulations and has revised and improved them in the course of implementation as the epidemic evolved, situations changed, and new information was learned. In 1995, the Standing Committee of People's Congress of Sichuan province introduced the "Regulation for Sichuan Province on STD and HIV/AIDS Prevention and Control", which was the first local statue on HIV/AIDS prevention and control. In 1997, the Sichuan Provincial Government promulgated and issued the "Plan for HIV/AIDS Prevention and Control in Sichuan Province (1997–2010)" and "Assignment of Responsibility of HIV/AIDS and STD Prevention and Control in Sichuan Province". They clearly defined HIV/AIDS prevention and control targets, measures, and responsibilities of 35 divisions and made Sichuan province the first in the country to set up a long-term plan for HIV/AIDS control. From 2002 to 2012, Sichuan province has successively issued the "Sichuan Province Action Plan on HIV/AIDS Control and Containment (2001–2005)", "Sichuan Province Action Plan on HIV/AIDS Control and Containment (2006–2010)", and "Sichuan Province Action Plan on HIV/AIDS Control and Containment (2011–2015)", defining the objectives and principles, measures, and focus areas of HIV/AIDS prevention and control as well as measures for supervising, guiding, and assessing of these Action Plans (West China Sichuan University 2007, 2012).

Sichuan province has taken the lead among all the provinces in the country in unveiling the local regulation of "Measures to promote civil society involvement in HIV/AIDS Prevention and Treatment". The number of NGOs grew from less than 50 in 2007 to 165, among which, 101 have been listed in the China HIV/AIDS Directory 2012.

The NGOs across Sichuan province have taken an active and leading role in participating in HIV/AIDS prevention and treatment and accomplished large amounts of effective work in carrying out behavioral intervention among high-risk and vulnerable groups, providing care and relief to PLWH and helping them build up confidence in life, reducing social discrimination, providing voluntary

counseling and testing services to vulnerable groups, engaging in government policy-making in terms of HIV/AIDS prevention, and staging national and international experience exchange activities. Those serve as a strong complements to government prevention and treatment work and promote social and economic development and social stability.

33.3.7 International Cooperation Projects and Scientific Research

Sichuan province began to actively introduce international cooperation projects on HIV/AIDS prevention and control in 1993. It successively applied and implemented the WHO HIV/AIDS Teacher Training Program in ten provinces and cities, Sichuan–Australia HIV/AIDS Prevention Cooperation Project on Teacher Training, China–UK HIV/AIDS Prevention and Control Project, China–UK HIV/AIDS Roadmap Tactical Support, Global Fund/China–UK HIV/AIDS Prevention and Care Project, China–Merck Comprehensive HIV/AIDS Prevention and Control Cooperative Project (West China Sichuan University 2013). The projects gradually expanded from capacity building and experimental implementation of introduced international advanced prevention and control tactics in its initial stage to supporting the implementation of comprehensive prevention and control measures that fully cover 21 cities (prefectures) and 181 counties across Sichuan province. Through years of implementing international cooperation projects, Sichuan province has pushed forward the issuing and implementation of relevant policy planning of HIV/AIDS prevention and control, further improved policy environment and management mechanism of HIV/AIDS prevention, increased the input in HIV/AIDS prevention of government at all levels, enhanced HIV/AIDS prevention operational capacity at community levels, cultivated and trained a host of critical personnel in multiple HIV/AIDS prevention departments and fully improved social participation. Taking the provincial condition into consideration and combing it with the reality, Sichuan province has been fully promoting the implementation of comprehensive prevention and treatment measures. Through bold exploration and innovation, various project-operating modes that can be borrowed and promoted have formed, laying a solid foundation for sustainable development of HIV/AIDS prevention. The projects, through demonstration effect, promote work in all areas by drawing upon the experience gained on key points in an extensive, in-depth, and thorough manner. The assessment indicators of comprehensive prevention and treatment are on the rise year on year, effectively enhancing overall HIV/AIDS prevention and treatment throughout Sichuan province.

The Liangshan Prefecture Study on Field Epidemiology and Intervention of Large Scale HIV/AIDS Prevention and Treatment, which is a major national science and technology project of the Twelfth Five Year Plan, has been carried out and has formed the basis of public health service network has been further consolidated in Temuli Village of Butuo County, Jiudu Village, and Muer Village of Liangshan Prefecture so as to improve local public health serviceability. Sustainable HIV/AIDS treatment, intervention, caring, and prevention management mode that suits

Liangshan Prefecture should be explored. Attention is also being paid to the exploration of means of intervention in teenagers and prevention of mother-to-child transmission, alleviating the harms to the next generation and reducing the infection rate and case fatality rate of HIV/AIDS.

33.3.8 Prevention and Treatment Models

Sichuan province has drawn on various comprehensive prevention and treatment modes that are suited for Sichuan province through bold exploration and innovation (West China Sichuan University 2007, 2012).

In accordance with the acute situation of drug control and HIV/AIDS prevention, the elimination of drugs, poverty, ignorance, and disease has been closely integrated. Assistance and priority has been given to Liangshan Prefecture for 3 consecutive years. A level-to-level administration and overall linkage mechanism that ranges from Prefecture HIV/AIDS Prevention Office, Prefecture Center for Disease Control and Prevention, Township Center for HIV/AIDS Prevention and Control to health clinics in towns and townships has been improved. The one-to-one management mode of the infected person has been fully applied in Liangshan Prefecture. Township and village groups and community health workers are mobilized to carry out the epidemiological survey, follow-up visit, education, intervention, treatment, caring, and relief among PLWH, constantly improving management of PLWH across Liangshan Prefecture.

To deal with short-term trans-provincial border mobility and contacts, drug abuse, and drug trafficking and sex work, intra-provincial trans-district HIV/AIDS prevention and control coordination mechanisms have been studied. The "Laingshan–Leshan Joint Prevention and Control Mechanism", "Panzhihua–Liangshan Joint Prevention and Control Mechanism" and "South Sichuan Province Joint Prevention and Control Mechanism" are good examples. Meanwhile, in order to promote the idea of joint prevention and control, Sichuan Province has gone beyond its own boundaries and established joint HIV/AIDS prevention and control mechanism with neighboring provinces and cities as well as provinces and cities that PLWH migrant to or come from, such as, "Sichuan–Guizhou Joint Prevention and Control Mechanism", "Sichuan–Chongqing Joint Prevention and Control Mechanism", "Sichuan–Henan Joint Prevention and Control Mechanism", and "Sichuan–Guangdong Joint Prevention and Control Mechanism". It has facilitated the exchange of epidemic information, sharing of peer education personnel, transfer of MMT client services, and mutual recognition of ART patient status, effectively realizing the management of mobile PLWH.

A referral mechanism for public security to transition people who use drugs from mandatory drug rehabilitation centers to MMT clinics was explored. The Supervision Corps of Public Security Department has drafted and issued the "Work program on Strengthening the Construction of Pilot Referral Mechanism between Mandatory Drug Rehabilitation Center and Community Methadone Maintenance Treatment Clinics". The provincial working team has promulgated and issued the "Measures

on Incentive Mechanism and Referral Service of Methadone Maintenance Treatment in Sichuan Province", facilitating the effective referral of people who leave mandatory drug rehabilitation centers to MMT clinics.

A community-level HIV/AIDS prevention and control mode that is based on community/town and township public health service institutions has been explored. In the counties that are hit hard by HIV/AIDS, a community (township, village) medical institution-based chain management mode that combines discovery, follow-up visit, treatment and caring of PLWH has been established. Comprehensive services such as publicity of HIV/AIDS prevention and control in communities, counseling, and intervention of target population, outpatient methadone referral and caring for PLWH have been carried out by community health service institutions, incorporating HIV/AIDS prevention and control in the routine work of community-level medical institutions.

Ways of establishing the long-term mechanism of school health education on HIV/AIDS prevention and control have been explored, namely, "the small hand and the big hand program", a health education pattern that stretches from school to family and then to the community. The students disseminate HIV/AIDS knowledge they have learned in classes to their parents, and at the same time, families expand their influence to the society, to realize the expansion of publicity and education from school to family and from family to society.

33.4 Challenges

Being a populous province with rapid economic development and rich ethnic diversity, Sichuan province has several features that have influenced the spread of HIV. First, HIV risk behaviors are wide-ranging, complex, and unlikely to change significantly for a long time. As a result, the epidemic is likely still on the rise. Second, the number of PLWH is large with rapid growth and complex and diverse composition, which makes the management and service demanding, time-consuming, and difficult. Third, limited resources and human resource capacity, and minority social norms and local cultural differences make responding to the HIV/AIDS epidemic in Sichuan very difficult.

Based on the current status of the HIV/AIDS epidemic in Sichuan, the following strategies might be considered for the future. First, strive to obtain more resources. Advocate and mobilize government at all levels to increase input and make greater effort to gain and integrate resources. Strengthen the flow of funding to ensure that all the work is advanced in a sustainable and forceful manner. Second, improve publicity. Strengthen the education on the harms of HIV/AIDS among the public and make them fully aware so as to raise their prevention consciousness. Intensify education on safe sex among broad ranges of groups (e.g., children, adolescents and young adults, university students, marrying couples, senior adults, key populations). Third, carry out effective management. Fully place the priority of prevention and treatment on communities, villages, and townships. Implement comprehensive prevention and treatment measures to ensure all PLWH enter and remain

in good-quality care. Fourth, block the transmission of HIV. Sexual contact has become the main route of HIV transmission. New HIV prevention strategies, including free condom distribution and pre-exposure prophylaxis (PrEP), need to be considered. Fifth, deliver enduring caring. On the basis of fully implementing "Four Frees and One Care" policy, approaches should be innovated and new rural cooperative medical system should be made use of, to extend care and services, improve adherence to medications. All efforts should be integrated as comprehensive responses in order to reduce the incidence of new HIV infection.

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Guangdong Province: Trade Liberalization and HIV

34

Peng Lin, Yan Li, and Jonas Tillman

Abstract

The Guangdong experience is interesting as a case study, given its role as an economic hub, having attracted both domestic migrant workers, as well as people from abroad ever since the economic reforms of the late 1970s. The first Special Economic Zones were set up in Guangdong, due to its proximity to Hong Kong, most famously in the city of Shenzhen. The region has a prospering manufacturing industry, where both labor-intensive manufacturing products, as well as high-end technology products, are produced and assembled. Trade liberalization and rapid economic growth have also created a booming commercial sex industry and a situation where many economically-marginalized workers are migrating to the region. Here, we document the development of Guangdong's HIV epidemic, which has grown dramatically from 1997 to 2017, and we describe epidemic response efforts in Guangdong over the same period.

34.1 Introduction

Guangdong province is located in southern Mainland China and borders Fujian province to the northeast, Jiangxi and Hunan provinces to the north, Guangxi Zhuang Autonomous Region (hereafter Guangxi) to the west, and Hong Kong and Macau Special Administrative Regions (SARs) to the south.

Guangdong is the most populous province in China. The permanent population was estimated at nearly 112 million at the end of 2017 (8.0% of the total population

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of China), including 86.4 million with local residence permits (known as *hukou*). In 2017, a majority of Guangdong's population was between the ages of 15 and 64 years of age (74.2%) and resided in urban areas (69.9%; Statistics Bureau of Guangdong Province 2017).

