

# Potential Bridges for HIV Infection to Men Who Have Sex With Men in Guangzhou, China

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Received: 19 September 2005 / Accepted: 27 March 2006 / Published online: 27 June 2006  
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**Abstract** To assess the potential for HIV acquisition among men who have sex with men (MSM) in Guangzhou, China, we conducted a cross-sectional, anonymous, face-to-face survey of MSM in the metropolitan area of Guangzhou, China. As a pilot recruitment for a cohort study, participants were recruited by convenience sampling through newspaper and television advertising, website information, and respondent referral. Blood samples were tested for HIV, hepatitis B (HBV), hepatitis C (HCV), and syphilis. Client-centered HIV and STD counseling was provided.

A total of 201 MSM were interviewed and 200 blood samples were tested. The prevalence of HIV antibody was 0% (97.5% CI 0–1.8%); 17.5% of MSM were HBV surface antigen positive; 1.0% had HCV antibodies; 10.5% had antibodies to syphilis. Syphilis seropositivity was associated with sex with a foreign MSM in the last six months and 10.4% reported sex with a foreign MSM overall. The majority (54.7%) reported unprotected anal sex with other men. Nearly one-third (31.8%) had regular female partners; 25.9% were currently married to a woman; 6% had casual female partners; 4.5% had sex with a female sex worker; 4.5% had sex with a male sex worker; and 12.9% had unpro-

tected vaginal sex and unprotected anal sex with a man in the past six months. Only one MSM reported injection drug use (0.5%). The currently low prevalence of HIV but high level of unprotected anal sex, high prevalence of syphilis infection, and sexual networks that include foreign MSM point to a transient window for HIV prevention among MSM in Guangzhou. We recognize challenges to recruiting a representative sample of MSM and retaining them in longitudinal cohort studies.

**Keywords** China · Men who have sex with men · HIV · Sexually transmitted infection (STI) · Risk behavior

## Introduction

China, the most populous nation on earth, is experiencing a rapidly increasing HIV/AIDS epidemic. Although the cumulative total number of reported HIV infections was 89,067 as of September 2004, an estimated 840,000 persons are thought to be living with HIV (UNAIDS, China, 2004). UNAIDS project that the number of HIV/AIDS cases in China will reach 10 million by 2010 unless transmission is dramatically reduced (UNAIDS, 2004). The largest numbers of HIV/AIDS cases have been among injection drug users, followed by female sex workers and former blood donors (UNAIDS, China, 2004). There is concern that interconnections or bridges between injection drug users, sex workers, former blood donors, and other populations may expand the epidemic to the general population.

Less is known about HIV infection among MSM in China. One report estimated that 11% of HIV infections in 2003 were among MSM (UNAIDS, China, 2004). A few studies have demonstrated a relatively high prevalence of HIV among MSM compared to the general population

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in Beijing (3.1%), Shenzhen (1.8%), Harbin (1.3%), and Shenyang (1.0%) (Choi *et al.*, 2003; Gu *et al.*, 2004; Qu *et al.*, 2002; Tao *et al.*, 2004). These levels of infection, fortunately for the moment, are much lower than among MSM communities elsewhere in the world.