Commonly referred to as the "Southern Gate of China," Guangdong has been an important hub for foreign trade for a long time, with the city of Canton (now named Guangzhou) having been the only port that allowed European trade as early as 1760 (Spence 1990). Since the adoption of the "Opening Up and Reform" policy of 1978, three special economic zones, Shenzhen, Zhuhai, and Shantou, have been established in Guangdong. Shenzhen was the first such zone to be created in the People's Republic of China, and also the most well-known. It underwent an incredible amount of economic development due to special economic policies (such as tax benefits), its proximity to Hong Kong, a significant amount of foreign direct investment (FDI), and the almost unlimited availability of temporary and cheap labor (Liang 1999). Guangdong was the province with the highest aggregated gross domestic product (GDP) in China, accounting for 10.9% of China's total GDP in 2017. The disposable annual per capita income in 2017 was 40,975 RMB for urban residents and slightly more than one-third of that for rural residents (Statistics Bureau of Guangdong Province 2017).

This chapter is meant to be an overview of China's HIV epidemic specific to Guangdong province, covering the epidemiology of HIV in the region up to 2017, the way that economic incentives have affected the risk behavior of certain groups, and the types of HIV interventions that have been put in place.

34.2 The HIV Epidemic in Guangdong

34.2.1 Overview of the HIV Epidemic in Guangdong

The first case of HIV infection in Guangdong province, an Argentinian national who was diagnosed with AIDS, was reported in 1986. Three similar cases of imported infections—HIV-positive foreigners entering the country—were identified between 1986 and 1989. The first case of HIV infection in a Guangdong resident was reported in 1990. This individual had just returned from abroad and presumably acquired the infection overseas. From 1990 to 1994, a further 112 cases of imported infections, mostly Guangdong residents, were reported and by the end of this period, 12 of Guangdong's 21 prefectures had at least one HIV case. The most commonly identified transmission route identified by these people living with HIV (PLWH) was heterosexual contact.

The first locally-acquired HIV infections in Guangdong began to be identified in 1995. Although a majority of newly-diagnosed cases of HIV infection continued to report heterosexual contact as their infection route, Guangdong's first HIV infection reported as acquired via drug injection had been identified by 1996. From 1997 to 2007, the HIV epidemic in Guangdong province was in a rapid growth phase, which was characterized by an explosion in HIV prevalence among people who inject drugs (PWID). Although infection via heterosexual contact continued to occur

during this period as well, it was not until 2008, when it regained its position as the most common HIV transmission route in Guangdong. Also in 1998, the first cases of infection via homosexual contact emerged, and thereafter, HIV prevalence began to increase among men who have sex with men (MSM). For the first time, in 2012, the male-male sexual contact route had surpassed the injecting drug use route in terms of transmission event frequency. By the end of 2017, a cumulative 81,641 cases of HIV infection had been reported in Guangdong, among whom 33,993 had progressed to AIDS, and 21,006 had died.

In taking a closer look at the characteristics of the PLWH who were diagnosed in Guangdong province in the two decades between 1997 and 2017, several important observations can be made. Among these 81,586 HIV/AIDS cases, a majority were male (81%), and most were either in their twenties or thirties (60%; Table 34.1). The main routes of transmission were heterosexual contact (55%) and injection drug use (21%). Although, a majority were residents (59%) and a relatively large proportion were not legal permanent residents (41%). Finally, the most densely populated central region of Guangdong had the largest proportion of HIV cases (71%), compared to the western region (20%) and the eastern region (9%; Fig. 34.1).

Table 34.1 Characteristics of PLWH diagnosed in Guangdong province from 1997 to 2017 and in successive 5-year periods

Characteristics	1997–2017 *N* (%)	1997–2002 *N* (%)	2003–2007 *N* (%)	2008–2012 *N* (%)	2013–2017 *N* (%)
Overall	*81,586 (100)*	*1528 (100)*	*9902 (100)*	*24,583 (100)*	*45,573 (100)*
Gender					
Male	66,098 (81.0)	1391 (91.0)	8276 (83.6)	18,596 (75.6)	37,835 (83.0)
Female	15,488 (19.0)	137 (9.0)	1626 (16.4)	5987 (24.4)	7738 (17.0)
Age at diagnosis, years					
<15	525 (0.6)	7 (0.5)	68 (0.7)	248 (1.0)	199 (0.4)
15–19	1924 (2.4)	43 (2.8)	113(1.1)	423 (1.7)	1343 (2.9)
20–29	23,494 (28.8)	794 (52.0)	3445 (34.8)	6476 (26.3)	12,754 (28.0)
30–39	25,061 (30.7)	580 (38.0)	4553 (46.0)	8800 (35.8)	11,117 (24.4)
40–49	14,777 (18.1)	76 (5.0)	1128 (11.4)	4423 (18.0)	9147 (20.1)
≥50	15,853 (19.4)	25 (1.6)	592 (6.0)	4213 (17.1)	11,013 (24.2)
Unknown	7 (<0.1)	3 (0.2)	3 (<0.1)	0 (0.0)	0 (0.0)
Transmission route					
Heterosexual contact	44,899 (55.0)	134 (8.8)	2286 (23.1)	13,860 (56.4)	28,584 (62.7)
Injection drug use	16,711 (20.5)	1300 (85.1)	6615 (66.8)	6232 (25.4)	2559 (5.6)
Homosexual contact	17,306 (21.2)	5 (0.3)	106 (1.1)	3391 (13.8)	13,804 (30.3)
Blood products	401 (0.5)	24 (1.6)	103 (1.0)	267 (1.1)	2 (<0.1)
Mother-to-child	441 (0.5)	2 (0.1)	53 (0.5)	227 (0.9)	159 (0.3)
Not classified	1883 (2.3)	63 (4.1)	739 (7.5)	606 (2.5)	465 (1.0)
Guangdong residency					
Resident	47,900 (58.7)	1325 (86.7)	6996 (70.7)	14,959 (60.9)	24,582 (52.9)
Non-resident	33,293 (40.8)	187 (12.2)	2475 (25.0)	9624 (39.1)	20,991 (46.1)
Unknown	448 (0.5)	16 (1.0)	431 (4.4)	0 (0.0)	0 (0.0)
Region in Guangdong					
Central	57,606 (70.6)	1358 (88.9)	7057 (71.3)	16,918 (68.8)	32,242 (70.7)
West	16,426 (20.1)	115 (7.5)	2354 (23.8)	5632 (22.9)	8324 (18.3)
East	7609 (9.3)	55 (3.6)	491 (5.0)	2033 (8.3)	5007 (11.0)

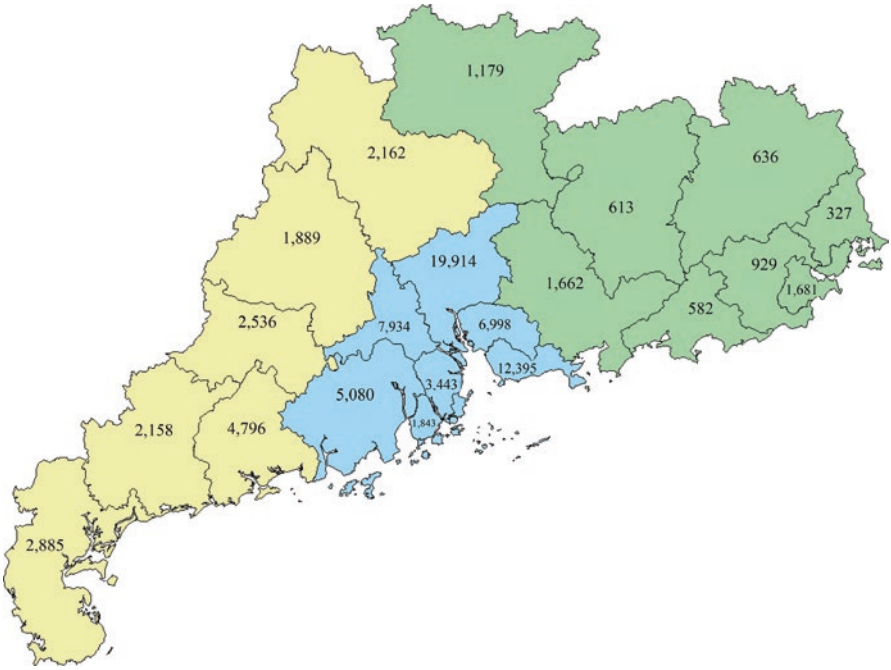

Fig. 34.1 Map illustrating the central (blue), western (yellow), eastern (green) geographical regions within Guangdong province as well as the geographical distribution of the total, cumulative numbers of HIV/AIDS cases reported across the three regions over the period from 1997 to 2017

When the 1997 to 2017 time period is divided into smaller spans of years, some trends are observable. For example, the age profile trended older—half of all PLWH diagnosed between 1997 and 2002 were in their twenties (52%), but only roughly one-quarter of PLWH diagnosed between 2013 and 2017 were (28%), whereas less 2% were in their fifties between 1997 and 2002 and 24% were in their fifties between 2013 and 2017. Similarly, the proportion of PLWH who were non-residents increased over time from 12% in the 1997 to 2002 period to 46% in the 2013 to 2017 period (Table 34.1).

The total numbers of cases identified increased roughly 30-fold from the 1997 to 2002 period ($n = 1528$) to the 2013 to 2017 period ($n = 45{,}573$). In the earlier years, the vast majority of PLWH were men, but prevalence gradually increases among women over time (Table 34.1 and Fig. 34.2). The dramatic increase in HIV cases among men between 2003 and 2005 may be, at least in part, due to HIV testing campaigns that were conducted in detention centers during this time. The dominant transmission route shifted from injection drug use (85%) in the 1997–2002 period

to heterosexual contact (56%) in the 2013–2017 period, with other transmission routes emerging then as well—homosexual contact (30%), and mother-to-child transmission (0.3%; Table 34.1 and Fig. 34.3).