However, sexual and needle-sharing networks of MSM in China may increase HIV prevalence among MSM in the near future. If prevalence among MSM in China rises, further transmission may result to their female partners. Studies suggest a high level of bisexual behavior among MSM in China, 19.3 to 71.9% of MSM reported having both male and female partners in several studies (Choi *et al.*, 2004; Qu *et al.*, 2002; Xu, Shi, & Hu, 2005). Many MSM in China are also married as a result of social pressure for having a child or being afraid of disclosure of sexual orientation (China-UK AIDS Care Project, 2004; Yang *et al.*, 2003; Zhang, 2000; 2003). As China becomes more economically and socially integrated into the rest of the world, there is increasing potential for sexual networks of MSM in China to include foreign partners. HIV prevalence among MSM in North America, Australia, and Europe is very high relative to China (Simms *et al.*, 2005). At least one study in San Francisco found 13.9% of MSM of Asian ethnicity had traveled to mainland China, of whom 13.2% had sex with men in China (McFarland, personal communication, 31 May 2005). Figures for Hong Kong, which is adjacent to Guangdong province, were 28.4 and 10.6%, respectively (McFarland, personal communication, 31 May 2005). Moreover, MSM communities in many other continents are experiencing a resurgence in risk for HIV as measured by increases in unprotected sex, syphilis, new HIV diagnoses, and HIV incidence (Caceres, 2002; Centers for Disease Control and Prevention [CDC], 2004; Chen *et al.*, 2003; Choi *et al.*, 2004; Dukers *et al.*, 2002; Hourihan *et al.*, 2004; Macdonald *et al.*, 2004; McFarland *et al.*, 2004; Simms *et al.*, 2005; The National Institute of Mental Health Healthy Living Project Team, 2004; Williams, Bowen, & Horvath, 2005; Wolitski *et al.*, 2001).

Guangdong province in southern China ranks fifth in cumulative reported HIV/AIDS cases, and Guangzhou, the capital, ranks second within the province (Center for Disease Control and Prevention of Guangdong Province [GDCDC], 2005). Guangzhou is remarkable for its rapid economic boom, benefiting early by China's opening economic policies, and for close linkages with the rest of the world. Guangzhou attracts large numbers of persons from other provinces seeking work. In addition, Guangzhou is a relatively tolerant, cosmopolitan center of education and culture and is particularly attractive to MSM. However, few data are available on the prevalence of HIV and related risk behaviors among MSM in Guangdong province. We therefore conducted a cross-sectional survey of MSM in Guangzhou. We measured the prevalence of HIV, HBV, HCV, and syphilis and conducted face-to-face interviews on

sexual risk behavior, HIV/AIDS knowledge, risk perception, and experiences of discrimination. We specifically examined sexual partnerships that may connect MSM to high HIV prevalence populations, including injection drug users, sex workers, and foreign MSM. The survey was also a pilot to evaluate recruitment approaches and gauge the willingness of MSM to participate in a longitudinal cohort study.

## Method

### Participants and procedures

This is a cross-sectional survey of MSM in Guangzhou, China. Participants were recruited by convenience sampling; demographic characteristics and HIV-risk related information were gathered by anonymous, face-to-face interviews; and blood was drawn for HIV, HBV, HCV, and syphilis testing.

The target population for this study is men who had any sexual experience with another male during their lifetime and who resided in Guangzhou at the time of the survey. Data presented in this paper represent the baseline interviews and infectious disease prevalence of pilot longitudinal cohort study of MSM to measure the prevalence and incidence of HIV, to assess changes HIV risk related behaviors over time, and to develop prevention interventions. The recruitment objective was to efficiently achieve a sample of MSM who would be willing to participate in the cohort. Data must therefore be interpreted with this objective in mind.

Participants were recruited through convenience sampling using four methods. First, information on our study was described in local newspapers and television providing potential participants with our contact telephone number and email address. Second, the study was also described on the website of the GDCDC. Third, recruitment information was placed on a popular website specifically for MSM in Guangzhou. Finally, MSM who participated were encouraged to refer other MSM acquaintances to the study. Interested MSM made an appointment with us to have the interview at the GDCDC offices at their convenience. Informed consent was obtained verbally. Interviews and serological testing was conducted anonymously; no personally identifying information was collected.

### Measures

The questionnaire was expanded from a pilot study of MSM conducted in Guangzhou in 2003 and reviewed by four key informants, two of who were MSM. The questionnaire was then piloted in three different populations, including fifteen persons from the general population, fifteen MSM in Guangzhou, and fifteen experienced interviewers from

the Institute of HIV/AIDS Control and Prevention of GD-CDC. The questionnaire included demographic characteristics, HIV/AIDS knowledge, perception of risk of HIV infection, self-identified sexual orientation, sexual behavior with different types of partners, and experience of injustice because of homosexual behavior or orientation. The anonymous, structured, face-to-face interviews were conducted by health professionals with specific training in MSM and gender issues in a private counseling room to ensure confidentiality.