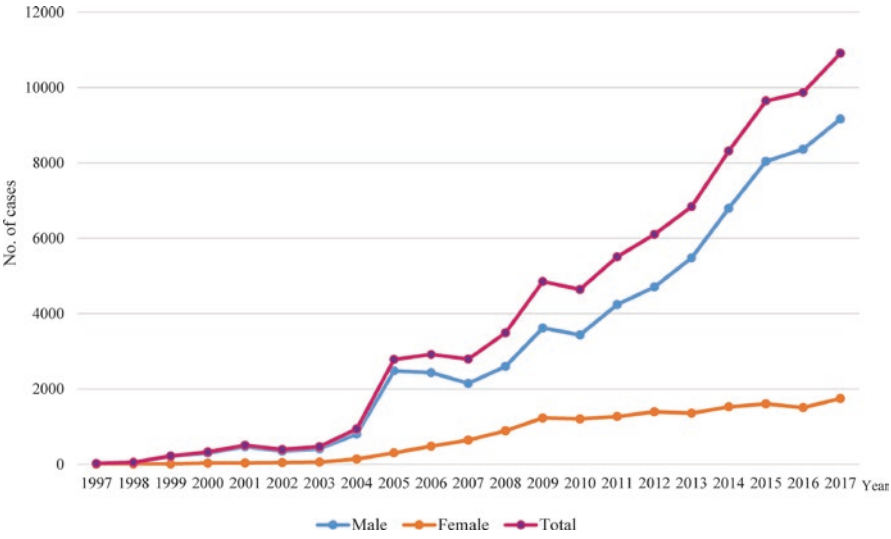

Fig. 34.2 Number of HIV cases reported in Guangdong each year from 1997 to 2017 overall and stratified by sex

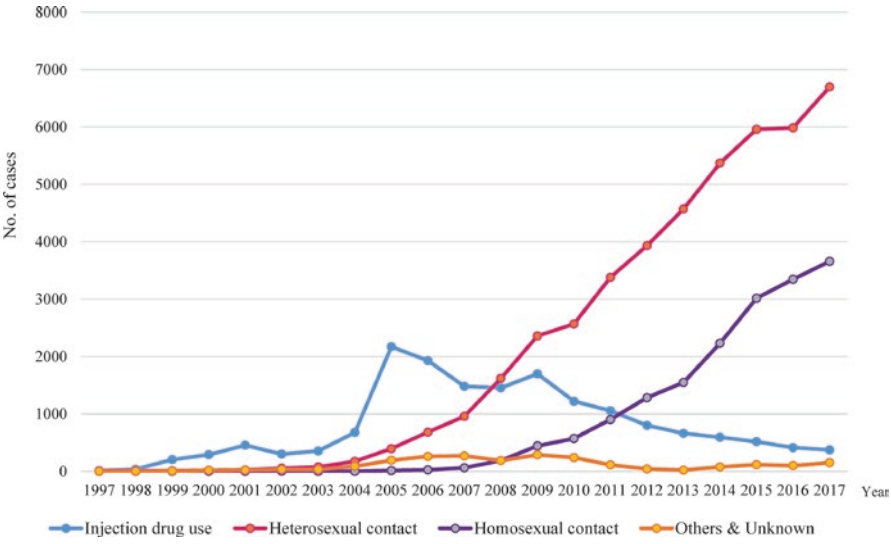

Fig. 34.3 Number of HIV cases reported in Guangdong each year from 1997 to 2017 by transmission route

34.2.2 Overview of the HIV Response

34.2.2.1 Case Reporting

A mandatory HIV reporting system has been in place in China since 1985, whereby all cases of HIV infection are required to be reported to the local Center for Disease Control and Prevention (CDC) by the medical facility making the diagnosis. Case reports were escalated from local to provincial, and then ultimately to national level CDC personnel, using a paper card system. In 2008, a new, real-time, web-based data system, which contained case reporting, was launched and replaced the earlier paper-based system. This new data system is called the National HIV/AIDS Comprehensive Response Information Management System (CRIMS). Guangdong participated in the development and pilot testing of this new system (see Chap. 24 for more information).

34.2.2.2 Funding

In 2003, the Chinese government officially recognized its HIV epidemic and launched its "Four Frees One Care" policy, which marked a major turning point in China's HIV response (see Chaps. 1 and 25 for more information).

Later that same year, the provincial government of Guangdong organized the first provincial-level funds devoted to HIV control and prevention. These funds amounted to ten million RMB annually and were later increased to 30 million RMB annually beginning in 2011. The primary purpose was to ensure sufficient financial backing for the strengthening of HIV surveillance in the region. In 2004, the HIV Prevention and Control Committee of Guangdong Province was established. The committee included more than 30 government departments and covered several of the prefectures in Guangdong that, at that time, had high HIV prevalence.

34.2.2.3 Sentinel Surveillance

China's nationwide sentinel surveillance system was launched in 1992 (see Chap. 2 for more information).

In Guangdong province, specifically, sentinel surveillance began a few years later in 1995 and by 1996 three sites were operating, one for PWID, one for female sex workers (FSW), and one for attendees of sexually-transmitted infection (STI) clinics. This network grew over the years such that by the end of 2017, there were 119 sentinel surveillance sites in Guangdong alone, covering several different key, high-risk populations (Table 34.2).

34.2.2.4 Testing

HIV voluntary counseling and testing (VCT) services have been provided at all levels of the CDC system in Guangdong (provincial, prefectural, and county) and in some other medical facilities (e.g., hospitals). Provider-initiated testing and counseling (PITC) has also been scaled up in various types of medical facilities. Furthermore, some epidemiologic surveys and studies have been conducted in the province. To keep up with the demand for HIV testing services, the number of HIV testing laboratories has increased rapidly across health and public health facilities at

Table 34.2 HIV sentinel surveillance sites among high-risk populations in Guangdong, 1995–2017

Population	1995–1996	1997–1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010–2017
Overall	*3*	*13*	*23*	*37*	*38*	*41*	*39*	*68*	*72*	*64*	*64*	*46*	*88*	*119*
STI clinic attendees	1	8	10	13	14	15	15	15	15	16	16	16	21	19
FSW	1	2	3	4	4	4	4	4	6	4	4	4	20	27
PWID	1	3	8	18	18	19	17	46	48	40	40	40	40	39
Pregnant women	0	0	2	2	2	3	3	3	3	3	3	3	3	19
MSM	0	0	0	0	0	0	0	0	0	1	1	1	3	6
Students	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Migrant men	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Blood donors	0	0	0	0	0	0	0	0	0	0	0	0	0	1

provincial, prefectural, and county levels. In 2017, Guangdong province had one provincial-level HIV confirmatory testing center, 37 HIV confirmatory testing laboratories, and more than 1814 HIV screening laboratories and rapid testing sites. In 2017 alone, more than 13 million HIV tests were conducted in Guangdong province (see Chaps. 5 and 12 for more information).

34.2.2.5 Treatment

Although free antiretroviral therapy (ART) for PLWH was launched in 2003 in Guangdong province, only one Guangzhou patient received free ART that year. In 2004, 65 AIDS patients in Guangdong received free ART. ART was only available in three Guangdong prefectures in 2004 but had expanded to all 21 prefectures by 2013. As of the end of 2017, a cumulative 53,639 PLWH in Guangdong had received free ART, with 44,190 still in treatment (see Chap. 13 for more information).

34.3 HIV and High-Risk Groups

34.3.1 Drug Users

34.3.1.1 Characteristics of PLWH Who Are Drug Users

Guangdong province has the highest number of registered drug users in China. In 2017, there were more than 677,255 drug users, more than 26% of the national total. From 1997 to 2017, a total of 16,134 HIV cases in Guangdong province were reported to have been acquired via injection drug use (Table 34.3).

Table 34.3 Characteristics of HIV-positive PWID diagnosed in Guangdong province from 1997 to 2017 and in successive 5-year periods

Characteristics	1997–2017 *N* (%)	1997–2002 *N* (%)	2003–2007 *N* (%)	2008–2012 *N* (%)	2013–2017 *N* (%)
Overall	*16,134 (100)*	*1296 (100)*	*6521 (100)*	*5920 (100)*	*2397 (100)*
Gender					
Male	15,182 (94.1)	1230 (94.9)	6187 (94.9)	5557 (93.9)	2208 (92.1)
Female	952 (5.9)	66 (5.1)	334 (5.1)	363 (6.1)	189 (7.9)
Age at diagnosis, years					
<15	5 (<0.1)	3 (0.2)	1 (<0.1)	1 (<0.1)	0 (0.0)
15–19	179 (1.1)	39 (3.0)	52 (0.8)	57 (1.0)	31 (1.3)
20–29	4700 (29.1)	700 (54.0)	2348 (36.0)	1264 (21.4)	388 (16.2)
30–39	7960 (49.3)	501 (38.7)	3358 (51.5)	3205 (54.1)	896 (37.4)
40–49	2852 (17.7)	47(3.6)	696 (10.7)	1225 (20.7)	884 (36.9)
≥50	439 (2.7)	5 (0.4)	66 (1.0)	168 (2.8)	198 (8.3)
Unknown	1 (<0.1)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
Guangdong residency					
Resident	11,574 (71.7)	1156 (89.2)	5011 (76.8)	4001 (67.6)	1406 (58.7)
Non-resident	4543 (28.2)	125 (9.6)	1508 (23.1)	1919 (32.4)	991 (41.3)
Unknown	17 (0.1)	15 (1.2)	2 (<0.1)	0 (0.0)	0 (0.0)
Region					
Central	11,261 (69.8)	1183 (91.3)	4619 (70.8)	3818 (64.5)	1641 (68.5)
West	4134 (25.6)	97 (7.5)	1675 (25.7)	1790 (30.2)	572 (23.9)
East	739 (4.6)	16 (1.2)	227 (3.5)	312 (5.3)	184 (7.7)

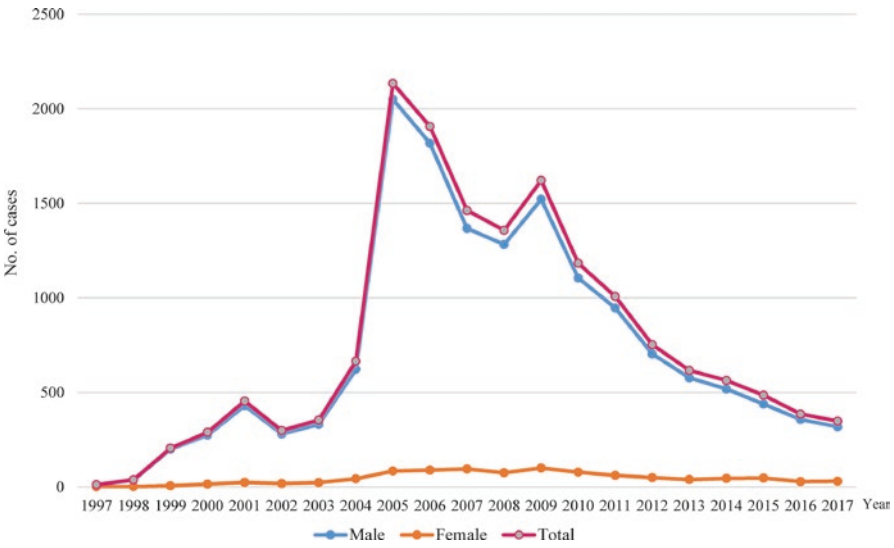

Fig. 34.4 Number of HIV cases among PWID reported annually in Guangdong province from 1997 to 2017 overall and stratified by sex

Overall, a majority of HIV-infected PWID in Guangdong from 1997 to 2017 were male (94%), 30–39 years of age (49%), legal permanent residents of Guangdong province (72%), and were diagnosed in the densely-populated central region of the province (70%). Changes over time among the PWID who were found to be HIV-positive mirrored that of the broader population of PLWH in Guangdong—larger proportions of the population were older, non-residents, and diagnosed in the western region in more recent years. Also, although overall a much greater number of HIV-infected PWID were male, a slow increase in HIV cases among female PWID was observed in the early 2000s, and then a slow decline in more recent years (Table 34.3 and Fig. 34.4).

34.3.1.2 Sentinel Surveillance Among Drug Users

The first HIV sentinel surveillance site among drug users in Guangdong province was launched at a detoxification center in 1995. The number of sites grew over time to a total of 38 sites by the end of 2017. In line with national guidelines, a convenience sampling method has been used to conduct serological surveys and high-risk behavioral surveys among drug users newly admitted to Guangdong's detoxification centers on an annual or biannual basis. Target sample size has generally been 200–400 individuals per site, although sample sizes sometimes, at some sites, surpassed 400.

Sentinel surveillance data from sites targeting drug users in Guangdong province from 2000 to 2017 indicate that peak HIV prevalence occurred between 2003 and 2005. HIV prevalence among drug users has since remained relatively low—estimated to be less than 2% (Fig. 34.5).

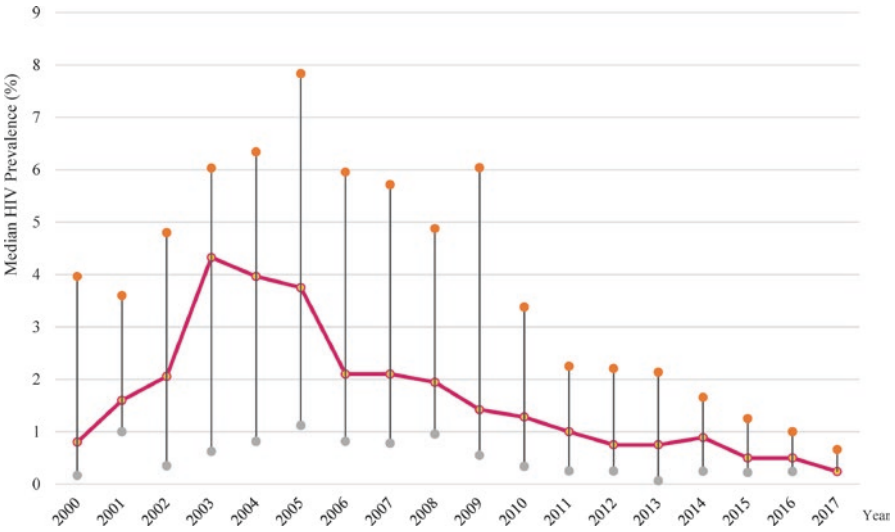

Fig. 34.5 Median HIV prevalence at sentinel surveillance sites targeting drug users in Guangdong province from 2000 to 2017. Vertical bars represent the inter-quartile range

However, since all the sentinel surveillance sites for drug users in Guangdong province have been in detention centers, samples may not be generalizable to the broader drug using population of Guangdong. Results from a 2008 study in Guangdong provide evidence that the HIV prevalence among community-based drug users (i.e., not in detoxification centers) was significantly higher (8%) compared to those in detention centers (4%; Lin et al. 2013).

34.3.1.3 Harm Reduction Programs for Drug Users

To reduce the transmission of HIV through unsafe drug injection practices, both methadone maintenance treatment (MMT) and needle and syringe exchange programs (NSEP) were established. As a part of China's National MMT Program, the first MMT clinic in Guangdong province was established at the end of 2005 and began treating opioid users in 2006. By the end of 2017, the number of MMT clinics in Guangdong had increased to 66, and the total cumulative number of clients treated at these clinics had reached nearly 36,000 (see Chap. 9 for more information).

China's National NSEP was launched in 2001, and the first two sites in Guangdong province were opened in 2005. A total of 106 sites have since been established as of the end of 2017 across 16 counties in six prefectures. In 2017, Guangdong province's NSEP sites had covered an average of 19,613 PWID every month and nearly 350,000 syringes had been distributed and almost 290,000 had been returned (see Chap. 10 for more information).

34.3.2 Female Sex Workers (FSW)

34.3.2.1 Resurgence of the Sex Industry

The Chinese Government crackdown on so-called "social evils" in 1949 led to a dramatic decline in the sex trade, with no official records of commercial sex workers in the decades following. However, Guangdong province was the first region to adopt market economy-oriented reforms and liberalized trade policies, which drew in a large number of people seeking to conduct business in the region. Thus, Guangdong has been a hub of domestic and foreign trade and a magnet for domestic migration as well as foreign immigration. These conditions made Guangdong ripe for the development of active sex trade.

Since the late 1970s, the number of individuals involved in commercial sex has increased rapidly. The earliest record of commercial sex work in Guangdong province after the Mao Era was the arrest records of 49 sex workers and their clients by police in 1979. Today, Guangdong is estimated to have the largest number of FSW in China. Dongguan, a key industrial city located in the Pearl River Delta, is known as the "factory of the world," but has also earned a reputation for being the "sex capital of China."

Since commercial sex remains illegal in China, albeit tolerated to some extent on local levels, venues, where transactions and agreements are made, tend to be hidden, and prostitution is often conducted indirectly in the course of other business at clubs, bars, tea shops, beauty salons, and hotels. The number of five-star hotels in Dongguan ranks third in the country after Beijing and Shanghai, and there are more than 1000 licensed hotels in the city, many which facilitate prostitution.

A 2005 study conducted in one Guangdong county estimated that FSW made up somewhere between 0.7% and 1.0% of the entire adult female population, and between 2.8% to 3.7% of the adult female population in the urban areas of the county (Li et al. 2006). Surveys in the early-2000s indicate that about one-third of men returning to Hong Kong from Mainland China reported having had sex with FSW in China in the last 6 months, one-third of whom did not use condoms (Lau and Thomas 2001). In a recent study conducted in two cities in Guangdong (Dongguan and Foshan), only 49% of the clients of FSW reported using condoms during sexual contact with FSW (Zhao et al. 2018).

34.3.2.2 Sentinel Surveillance Among FSW

The first HIV sentinel surveillance site for FSW in Guangdong province was established in 1995. By 2012, the number of sites had increased to 27. At first, these were associated with detention centers, and thus, like sites for drug users, only examined the incarcerated portion of this key population. Over time, surveillance was transitioned to more community-based sites, and starting in 2010, all sentinel surveillance sites targeting the FSW population in Guangdong were community-based.

In 2017, FSW with HIV infection were found at 8 of the 27 sites. The highest HIV prevalence observed at a single site was 1.5%. However, syphilis infection was

Table 34.4 HIV prevalence among FSW in Guangdong overall, and at the original three sentinel surveillance sites in Guangdong from 1997 to 2017

	Guangdong province overall			HIV prevalence (%)		
Year	Total tested *N*	HIV-positive *N*	HIV prevalence %	Guangzhou only	Shenzhen only	Zhuhai only
1997	1823	0	0	0	0	0
1998	1150	2	0.17	0.31	0	0
1999	1600	4	0.25	0.78	0	0
2000	1199	13	1.08	2.21	0	0
2001	1123	12	1.07	2.27	0	0
2002	1262	19	1.51	1.60	1.74	0.82
2003	1273	17	1.34	1.68	0.58	1.56
2004	1229	5	0.41	0.94	0	0.30
2005	507	2	0.39	0	0	0.72
2006	626	5	0.80	1.66	0	2.25
2007	651	2	0.31	0	0	1.68
2008	607	1	0.16	0	0	1.06
2009	5646	10	0.18	0.20	0	0
2010	9537	7	0.07	0.12	0.23	0.25
2011	10,899	13	0.12	0	0	0.25
2012	11,153	11	0.1	0	0	0
2013	11,505	5	0.04	0.12	0	0
2014	10,186	5	0.05	<0.01	<0.01	<0.01
2015	11,245	6	0.05	0.12	<0.01	0.25
2016	11,404	10	0.09	0.12	0	0
2017	11,275	19	0.17	<0.01	<0.01	<0.01

diagnosed among FSW at 26 of 27 sites, and a syphilis prevalence ranging from 0.0% to 7.2% was found. Median syphilis prevalence among FSW tested at sentinel surveillance sites in 2017 was 0.9% (inter-quartile range [IQR]: 0.5–0.9%).

In an attempt to exclude the possible effect of the increasing number of sentinel surveillance sites for FSW on changes in HIV prevalence over time, annual results from only the original three sites were tabulated (Table 34.4). The results show that the HIV prevalence has been at a stable, low level since 2008. One possible explanation for the higher prevalence estimates in 2007 and prior may be the differences between samples drawn from detention centers versus communities. In general, low-fee FSW in China face a higher risk of incarceration due to their relatively greater exposure—they are not conducting business from inside a venue and do not have the protection of a venue owner and other FSW. Furthermore, evidence indicates that low-fee FSW tend to have higher HIV prevalence due in large part to their reduced ability to negotiate condom use because of economic pressures and vulnerability to client violence. The higher HIV prevalence in earlier years when samples were taken from detention centers is therefore not surprising.

Research has supported the sentinel surveillance findings of low overall HIV prevalence among FSW in Guangdong. For example, in a study using respondent-driven sampling to recruit FSW in the community in Zhaoqing prefecture in 2006, zero of the 320 participants recruited were found to have HIV infection. However,

the same study found the prevalence of syphilis, gonorrhea, and chlamydia to be high (8.0%, 9.5%, and 3.9%, respectively), indicating a high frequency of risky sexual behavior in the sample (Li et al. 2010). Another study conducted in Jiangmen showed that the HIV prevalence among FSW in high-, middle- and low-fee settings was 0.14%, 0.23%, and 1.53%, respectively (Zhang and Huang 2012). A study conducted among low- and mid-tier FSW found an HIV prevalence of 0.3%, a syphilis prevalence of 5%, and a herpes simplex 2 virus (HSV-2) prevalence of 31% (Fu et al. 2014). In another study conducted in Guangzhou, no HIV infection was found among high- and mid-tier FSW sampled but found a 2.63% HIV prevalence among low-tier FSW participants (Li et al. 2016). This study also reported that street-based FSW tended to have lower levels of education, to be supporting their families, to charge less for their services, and to remain in the commercial sex industry for a longer time, compared to establishment-based FSW. Also, the proportion of low-fee FSW consistently using condoms with clients and with regular, non-commercial partners was lower than for the mid- and high-fee FSW. The prevalence of syphilis, gonorrhea, and chlamydia was also higher among street-based FSW (Li et al. 2012). Finally, a cross-sectional study conducted in three cities in Guangdong found an HIV prevalence of 0.6% among FSW (Shen et al. 2016) (see Chaps. 3 and 7 for more information).

34.3.2.3 Harm Reduction for FSW

To reduce the transmission of HIV through sexual contact, behavioral intervention programs, particularly condom use promotion programs, were conducted. In 2004, behavioral intervention groups had been established at all levels of the CDC system. Outreach and peer education programs were conducted among street-based and establishment-based FSW. Some of these programs were developed and run by CDC personnel and some by civil society organizations, both non-government organizations (NGOs) and community-based organizations (CBOs). In 2017, these programs covered an average of roughly 24,000 FSW per month, and a total of 83,319 FSW were tested for HIV in that year.