At the end of the interview, client-centered counseling was provided on HIV, HBV, HCV, and syphilis. Blood was then drawn for serological testing. Participants were instructed to return or call in one month to obtain results. Results were given anonymously; participants needed to provide a unique code and their date of birth. Of 201 participants interviewed, 200 agreed to serological testing. Persons testing positive for any infection were given referrals information to care and treatment.

Specimens were tested for HIV antibody, HBV surface antigen (HBsAg), HCV antibody, and syphilis antibody. For HIV testing, specimens were first tested with one sandwich ELISA (Diagnostic Kit for Antibody to Human Immunodeficiency Virus, bioMérieux-Netherlands). If the ELISA was positive, Western Blot was performed (Genelabs, Singapore). HBsAg (Shanghai Kehua Bioengineering Co., Ltd., Shanghai, China), HCV antibody (Shanghai Kehua Bioengineering Co., Ltd., Shanghai, China), and syphilis antibody (Double Antigen Sandwich ELISA, Livzon Group Reagent Factory, Zhuhai, China) were detected by ELISA. Specimens testing positive for syphilis antibody were confirmed by the toluidine red unheated serum test (TRUST, Beijing WANTAI Biological Pharmacy Enterprise CO., LTD., Beijing, China) to identify current infections.

#### Data analysis

Data were entered into an EpiData database with logic check programs. Before entry, completed questionnaires were cross-checked by different interviewers for missing or unclear answers before participants left. Analysis is descriptive and guided by assessing current prevalence of infectious diseases, levels of recent sexual behavior, and the potential for HIV transmission to MSM through sexual connections with high risk populations. We hypothesized several potential bridges, including those to injection drug users, male and female commercial sex work, female partners, and foreign MSM partners. We additionally characterize associations with several outcomes, including syphilis infection, unprotected anal intercourse (UAI) with men, and recent UAI with men and unprotected vaginal sex with women using logistic regression analysis as indicated in the text.

#### Results

A total of 201 eligible participants were enrolled between in less than two months (October–November, 2004). The most successful recruitment source was through newspaper advertisement (60.7%), followed by the Internet (25.9%; Table 1). Mean age was 29.5 years (range 16 to 66). Educational level was high, 63.7% had college education or more, and monthly incomes are relatively high for the city. Only 5.0% were unemployed. Slightly over one-fourth (25.9%) were currently married to a woman; 3.0% had previously been married and 8.5% resided with a regular female partner. Participants resided in all neighborhood of Guangzhou; however, only a minority (37.8%) were official Guangzhou residents (i.e., with “Guangzhou hukou”, local citizenship identification documents in China). A large proportion (37.8%) lived in Guangzhou for three years or less. A moderate majority, 60.8% expressed willingness to participate in a projected three-year cohort study.

Blood specimens were drawn from 200 of the 201 participants; one person declined to take any tests after the interview and following counseling. No HIV infections were detected (0%, 97.5% one-sided CI 0–1.8) and two participants were HCV-positive (1.0%, 95% CI 0.1–3.6). The prevalence of chronic hepatitis B infection (HBsAg-positive) was 17.5% (95% CI 12.5–23.5). Syphilis seropositivity was 10.5% (95% CI 6.6–15.6), with four (2.0%, 95% CI 0.5–5.0) confirmed as recently infected.

The vast majority (88.1%) self-identified as homosexual (59.7%) or bisexual (28.4%; Table 2). The mean age of first sexual encounter (with either sex) was 19.5 years (range 5 to 40) and the mean age of first homosexual experience was 20.9 years (range 7 to 40), with 72.6% of first sexual encounters being with males. Only 2.0% first had sex with men at age 17 years or younger. The single most common means of finding male sex partners was through the Internet (38.8%). Nearly equal proportions of MSM had regular (64.7%) and casual (65.2%) male partners in the last six months. By partner type, 61.5% had UAI with regular partners and 46.6% had UAI with casual partners. Overall, 54.7% reported any UAI. Few reported paying for sex with a man (4.5%) or woman (4.5%) or being paid by a man for sex (1.0%). Of note, 5.5% reported being forced to have sex with a man. Sex with a foreign MSM in the last six months was reported by 10.4%.