34.3.3 Patients with Other Sexually-Transmitted Infections (STIs)

34.3.3.1 A Dramatic Increase in STI Incidence

With the resurgence of the sex industry in China, STI prevalence has increased dramatically. Guangdong is one of the provinces with the highest rates of STIs in all of China. In 1995, the combined incidence of eight different sexually transmitted infections was over 128 cases per 100,000 residents, the highest incidence measured in any Chinese province (Gong et al. 2002). According to government statistics, the incidence of syphilis increased nearly every year from 1995 to 2010. The average year-over-year increase was an alarming 38%. Syphilis incidence increased from 1.8 per 100,000 residents in 1995 to over 47 per 100,000 residents in 2010 (Tucker and Cohen 2011). From 1977 to 1993, the average annual incidence of gonorrhea was 34 diagnosed cases per 100,000 residents, ranking second highest in China at

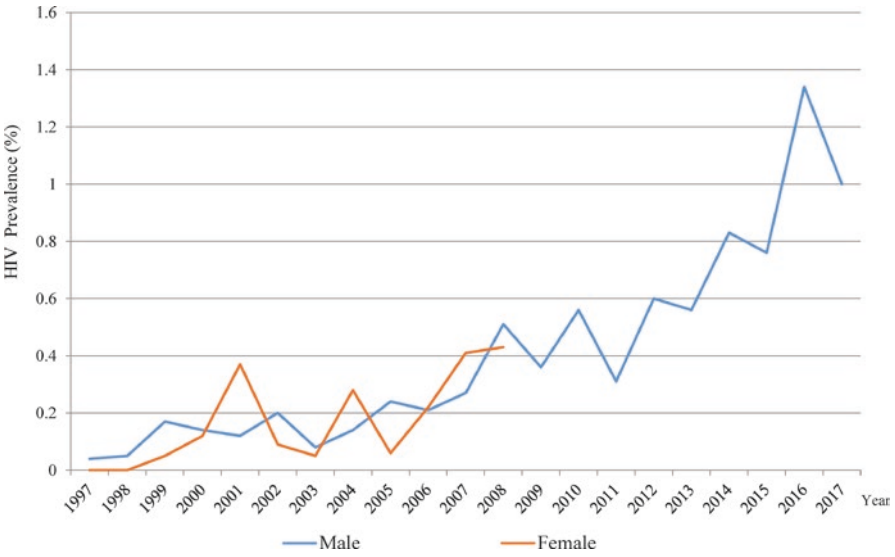

Fig. 34.6 Annual sentinel surveillance estimates of HIV prevalence among male and female STI clinic attendees in Guangdong province from 1997 to 2017

that time (Song et al. 1995). However, gonorrhea incidence has since decreased from 55 per 100,000 residents in 1995 to 19 per 100,000 residents in 2010 (Wang et al. 2013) (see Chap. 3 for more information).

34.3.3.2 Sentinel Surveillance for STI Outpatients

By 2012, HIV sentinel surveillance sites targeting STI clinic attendees had been set up in all 19 prefectural cities, except Heyuan and Shanwei. HIV prevalence based on sentinel surveillance data for this key population from 1997 to 2017 shows an overall upward trend among both males and females (Fig. 34.6), which may be a reflection of the generally high prevalence of high-risk sexual behavior among this group.

Several studies conducted among STI clinic outpatients in Guangdong have shown a similar increasing trend in HIV prevalence within this population. A survey of STI outpatients in Jiangmen found that HIV prevalence increased from 0% to 1.3% over the period from 2003 to 2007 (Tan et al. 2008). A survey of STI outpatients in Dongguan found that HIV prevalence increased from 0.5% to 3% over the period from 2010 to 2016 (Deng and Liu 2018). For the male subpopulation HIV prevalence increased gradually from 0.5% in 2008 to 2% in 2012 in the same area (Zhang et al. 2013). A study conducted in Shantou in eastern Guangdong found that HIV prevalence among STI outpatients had also increased from 0.04% in 2004 to 0.26% in 2011 (Fang et al. 2012). A cross-sectional study conducted in three cities in Guangdong reported HIV prevalence among male STI patients to be 3.3% (Zhao et al. 2016). Finally, in a recent study in two Guangdong cities, prevalence of HIV among FSW STI clinic attendees was found to be over 4% (Zhao et al. 2018) (see Chap. 3 for more information).

34.3.3.3 Harm Reduction for STI Clinic Attendees

In an effort to reduce the transmission of HIV through sexual contact, behavioral intervention programs, including health education campaigns and condom use promotion programs, were conducted among STI clinic attendees. HIV PITC was also scaled up in STI clinics. The number of HIV tests provided to STI clinic attendees in Guangdong province increased from 69,930 in 2011 to 380,642 in 2017 (see Chaps. 11 and 12 for more information).

34.3.4 Men Who Have Sex with Men (MSM)

34.3.4.1 HIV on the Rise Among MSM

Although the first case of HIV identified in the MSM community in Guangdong was reported in 1998, HIV prevalence among this key high-risk group did not begin to climb until about 10 years later, in 2008. From 2008 to 2017, a sharp increase in the annual number of newly identified cases among MSM has been observed (Fig. 34.7). As of the end of 2017, a cumulative total of 17,306 HIV/AIDS cases among MSM in Guangdong had been identified.

Due to enduring stigma and discrimination against MSM in China, it is thought that many MSM diagnosed with HIV report their route of transmission as heterosexual contact, blood transfusion, or unknown, resulting in underestimation of the true HIV prevalence among this group. Furthermore, many have never before received HIV testing due to concerns over privacy and confidentiality as well as other important barriers. Therefore, it is likely that many MSM have HIV infection and still do not know their status, further causing underestimation of the HIV

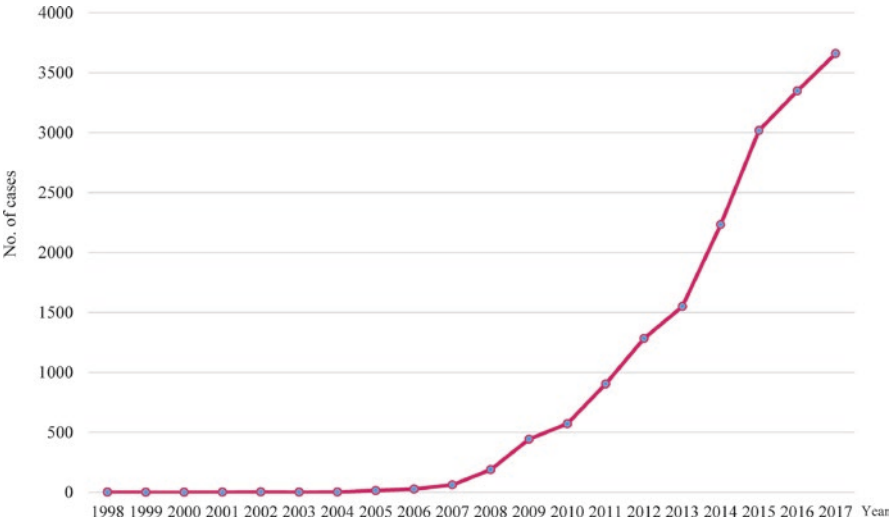

Fig. 34.7 Annual number of HIV cases among MSM in Guangdong province, 1998–2017

Table 34.5 HIV prevalence among MSM based on sentinel surveillance data in Guangdong, 2002–2017

Year	Guangzhou %	Shenzhen %	Foshan %	Zhongshan %	Dongguan %	Jiangmen %	Zhanjiang %	Zhuhai %
2002	–	0.91	–	–	–	–	–	–
2003	1.71	–	–	–	–	–	–	–
2004	–	1.53	–	–	–	–	–	–
2005	0.74	1.67	–	–	–	–	–	–
2006	1.71	2.48	–	–	–	–	–	–
2007	–	3.90	–	–	–	–	–	–
2008	5.20	7.90	–	–	–	–	–	–
2009	4.00	5.80	2.90	–	–	–	–	–
2010	7.29	11.19	9.52	10.00	10.50	–	–	–
2011	9.25	13.00	10.20	12.60	11.30	6.80	–	–
2012	10.00	12.30	13.10	15.70	22.90	7.40	–	–
2013	10.94	10.80	12.72	11.93	17.56	6.65	–	–
2014	12.34	12.17	12.21	12.35	17.25	7.30	6.57	–
2015	11.00	9.00	13.83	12.00	14.73	5.67	5.71	8.13
2016	8.75	7.75	13.23	15.60	12.98	5.99	8.17	9.45
2017	3.76	8.25	12.26	13.20	11.54	6.98	3.08	7.39

epidemic among MSM in Guangdong. Nevertheless, the steep increase in cases that are reported is cause for serious concern.

Since MSM tend to be "hidden" because of persistent stigma and discrimination, epidemiological survey data have historically been somewhat scarce. However, as of 2017, a total of eight sentinel surveillance sites existed among MSM in the Pearl River Delta area. Surveys and reports from these sentinel sites suggest that HIV prevalence among MSM has been increasing substantially (Table 34.5 and Fig. 34.8).

A study among MSM in Shenzhen showed that HIV prevalence increased from 1.7% in 2005 to 9% in 2015 (Cai et al. 2017). Another study also conducted in Shenzhen, found HIV prevalence among MSM to be12% (Cai et al. 2017). A similar study conducted in Guangzhou, targeting the MSM who used HIV self-testing, found HIV prevalence among this subgroup to be 4.5% (Zhong et al. 2017). However, the lack of data from the eastern and western parts of the province leaves the spread of the epidemic for MSM in these areas largely unmapped.

34.3.4.2 The Response and the Epidemiological Situation for MSM

To reduce transmission of HIV through male-male sexual contact, behavioral intervention programs, particularly condom use promotion and testing campaigns, have been conducted. However, this population has been difficult to reach via government-driven intervention programs. CBO- and NGO-led interventions for MSM have only been available in Guangzhou and Shenzhen prior to 2008. After 2008, more and more NGOs have been involved in intervention programs targeting MSM. In 2017, of 216,270 MSM were covered by intervention programs and a total of nearly 42,000 were tested for HIV. However, most of the intervention programs were conducted in the Pearl River Delta Region and some of the western cities including

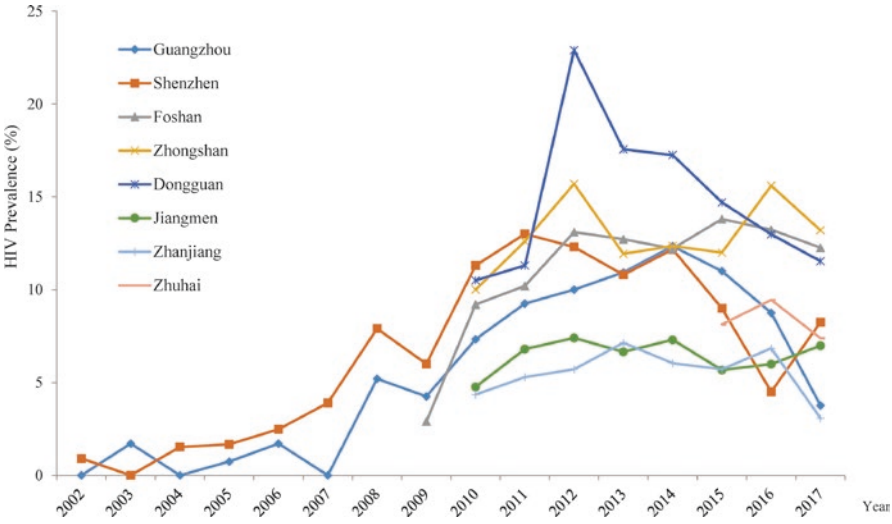

Fig. 34.8 HIV prevalence among MSM based on sentinel surveillance data from eight Guangdong cities, 2002–2017

Zhanjiang and Yunfu, and coverage of HIV prevention interventions for MSM in eastern Guangdong is very poor (see Chap. 8 for more information).