MSM reported substantial numbers of female partners. Nearly one-third (31.8%) of men reported having a regular female partner (25.0% of married men did not count their wives as regular female sex partners); 6.0% reported having casual female partners; and 4.5% had commercial female sex partners in the last six months. Eight men (4.0%) reported both regular and casual female partners. Of note, 12.9%

**Table 1** Demographic characteristics and recruitment source of men who have sex with men, Guangzhou, China, 2004 (*N* = 201)

Characteristic <sup>a</sup>	<i>N</i> (%)
Recruitment source	
Newspapers	122 (60.7)
Internet	52 (25.9)
Acquaintance	23 (11.4)
Television	4 (2.0)
Age group (years)	
16–24	21 (10.5)
25–29	66 (33.0)
30–34	58 (29.0)
35–39	32 (16.0)
40 +	23 (11.5)
Education level	
Secondary or less	19 (9.5)
Completed secondary school	50 (24.9)
College and above	132 (63.7)
Employment status	
Employed	177 (88.1)
Unemployed	10 (5.0)
Student	14 (7.0)
Monthly income (US\$)	
<\$122	26 (12.9)
\$122–\$ 243	55 (27.4)
\$244–\$487	60 (29.9)
\$488 +	55 (27.4)
Married status	
Single	124 (61.7)
Currently married to a woman	52 (25.9)
Currently live with girlfriend	17 (8.5)
Divorced, widowed	6 (3.0)
Neighborhood of residence	
Haizhu	47 (23.4)
Tianhe	41 (20.4)
Baiyun	34 (16.9)
Dongshan	16 (8.0)
Panyu	13 (6.5)
Others	50 (24.9)
Official Guangzhou resident	76 (37.8)
Years residing in Guangzhou	
<1	20 (10.7)
1–3	51 (27.2)
4 +	116 (62.0)
Willingness to participate in cohort study	113 (60.8)

<sup>a</sup>Totals do not always add up due to missing data, percents are for respondents.

of men reported concurrent unprotected sex with male and female partners.

During the previous 12 months, about 29.9% of respondents reported they a symptom of an STD, primarily genital ulcers, genital proliferation, dysuria or burn feeling around genitals or anus, and urethral discharge (Table 2). Of these, 63.3% did not seek treatment from a licensed doctor. Eighteen MSM (9.0%) reported testing for a sexually transmitted infection (STI) in the last six months. Of the eighteen, three

**Table 2** Sexual orientation and hiv risk-related behavior among men who have sex with men, Guangzhou, China, 2004 (*N* = 201)