34.3.5 Women

34.3.5.1 HIV Case Reports Among Women

From 1997 to 2017, a total of 15,488 newly diagnosed HIV cases were reported among females in Guangdong province. Overall, newly diagnosed female PLWH tended to be in their 20s or 30s (57%), residents of Guangdong (62%), and reside in the central region of the province (63%; Table 34.6). Over time, newly-diagnosed female PLWH tended to be older—only 2% were 50 years of age or older from 1997 to 2002, whereas 30% were 50 or older from 2013 to 2017. Furthermore, over the years, larger and larger proportions of female FSW were non-residents of Guangdong. Overall, the most common mode of transmission was heterosexual contact, with a notable exception—from 1999 to 2001 the most common mode of transmission was injection drug use (Table 34.6 and Fig. 34.9). In 2017, more than 90% of HIV cases among females were acquired via heterosexual contact (see Chap. 7 for more information).

34.3.5.2 HIV Surveillance Among Pregnant Women

HIV sentinel surveillance sampling pregnant women was initiated in 1999 in Guangzhou and Dongguan, and in Jiangmen in 2002. By 2010, the number of sentinel sites among pregnant women increased from these 3 to a total of 19. The aggregated

Table 34.6 Characteristics of HIV-positive women diagnosed in Guangdong province from 1997 to 2017 and in successive 5-year periods

Characteristics	1997–2017 *N* (%)	1997–2002 *N* (%)	2003–2007 *N* (%)	2008–2012 *N* (%)	2013–2017 *N* (%)
Age at diagnosis, years					
<15	233 (1.5)	2 (1.5)	30 (1.8)	116 (1.9)	85 (1.1)
15–19	417 (2.7)	4 (2.9)	41 (2.5)	169 (2.8)	203 (2.6)
20–29	4479 (28.9)	83 (60.6)	721 (44.3)	2025 (33.8)	1650 (21.3)
30–39	4318 (27.9)	40 (29.2)	587 (36.1)	1874 (31.3)	1817 (23.5)
40–49	2700 (17.4)	3 (2.2)	132 (8.1)	899 (15.0)	1666 (21.5)
≥50	3339 (21.6)	3 (2.2)	115 (7.1)	904 (15.1)	2317 (29.9)
Unknown	2 (<0.1)	2 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)
Transmission route					
Heterosexual contact	13,617 (87.9)	47 (34.3)	1066 (65.6)	5173 (86.4)	7331 (94.7)
Injection drug use	1055 (6.8)	68 (49.6)	355 (21.8)	422 (7.0)	210 (2.7)
Blood products	146 (0.9)	8 (5.8)	32 (2.0)	106 (1.8)	0 (0.0)
Mother-to-child	206 (1.3)	0 (0.0)	26 (1.6)	111 (1.9)	69 (0.9)
Not classified	464 (3.0)	14 (10.2)	147 (9.0)	175 (2.9)	128 (1.7)
Guangdong residency					
Resident	9664 (62.4)	97 (70.8)	1057 (65.0)	3859 (64.5)	4651 (60.1)
Non-resident	5744 (37.1)	38 (27.7)	491 (30.2)	2128 (35.5)	3087 (39.9)
Unknown	80 (0.5)	2 (1.5)	78 (4.8)	0 (0.0)	0 (0.0)
Region in Guangdong					
Central	9751 (63.0)	117 (85.4)	1220 (75.0)	3779 (63.1)	4635 (59.9)
West	1640 (10.6)	12 (8.8)	93 (5.7)	560 (9.4)	975 (12.6)
East	4097 (26.5)	8 (5.8)	313 (19.2)	1648 (27.5)	2128 (27.5)

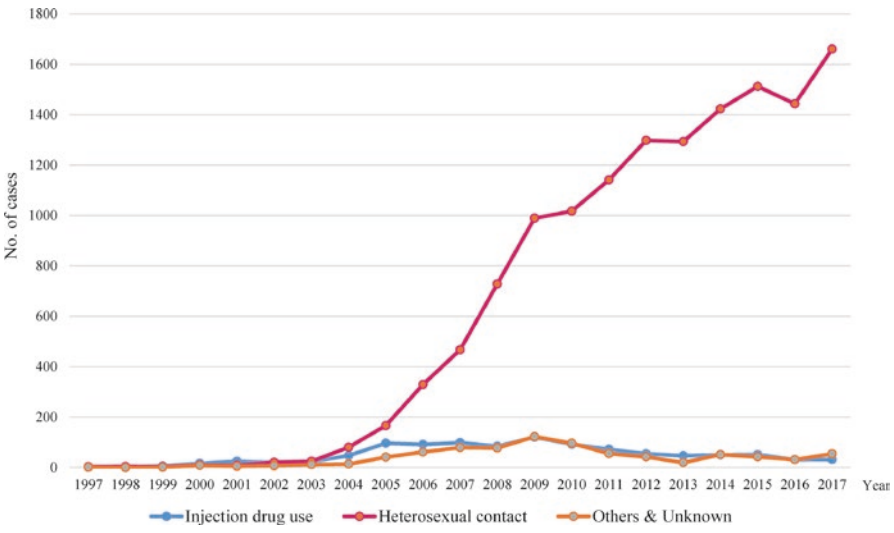

Fig. 34.9 HIV prevalence among women in Guangdong stratified by transmission route, 1997–2017

HIV prevalence among pregnant women tested at these sites was lower than 0.1% throughout the period. In 2017, HIV infections were detected in three of the 19 sentinel sites, with the highest prevalence observed to be 0.3% at one site.

34.3.5.3 The Syphilis Epidemic Among Women

As the presence of syphilis infection both increases the susceptibility and transmissibility of HIV infection, the dramatic rise in syphilis incidence and prevalence among women in China is a serious issue. A study conducted in six Guangdong cities in 2004 and 2005 showed that the prevalence of syphilis among pregnant women across 23 hospitals ranged from 0.4% to 0.9% (Chen et al. 2006). Another study found that latent syphilis incidence among women of childbearing age (15–49) in Guangdong province increased from 17.4 per 100,000 residents in 2005 to 48.8 per 100,000 in 2010 (Ren et al. 2012). Finally, a study of Guangdong's cities from 2012 to 2013 found that 3,281,321 (93%) pregnant women had received HIV testing and 2,918,914 (83%) had received syphilis testing, and that the prevalence of HIV and syphilis were 1.8 per 100,000 and 14.2 per 100,000, respectively (Tang et al. 2015) (see Chap. 3 for more information).

34.3.5.4 Response to HIV Among Women

A prevention of mother-to-child transmission (PMTCT) intervention program was initiated in 2004, initially covering three counties. It expanded to cover all counties by 2017, providing free screening for pregnant women and intervention for those who were diagnosed with HIV infection. However, in counties not covered by the program, women often paid for the testing. In total, over 99.8% of the pregnant women in Guangdong province were screened for HIV in 2017 (see Chap. 15 for more information).

34.3.6 The Migrant Population

34.3.6.1 Migrants Are at High Risk and Vulnerable

Guangdong is the most populous province with the largest migrant population in China. This floating population in Guangdong has been estimated at above 30 million. A majority of male migrant workers are employed in industry and construction, while most female migrant workers are employed in industry and service establishments such as hotels, restaurants, and entertainment venues. Studies have shown that the migrant population tends to have lower educational attainment, lower income, and lower access to health services compared to permanent residents who hold a *hukou*.

Most migrants are sexually active and are vulnerable to HIV and other STIs. A study in Guangdong found that the HIV awareness rate among the migrant population was only 49%, that 8% of the participants had extramarital sex in the last year and that only 72% of them used condoms in their most recent extramarital sexual

contact (Liu et al. 2009). A study in Foshan city showed that HIV awareness and risk behavior varied for different occupations among the migrant population. HIV awareness was particularly low among workers in the entertainment, restaurant, and construction industries. The study also showed that 31% had engaged in commercial sex and 9% reported non-commercial casual sex in the last year (Chen et al. 2011). A similar study conducted in Shenzhen found that 4% of surveyed migrants had taken part in commercial sex and only 36% of them reported consistent condom use (Sun et al. 2017).

An exaggerated vulnerability is experienced by individuals in dual-risk populations, such as migrants who are MSM. In a study of migration patterns among MSM, Guangdong had the highest migrant inflow ratios—migrant MSM were moving into Guangdong from areas of higher HIV prevalence among the broader MSM population (Mi et al. 2016). A study conducted in Guangzhou showed that migrant MSM, compared to local MSM, have higher odds of reporting unprotected anal intercourse, having multiple male sexual partners, and lower rates of condom use (Wu et al. 2016).

34.3.6.2 Surveillance Among Migrant Workers

Because migrants were significantly over-represented among HIV case reports, six sentinel surveillance sites were set up in the Pearl River Delta region, where the migrant population is most concentrated, beginning in 2010. The annual HIV prevalence among migrants sampled at the six sites overall was 0.04%, 0.14%, 0.12%, 0.08%, 0.17%, 0.04%, 0.04%, and 0.17% in the years from 2010 to 2017, respectively.

A cross-sectional study in Zhuhai found that 75% of PLWH were migrants (Li et al. 2018). A similar study in Dongguan found that the proportion of migrants among PLWH rose from 52% in 2010 to 71% in 2015 (Li et al. 2016). A study conducted in Zhongshan in 2010 estimated an HIV prevalence of 0.13% among the migrant population (Tan et al. 2011). A cross-sectional study conducted in three medium-sized Guangdong cities with large floating populations found the prevalence of HIV and syphilis were 0.17% and 1.31%, respectively (Fu et al. 2013).

34.4 Conclusion

With sudden and rapid trade liberalization and economic development as a backdrop, China's HIV epidemic has taken a somewhat unique course in Guangdong province. Although slow to get started, with only 500 cases identified cumulatively as of 2003, HIV prevalence increased rapidly, particularly among high-risk groups. Guangdong must redouble its efforts in prevention and expand testing, treatment, and care if it is to bring its HIV epidemic under control.

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Challenges and Future Directions

35

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Abstract

China has made remarkable achievements in advancing its HIV/AIDS prevention and treatment programs. Infrastructure for surveillance, laboratory testing, voluntary counseling and testing, outreach, intervention, and harm reduction for key populations, and antiretroviral therapy (ART) services for people diagnosed with HIV have been well developed. Meaningful reductions in HIV transmission have been observed among people who inject drugs, serodiscordant couples, and children of mothers living with HIV. The "Four Frees and One Care" policy has facilitated large numbers of people being tested for HIV and a high proportion of people living with HIV (PLWH) being diagnosed. Moreover, a large number of people diagnosed with HIV have received free ART. The case-fatality rate of PLWH has dropped by over 70% in the past 30 years. However, the HIV/AIDS epidemic is not yet under control. The epidemic has shifted almost exclusively to expansion via sexual transmission. The number of newly-diagnosed HIV cases continues to increase and the number of deaths among PLWH has remained unacceptably high. To take control of the HIV/AIDS epidemic, China faces tremendous challenges and needs to develop new strategies.

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35.1 The Many Challenges of China's HIV Epidemic

China's HIV epidemic continues to evolve. It started with injecting drug use in the late 1980s, it expanded quickly via contaminated plasma collection in the early- to mid-1990s, and then, increased further via mother-to-child transmission (MTCT; Pisani and Zhang 2017; Chaddah and Wu 2017). Today, the HIV epidemic in China has shifted from multiple transmission modes to now almost exclusively sexual transmission (Wu 2018). Unfortunately, however, our understanding of the epidemic has not become simpler.