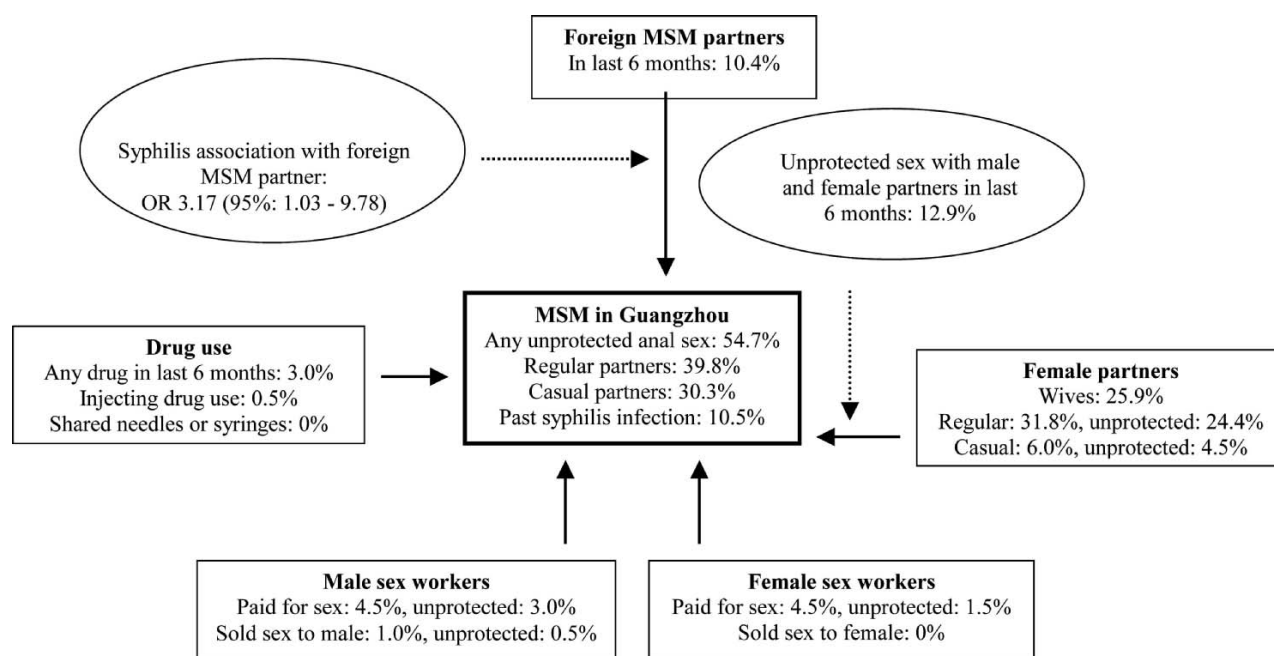
Variable <sup>a</sup>	<i>N</i> (%)
Self described sexual orientation	
Homosexual	120 (59.7)
Bisexual	57 (28.4)
Heterosexual	3 (1.5)
Uncertain	21 (10.4)
First sex with a man before at age 17 years or younger	4 (2.0)
Ways of finding male sex partners (last 6 months)	
Internet	78 (38.8)
Friend or friend's introduction	22 (10.9)
Park	18 (9.0)
Through regular partner	16 (8.0)
Gym	15 (7.5)
Bathhouse or sauna	12 (6.0)
Other	40 (19.9)
Sexual behavior with men (last 6 months)	
Regular male partner	130 (64.7)
Anal intercourse with a regular male partner	106 (52.7)
Casual male partner	131 (65.2)
Anal intercourse with a casual male partner	103 (51.2)
Any unprotected anal intercourse	110 (54.7)
Paid for sex with a male partner	9 (4.5)
Was paid for sex by a male partner	2 (1.0)
Was forced to have sex with a male	11 (5.5)
Sex with a foreign MSM	21 (10.4)
Sexual behavior with women (last 6 months)	
Regular female sex partner	64 (31.8)
Casual female sex partner	12 (6.0)
Paid for sex with a female	9 (4.5)
Unprotected sex with a man and a woman, last 6 months	26 (12.9)
Had STD symptoms in last 12 months	60 (29.9)
Did not seek treatment by physician	38 (18.9)
Tested for STI in last 6 months	18 (9.0)
Tested for HIV in last 6 months	16 (8.0)
Perceived self to be at possible or probable risk for HIV	132 (66.3)
Always carry a condom	40 (19.9)
Injection drug use in last 6 months	1 (0.5)
Experienced injustice due to being homosexual	26 (12.9)
Felt shame about being homosexual	151 (75.1)

<sup>a</sup>Totals do not always add up due to missing data, percents are among respondents.

reported diagnosis of gonorrhea, five condyloma acuminata, and one each of non-gonococcal urethritis, syphilis, genital herpes, and scabies; seven reported negative results.

A section of the questionnaire addressed knowledge, attitudes, perceptions, and other risks for HIV. Although 90.0% of respondents could identify three true routes of transmission, 29.9% still thought HIV could be transmitted through mosquito bites and 35.5% through sweat or tears. A surprising 71.5% believed that wearing two condoms could protect them from HIV infection during anal sex. Sixteen (8.0%) of MSM had tested for HIV in the last six months; nearly two-thirds (66.3%) perceived themselves to





**Fig. 1** Potential bridges for HIV infection to men who have sex with men, Guangzhou, China ( $N = 201$ )

be at risk for HIV. Only 19.9% of the respondents carried condoms with them. Six MSM (3.1%) reported any drug use, one (0.5%) reported injection drug use in the last six months. Two declined to answer the question. The one acknowledged injecting drug user reported never sharing needles, syringes, or related equipment. Overall, 12.9% of MSM reported experiencing injustice because of being homosexual; 75.1% expressed feeling shame over their homosexuality.

Figure 1 summarizes the potential bridges for HIV transmission to MSM. The potential bridge from foreign MSM may be the most risky in terms of connection to a potentially high HIV prevalence population. In addition, reporting sex with foreign MSM (10.4%) was associated with syphilis infection (OR 3.17, 95% CI 1.03–9.78). Risk through connection to commercial sex workers was moderate, 4.5% reporting either male or female sex worker partners with unprotected sex reported by 3.0% and 1.5%, respectively. The potential bridge to IDU populations was not great considering only one subject reported injection drug use. Of course, under-reporting of this behavior may be likely. The potential “bisexual bridge” was large in terms of the number of men with both male and female partners. However, HIV prevalence in the general population of women is currently low.

## Discussion

Our study showed some good news for MSM in Guangzhou. The HIV prevalence appears to be currently low compared

to MSM communities in other parts of the world, and may be comparable to other parts of China (Choi *et al.*, 2003; Gu *et al.*, 2004; Qu *et al.*, 2002; Tao *et al.*, 2004). Of note, the upper bound for the one-sided 97.5% confidence interval for the 0% HIV prevalence in the present study overlaps the estimate for HIV prevalence among MSM in Shenyang, Harbin, Shenzhen and a previous pilot survey of MSM in Guangzhou (Choi *et al.*, 2003; Gu *et al.*, 2004; He *et al.*, 2001; Qu *et al.*, 2002; Tao *et al.*, 2004). It is also good news that we did not find very close linkage between MSM and IDU, the population which currently accounts for the most HIV infection in China.

However, other findings point to the potential for future expansion of the HIV epidemic among MSM in Guangzhou. UAI was high overall. Syphilis infection was also relatively high compared to the general population (He *et al.*, 2005a) and compared to MSM in Shenzhen (Yang *et al.*, 2003). Moreover, having syphilis was associated with having foreign MSM partners. Taken together, the findings are worrisome on several levels. First, syphilis is a marker for engaging in high-risk sexual practices (e.g., unprotected sex with multiple partners). Second, syphilis can enhance the acquisition of HIV. Third, the association with foreign MSM partners points to sexual connection with MSM communities elsewhere in the world which have much higher prevalence of HIV and which are experiencing resurgences in syphilis and sexual risk behavior (Caceres, 2002; Centers for Disease Control and Prevention [CDC], 2004; Chen *et al.*, 2003; Choi *et al.*, 2004; Dukers *et al.*, 2002; Hourihan *et al.*, 2004; Macdonald *et al.*, 2004; McFarland *et al.*, 2004; Simms *et al.*, 2005; The National

Institute of Mental Health Healthy Living Project Team, 2004; Williams *et al.*, 2005; Wolitski *et al.*, 2001).

It is even more worrisome that a large majority of MSM with STI symptoms did not seek proper treatment. Overall STI and HIV testing was low. Moreover, sexual networks that included commercial sex workers, the second largest category of HIV cases in Guangdong, similar to a previous study (Zhang, Li, & Hu, 2001) was moderately high.