The proportion of newly diagnosed people living with HIV (PLWH) who reported sexual contact as their infection route increased in just 5 years from less than 90% in 2013 to over 95% in 2017—heterosexual contact has accounted for 66.2–69.5% of all sexually-acquired infections and homosexual contact for 19.1–28.2% (National Center for AIDS/STD Control and Prevention 2017, 2018). Over the next 5 years, the epidemic is predicted to continue to evolve with an increase in the proportion of infections attributed to heterosexual contact, perhaps approaching 75%, and a decrease in the proportion attributed to homosexual contact, perhaps declining to 20%.

Although heterosexual transmission is clearly the largest driver of new HIV infections in China, HIV prevalence among female sex workers (FSW) and male attendees of sexually transmitted infection (STI) clinics remains consistently below 1%. How then, should we interpret the observed increase in heterosexual transmission of HIV? This is a typical case when population size is huge, even a typical case when population size is huge, even a very low prevalence still produces a considerably large number of HIV infections. This mode of HIV epidemic makes control extremely difficult.

HIV infections acquired via heterosexual transmission are concentrated primarily in rural areas where the initial HIV outbreaks occurred and first spread including, for example, Yunnan, Guangxi, Xinjiang, and Sichuan. Newly diagnosed men who report their route of infection as being heterosexual contact tend to report acquiring their infections from FSW. By contrast, newly diagnosed women most commonly report acquiring their infections from extra-marital, non-commercial partners (National Center for AIDS/STD Control and Prevention 2018).

In the context of commercial sex, a small number of FSW usually provide sexual services to a large number of male clients. Thus, intervention programs targeting FSW should have a significant positive impact and successfully slow down the epidemic. However, there are tremendous barriers to delivering effective HIV interventions to Chinese FSW. Firstly, low-tier FSW (i.e., those who charge low fees and are usually independent and street-based) are at the highest risk of acquiring and transmitting HIV and other STIs (compared to mid- and high-tier FSW) yet are the most difficult to approach. This very large, and very high-risk subgroup of FSW are typically scattered across rural regions and outer reaches of city suburbs, and deliberately hide their occupation and move frequently for fear of harsh societal stigma and discrimination as well as police "crackdowns" and incarceration. Secondly, with increased mobile device use and increased cellular network and wireless internet coverage as well as rapid adoption of mobile applications for

geospatial social networking, FSW have changed the way they seek potential clients, which further contributes to the "hidden" nature of Chinese FSW and challenges in approaching this vulnerable group with HIV prevention, testing, treatment, and care services.

Changes in social norms and perceptions of sex have greatly changed Chinese sexual life. Casual sex has become more popular than ever. More people are accepting of the idea of having sex with friends, colleagues, or even strangers. This increase in acceptability of extra-marital, non-commercial sex explains the majority of HIV infections acquired through heterosexual contact among women and about 40% heterosexually-acquired infections among men (National Center for AIDS/STD Control and Prevention 2018). All PLWH, whether diagnosed or undiagnosed, may be engaging in this type of risky behavior, potentially transmitting HIV to their sexual partners. This means that there are no "focal points" to be targeted by outreach programs, making prevention intervention very difficult.

Male-male sexual contact is the major mode of transmission driving the HIV epidemic in urban areas and in northern China (National Center for AIDS/STD Control and Prevention 2018). In the capital cities of all 31 provinces, homosexual transmission accounted for over 50% of newly reported HIV infections among men. However, men who have sex with men (MSM) are thought to account for less than 5% of the entire male population in China. Thus, Chinese MSM clearly experience a disproportionate burden of disease. However, this group is actually quite diverse and is similarly hidden and difficult to reach with interventions for several reasons. Firstly, a majority of newly diagnosed HIV infections attributed to male-male sexual contact are reported among male youths and young adults. However, middle-aged and older Chinese men are known to practice risky homosexual behavior as well and therefore are at similar risk of HIV infection. Thus, it is thought that the age distribution of PLWH who are MSM is skewed young because of deliberate miss-reporting of infection route by adult males who do not want their male-male sexual activity exposed. Over-reporting of heterosexual contact and under-reporting of homosexual contact transmission routes among Chinese men living with HIV helps explain the observed differences in patterns of HIV infection between men and women but highlights major barriers to intervention—it is unclear which men need what kinds of intervention services and how these men can best be approached. Secondly, a considerable proportion of MSM also have sex with women (MSMW), and many are married. Extreme societal pressure to marry and produce an heir to carry on the family name combined with persistent stigma and discrimination against MSM combine to encourage this practice. Furthermore, many MSM and MSMW do not self-identify as homosexual or bisexual and therefore messaging on the risks of HIV and the importance of protecting oneself and one's partners in the context of a particular sexual orientation yields suboptimal results. Female partners of MSMW are particularly vulnerable to HIV infection as they are often unaware of their male partners' homosexual behavior. This may also help explain the observed differences in patterns of HIV infection between men and women—men acquire HIV infection from men and pass their infection on to women. However, this also similarly highlights major barriers to intervention as it becomes difficult to know who needs what kinds of services and how best to deliver them.

One possibility for solving some of these issues has been the development and broad adoption of mobile applications tailored to men seeking men for dates and sex. These virtual communities provide a range of different modes of communication (e.g., person-to-person texting, group chatting, message boards, advertising) combined with geospatial locating capabilities that enable men to easily seek and find other men in a relatively hidden and safe environment. Research is only now just beginning to uncover how these tools can be used to deliver HIV prevention, testing, and treatment interventions in a way that is relevant and effective for MSM in China. Early results are promising, and this work must be expanded.

Two additional groups of people require special attention if China is to bring its HIV epidemic under control. The first is students. Over the past 5 years, the number of students newly-diagnosed with HIV infection has significantly increased. Now, over 3000 students are diagnosed with HIV infection each year, and over 80% of them report having become infected via male-male sexual contact. The second is senior male adults over 60 years of age. Less than 5000 new infections among men over 60 were diagnosed in 2010, but just 7 years later in 2017, almost 20,000 new infections were found among this group. This represents a doubling in the proportion of all cases reported annually—from 7.4% to 14.7% (National Center for AIDS/STD Control and Prevention 2018). Although traditionally, men over the age of 60 tend to be less sexually active, modern medicine has changed that—erectile dysfunction drugs such as Viagra have extended their sexual capability well into old age. These senior men most likely visit low-tier FSW, thereby exposing themselves to the risk of HIV and other STIs.

While it appears China's HIV epidemic has perhaps grown simpler over time with now nearly all cases caused by a single transmission route, the many above-described issues, as well as others that are perhaps not yet recognized, underscore the complicated nature of China's current HIV/AIDS epidemic. China must re-commit itself to developing a deeper understanding of its current epidemic and applying that understanding to innovative interventions.

35.2 Challenges in Controlling the Sexual Transmission of HIV

China's sexually driven HIV/AIDS epidemic is shaped by social and cultural norms about sex. Shifts in these norms toward increasing tolerance and acceptance of multiple sexual partners, homosexual and bisexual behaviors, casual sex, and extra-marital sex are unlikely to change in the near future. Thus, it is expected that the sexual transmission of HIV infection will continue in China as well. Making matters worse is the rapid increase in synthetic drug use, particularly among China's youth and young adult populations, is further contributing to riskier sexual behaviors that facilitate HIV sexual transmission.

In general, people are presumed to think rationally. In the case of PLWH, it is assumed that they simply did not have sufficient HIV/AIDS knowledge, did not know the risks, and/or did not understand how to prevent it. Furthermore, it is

assumed that once people have such knowledge, they should able to take actions to prevent HIV infection. This is the typical belief among the Chinese public, and it is true for most infectious diseases, particularly food- or water-borne digestive infections and diseases that are preventable with vaccines. However, it is not true in the case of HIV.

One of the authors that contributed to this volume asked one question of over 100 students who had been diagnosed with HIV within the prior 3 years. The question was: "if you could go back 5 years and live them over again with your current HIV/AIDS knowledge, are you confident you would prevent your HIV infection?" Very, unfortunately, none answered "yes." Some people engage in high-risk sexual behaviors even though they know they could become infected with HIV because of economic factors, some because they cannot, or choose not, to control themselves, and some because they simply do not care. Clearly, knowledge alone is insufficient for HIV prevention.

If used appropriately, condoms are very effective tools for preventing HIV infection via sexual transmission. So, why have condoms not stopped China's sexually-driven HIV epidemic? In general, people believe that the use of a condom is not difficult and therefore, once people learn how to use condoms and that condoms can protect them from HIV infection, they will henceforth easily choose to consistently use condoms to protect themselves. Unfortunately, this is not the case in real life. In real life, consistent condom use is very difficult.

Many years ago, a peer educator from San Francisco was invited to appear on a nationally syndicated television talk show in the United States. When asked why he worked so diligently to spread the message on safe sex among MSM communities and at the same time he, himself, was continuing to engage in risky sexual behavior, he replied that he was good at his job, but that he was also a human being—a regular homosexual man. His answer surprised audiences. Clearly, risky sexual behavior is not linearly associated with HIV/AIDS knowledge and perceived HIV/AIDS risk.

To understand how Chinese MSM communities perceive the HIV epidemic, a very small focus group discussion was held in Beijing in 2015, with representatives of MSM communities from selected cities (e.g., Beijing, Tianjin, Guangzhou, Qingdao, Chengdu). A total of ten men were invited. One man said that once a person used a 0.03 mm condom, he would never use a 0.05 mm condom again, and once he used a 0.01 mm condom, he would never use a 0.03 mm condom again. One man, who was employed as a surgeon at a famous university-affiliated hospital said that he had not used a single condom in the past 3 years. All in attendance were shocked by this—it was unbelievable that a well-educated health professional continued to engage risky sexual behavior. He replied that the risk was worth it to him to have the enhanced pleasure he experienced having sex without using a condom. This phenomenon of passion and gratification overcoming rationality is very hard to understand, but it is a real-world issue.

Taken together, these findings suggest reliance on education and condom promotion only will not be enough to slow down the sexual transmission of HIV. More must be done. Biological (rather than behavioral) strategies must be employed to effectively confront the challenges associated with preventing the spread of HIV in

China via sexual contact. Many biologically-based prevention technologies and strategies have been developed, tested, and found to be safe and effective in preventing HIV transmission among different risk groups and in different settings.

Treatment of STIs is an effective strategy for reducing sexual transmission of HIV and has been used in most countries. Studies have shown that in areas where STIs are prevalent and HIV is primarily transmitted via sexual contact, treatment of STIs significantly reduces HIV incidence. STIs are prevalent in China, and controlling STIs, particularly syphilis, has been adopted as a national strategy for HIV control in China. However, it is not well and fully implemented and thus, has so far had very limited impact on China's HIV epidemic.

Male circumcision has been found to be effective in reducing HIV infection among heterosexual males and has been used in some of the African countries where HIV prevalence is high. Although China's HIV epidemic continues to expand, the overall national HIV prevalence is only 0.06% (National Center for AIDS/STD Control and Prevention 2018). Furthermore, a pilot test of male circumcision among MSM was conducted and although participants' reported intention was high, their actual acceptance rate was less than 1%. Low prevalence combined with low acceptance suggests a low probability of success for this intervention and therefore, male circumcision has not been advanced as a national strategy in China.