We also found a very high level of potential bridging from MSM to the general population through regular and casual female partners, a so-called “bisexual bridge”. Our finding of about one-third have female partners during past six months is comparable to MSM in Beijing (28%) (Choi *et al.*, 2001) and Shenyang (36.3%; Gu *et al.*, 2004). Other studies have also noted that few MSM (21.1%) in China divulge their homosexuality to their wives (Qu *et al.*, 2002).

Our study also reveals challenges in establishing a longitudinal cohort study of MSM in Guangzhou. Not all respondents were willing to volunteer for a future cohort study; 60.8% willingness in this study may not predict adequate follow-up. Moreover, it may be logistically difficult to retain participants in such a mobile population. Only a minority were official Guangzhou residents and a substantial proportion had lived in Guangzhou for less than three years. Preliminarily, less than one-third of our survey participants showed for their six-month follow-up visit.

Of note, the Internet was the second most common source for recruitment in our study and the most common source of finding male sex partners among participants. The Internet is likely to become a tool that increases the sexual networks of MSM within China and abroad. Of note, other studies have found associations between STI and finding partners over the Internet (Elford, Bolding, & Sherr, 2001; Lau *et al.*, 2003; McFarlane, Bull, & Rietmeijer, 2000). On the other hand, the Internet may be an effective means of providing HIV prevention information to MSM in China (Williams *et al.*, 2005).

We recognize that the main limitation of our study is the representativeness of our sample. We used convenience methods because the primary aim was to gauge the ability to establish a cohort of MSM. The direction of bias is difficult to measure; however, several factors point to under-estimation of true HIV prevalence and levels of risk behavior. First, there is likely to be under-reporting of stigmatized and illegal behaviors, such as drug use and commercial sex. Second, our survey may also under-represent MSM without access to the health care system or public mass media including the Internet. Such persons may be less exposed to prevention messages. Our sample of MSM was more educated than the general population and perhaps the wider MSM population. College level education in studies of MSM in China range widely from 37.7% in Shenyang (Gu *et al.*, 2004) to 78.8% in Beijing (Liu, Liu, & Xiao, 2001). Our finding of 63.7% was also similar to a previous survey of MSM in Guangzhou

(69.4%) primarily based on Internet plus venue outreach recruitment (He *et al.*, 2005b). On the other hand, MSM who perceived that they are truly at high risk may have sought out participation in our survey. Finally, the small sample size of our survey overall also limits interpretation.

Ultimately, true representative samples of MSM are difficult to achieve and validate in any context. Our survey achieved geographic diversity and used a variety of recruitment avenues. The demographic make-up and results of our sample was consistent with the previous survey of MSM in Guangzhou (He *et al.*, 2005b) and with a survey of MSM in nearby Shenzhen (Tao *et al.*, 2004) in which a bar-based sampling strategy was applied. The high education level may be the result of the rapid development of Beijing and Guangzhou attracting more educated people. Also the prevalence of the participants who had regular male partners were similar to the survey through mail (Zhang *et al.*, 2003). We acknowledge, nonetheless, that a more rigorous sampling survey of MSM in Guangzhou is still needed.

Despite these limitations and possible biases, we feel our data highlight a prevention opportunity that cannot be ignored. The currently low HIV prevalence among MSM in Guangzhou may be transient given the several potential bridges to higher prevalence populations. Our findings suggest that practical measures such as STI screening and treatment programs, especially for syphilis, promotion of HIV counseling and testing, and the use of the Internet to reach MSM may be effective first steps.

**Acknowledgements** The authors acknowledge the invaluable technical assistance of Ruiheng Xu, Li Ling, Xingfen Yang, Weiqing Chen, Futian Luo, Qinq Liu for study design, Huiming Luo for organization for the pilot of the questionnaire, and Weibin Wu for data entry and data cleaning, Zhuoyue Wan, Limei Diao, Xinge Yan, Ping Lin for laboratory help, and Pheobe Kajubi and Wayne Steward for review of the paper. The support of health department of Guangdong, CDC-GAP China project, and the Center for AIDS prevention Studies (CAPS) of the University of California San Francisco (UCSF) are acknowledged.

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