Pre-exposure prophylaxis (PrEP) using antiretroviral (ARV) drugs has been tested in heterosexual and homosexual populations internationally and found to be safe and effective, resulting in several nations' health authorities approving ARVs for HIV PrEP. In general, PrEP must meet following criteria to be effective: (1) it must be affordable, (2) it must target uninfected men in areas that have a relatively high HIV incidence (e.g., at least 3%), (3) it must target groups willing to take it, and (4) it must include medical monitoring for side effects. In China, the overall incidence of HIV prevalence is very low. The only group that may meet these criteria for PrEP is MSM. A first pilot study of PrEP was conducted in China from 2008 to 2011, but results were disappointing—the intention to use PrEP was low (19%) and actual uptake of PrEP was even lower (2.5%; Ding et al. 2016). A second study of PrEP, conducted from 2012 to 2015, demonstrated that it could be effective in reducing HIV incidence if the compliance rate was high (Zhong 2018). An ongoing qualitative study indicated that MSM are unlikely to take PrEP for HIV prevention—risk perception is low, belief in PrEP as an effective prevention strategy is low, and worry about PrEP side effects and drug resistance is high. Thus, government provision of free PrEP is currently difficult to justify. Furthermore, the only ARV medicine that has been studied for PrEP in China is tenofovir disoproxil fumarate (TDF), which costs about 15 USD per month when manufactured in China as a generic. Truvada, a dual medicine for PrEP manufactured by the Gilead, costs some 300 USD a month in China. Without assistance, Truvada is unaffordable for many people in China. Perhaps in the future, the Chinese Government should consider partial coverage of the cost of PrEP by including it in state-provided health benefits. However, at the present time, PrEP has not been included as a national prevention strategy.

Post-exposure prophylaxis (PEP) has been used for many years in China as a prevention strategy for health, public health, and other professionals occupationally exposed to HIV. Each year, about 700–1000 HIV exposure events occur in China, with a majority of those being among health professionals, and some among law enforcement officers. PEP has been provided to all professionals who report occupational exposure to HIV and none have become infected. Request for the non-professional use of PEP mainly comes from MSM communities. Services for providing PEP to MSM based on request only operate in a few cities, such as Beijing, Guangzhou, and Shanghai, with individuals requesting PEP bearing the costs themselves. However, PEP has not been expanded and implemented as a national prevention strategy yet.

HIV treatment as prevention (TasP) is a strategy based on the fact that PLWH, the only sources for producing new HIV infections, can be made less infectious through effective treatment. To take full advantage of this strategy, PLWH must be diagnosed as quickly as possible after they become infected and must be initiated on effective treatment as soon as possible after they are diagnosed. Studies have shown that early diagnosis and immediate initiation of ART can reduce onward HIV transmission considerably. The TasP strategy has been implemented in China since 2011 among serodiscordant couples. In 2011, there was a total of 65,795 known serodiscordant couples in China, 58% of PLWH within these couples received ART, and the HIV seroconversion rate was only 2.6% (National Center for AIDS/STD Control and Prevention 2018). In 2017, there were 141,435 known serodiscordant couples nationwide, ART coverage had increased to 81% and the HIV seroconversion had fallen to 0.68% (National Center for AIDS/STD Control and Prevention 2018). Clearly, this strategy works, but the number of new HIV infections remains unacceptably high.

Although seemingly simple and easy, this strategy has several important challenges. First, a large proportion of PLWH in China remain undiagnosed and/or present late to testing and care. A majority of new infections are probably transmitted by PLWH who do not know they are infected. Thus, HIV testing has been scaled up very quickly, particularly in the past 15 years. The more HIV tests performed, the more PLWH are diagnosed—in 2004, 20 million tests were provided, yielding 23,100 diagnoses while in 2017, 200 million tests were performed and 134,512 diagnoses were made (Wu et al. 2017a, b; National Center for AIDS/STD Control and Prevention 2018). Although a majority of HIV tests were conducted, and a majority of HIV diagnoses were made, in healthcare settings (62% of tests and 54% of diagnoses in 2017), a disproportionately large number of these PLWH were diagnosed only after they had progressed to advanced HIV disease or AIDS. These "late presenters" have had HIV infection for years and not known it, likely passing on their infection to multiple sexual partners. More must be done to encourage early and frequent HIV testing uptake. Second, detection of acute or early stage of HIV infection (i.e., the first, short window of time when infectiousness is at its peak) requires sophisticated laboratory technology and is not feasible to be implemented on a nationwide scale. With testing uptake already sub-optimal, scaling up capacity for HIV detection in acute early infection is unlikely to have a meaningful impact on China's HIV epidemic. Third, there

continues to be "leakage" from China's HIV care continuum—PLWH are lost with every step from screening HIV-reactive, to confirmed diagnosis, to clinical assessment and initiation of ART (Ma et al. 2018). Service fragmentation has historically caused the process of becoming diagnosed and starting treatment to be too slow, difficult, and complicated—wait times were too long, notifications were late or incomplete, and follow-up for migrants or mobile populations was nearly impossible. A new patient path from screening to treatment has been developed that substantially streamlines, simplifies, and accelerates this process and results in trials have been very impressive, resulting in its adoption already as national policy (Wu et al. 2017a, b). However, implementation is still ongoing.

35.3 Future Directions

China's ultimate goal, the elimination of HIV, is large and daunting, and to some perhaps, seemingly impossible. However, it can easily be broken up into many smaller goals, which may form an outline of future directions. For example, it is possible to eliminate HIV from certain geographic areas, or among specific group of people.

Dehong prefecture, Yunnan province, is a likely geographic candidate for HIV elimination. Comprehensive responses to HIV have been implemented in Dehong since 2003. These included condom use promotion among FSW, harm reduction among PWID, large scale HIV testing programs both within healthcare settings and in the broader community, and ART for all diagnosed PLWH. Now, 15 years later, these efforts are paying off—the number of newly diagnosed cases has dropped from roughly 1500 annually in 2003 to only 300 cases in 2017, probably as a result of these intensive interventions. Continuation of these programs, alone, could result in a further reduction to less than 100 per year in the next 5 years. Further expansion or addition of new, innovative strategies may result in even faster elimination.

Elimination of HIV MTCT is also possible in China. Since 2010, China has implemented a nationwide program targeting all pregnant women for the prevention of HIV, syphilis, and hepatitis B virus (HBV) transmission to their infants. As a result of this program, the overall HIV MTCT rate has reduced from 8% in 2009 to 5.2% in 2017, and in urban areas to less than 2%. To completely eliminate this HIV transmission route, further data analysis is needed. Public health specialists need to understand the following questions: Are MTCT events concentrated in certain areas or are they distributed across the whole country? Why are MTCT events still occurring under the universal PMTCT program? Did PMTCT program services not reach these mother-infant pairs in a timely fashion? Or, is the program not effective at blocking this route of HIV transmission? Asking these questions and others and seeking the answers through analysis of routinely collected data is an important activity necessary for improving the PMTCT program, and eventually eliminating this transmission mode.

PWID is likely the first high-risk population that would be a reasonable candidate for eliminating HIV in China. After 15 years of harm reduction, the HIV

epidemic among China's PWID population has been well controlled. The proportion of all newly diagnosed HIV cases among PWID fell from 44% in 2004 to less than 4% in 2017. At the peak of China's HIV epidemic among PWID, 16,000 cases were newly identified in 2006. Only 4000 cases were found in 2017. Hopefully, the total number of new infections among PWID could fall further to less than 1000 in next 5 years, but in order for that to happen, further epidemiological analysis is required to guide precise responses to the gaps in current harm reduction programs.

Elimination of HIV transmission among serodiscordant couples is another good target. The HIV seroconversion rate in this key, the high-risk group has already fallen to less than 1% as a result of TasP strategies. However, coverage is currently only approximately 80% and no special guidance, counseling, or support are provided to couples who want to have a child. In order to eliminate HIV transmission among serodiscordant couples, coverage must be made universal and services must be expanded.

Although not reasonable yet to consider elimination, the sexual transmission route must be addressed quickly and comprehensively so that the trajectory with which China's HIV epidemic is expanding may be changed and brought toward control. MSM is the group most hit by the HIV epidemic in China now and that will continue for a long time. Great effort, focus, prioritization, and funding must be dedicated toward prevention of HIV transmission in the contexts of both heterosexual contact and homosexual contact. Prevention strategies targeting transmission events during commercial sex should continue to concentrate on FSW, including condom use promotion, regular STI check-ups, and timely treatment, and HIV testing. In the context of non-commercial heterosexual contact, it is important to increase sexual health knowledge, HIV/AIDS knowledge, encourage correct and consistent condom use, and early and frequent testing. For MSM, all current, effective programs, including condom promotion, HIV testing, and ART must continue and be further expanded. New prevention strategies need to be tried and implemented on a national scale. The most promising new prevention strategies include PrEP and PEP, but more study will be required to understand how best to implement and promote PrEP and PEP among MSM communities. Furthermore, more effort should be put into developing MSM-friendly community-based organizations that can help with the design, implementation, and evaluation of future interventions among MSM.

HIV testing is one of the most important HIV epidemic control strategies. However, despite China's massive expansion of HIV testing via a range of testing format options, people still have low rates of testing uptake and still tend to not be diagnosed until they have already entered late-stage disease. Considerable effort has been made to understand the unique compliments of barriers to HIV testing experienced by high-risk groups, and still, not much progress in this area has been made in recent years. One reason is that stigma toward HIV and PLWH is persistently severe. It is the single most important barrier for Chinese people to seek and obtain an HIV test. This is particularly true among already-marginalized groups, such as MSM, FSW, PWID, and others. One of the future strategies for improving rates of first-time and repeat HIV testing is HIV self-testing. Self-testing protects privacy

and confidentiality, is convenient and easy, and offers results very quickly. This strategy is very promising. Making self-test kits more readily available, cheaper, simpler, easier to use, and more reliable and accurate is of critical importance. More supportive national policies for promoting HIV self-testing and linking self-testers to further diagnosis and treatment services are needed.

Finally, social media applications, such as WeChat, MOMO, and Blued, are new tools that have been rapidly adopted by people in China, allowing them to make social connections, communicate regularly, and find friends and dates. WeChat is one of the most popular apps being used in China. It was launched in 2011. It is currently being used by 94% of all mobile phone devices in China and already has 800 million users. MOMO is one of the most popular apps being used by heterosexuals to make friends and find sexual partners. It was also launched in 2011 and already has 300 million users. Blued is the most popular mobile app being used by MSM in China. Estimates suggest that almost 80% of all MSM in China use Blued. All of these apps represent important new platforms for approaching people with HIV/AIDS information and prevention interventions. This must be part of the solution in the future if China is going to bring its HIV/AIDS epidemic successfully under control.

In summary, there is a great need to innovate and implement multiple new combinations of strategies in order to take China's comprehensive HIV/AIDS response into the next decades. Looking backward, it is clear that China has made major strides toward the ultimate goal of HIV elimination. However, looking forward, it is clear that more, and more difficult, challenges lie ahead. China must gather its resolve and confront these challenges directly and pragmatically, yet aggressively because the next major strides required will be even more difficult to achieve.

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