

# Mobility and HIV in Central America and Mexico: A critical review

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**Abstract** Mobility is a key determinant of HIV/sexually transmitted infection (STI) transmission dynamics in Asia and Africa. Scant data exist regarding its dynamic impacts on HIV/STI risk in Central America and Mexico. Our objective was to critically review the epidemiology and social and structural context of HIV/STI risk among mobile populations in Central America and Mexico. Eligible articles were published in English or Spanish between January 1, 2000 and August 31, 2010; conducted in Central America or Mexico; specified the mobile population included; and described primary research. 2045 records were screened, 275 articles reviewed, and 22 studies included. Mobility is associated with increased HIV risk behaviors, though it also

may increase preventive behaviors. Among mobile groups in Central America and Mexico, social isolation, the socio-economic impacts of displacement, gender inequalities, and stigma/discrimination shape HIV risk. Epidemiologic research and multi-level interventions that target and engage vulnerable groups in transit stations are recommended.

**Keywords** Mobility · Migration · HIV · Mexico · Central America · Sexually transmitted infections

## Introduction

Population mobility has emerged as an important contributor to global infectious disease epidemiology, and has become a central theme in discussions of the human immunodeficiency virus (HIV) epidemic among researchers, policymakers, non-governmental organizations, and the private sector [1–13]. We operationalize mobility as inclusive of migration, defined as movement from one country, place, or locality to another, as well as temporary or circular movement, such as for seasonal work [8]. Mobility includes not only international migration, but also internal, bi-national, and regional movements.

Mobility has been linked to the epidemiology and context of HIV infection and risk in Africa [2–4, 6, 7, 14–25] and Asia [9, 26–31]. Also known as Mesoamerica, Central America and Mexico form a migration corridor linking South and North America; yet, few studies have addressed mobility and HIV epidemiology in this setting [32–34]. The objectives of this critical review were threefold: [1] to describe the epidemiology of HIV/STIs among diverse mobile populations in Central America and Mexico; [2] to analyze how mobility can contribute to social and structural conditions shaping HIV/STI risk; and [3] to describe

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and evaluate the results of interventions to prevent HIV/STI among mobile populations.

### Mobility as a Social and Structural Driver of HIV Vulnerability

The social and structural situations encountered by mobile groups are key pathways through which mobility can influence HIV/STI risk [7, 35]. Informed by Link's and Phelan's [36, 37] theories regarding the origins of health inequalities, we conceptualize these social and structural experiences as “fundamental causes” that put migrants “at risk of risks.” According to this framework, HIV risk and its proximate determinants (e.g., unprotected sex; substance use; sexual violence) are the expression of wider social and structural inequities, such as the low SES and limited power migrants often experience [38]. Thus, this framework facilitates a deeper understanding of migration contexts and their impacts [7], which are crucial to meeting migrants' health needs [39].

Mobile groups differ in the social and structural experiences they encounter, and consequently, their exposure to risks. These include disruption of social networks and exposure to more liberal social norms, which have been linked to sex with casual partners, substance use, and increased HIV/STI risk among labor migrants and their long-term partners [17, 32, 33, 40–46]. Among displaced persons, undocumented migrants, sex workers (SW), and trafficked persons, poverty and homelessness may result in survival sex (i.e., sex in exchange for shelter, money, or other resources), unsafe/coercive substance use, sexual violence, and physical violence and instability [47–52]. Stigma, competing immigration-related stressors, and cultural, linguistic, and economic factors often pose barriers to health services, exacerbating risk [48, 50, 53–56].

Though most research suggests that mobility increases exposure to risks, this is not true of all forms of mobility [28]. Travel to more liberal social climates can improve access to HIV prevention [57, 58]. Mobility may improve access to resources; remittances and savings can enable migrant households to allocate additional resources to health services [57]. Women may experience improved autonomy, wages, working conditions, and new skills [59, 60], potentially improving gender equity and women's abilities to negotiate safe sex. Mobility may provide respite to abused youth and sexual minorities (e.g., gay, trans, or bisexual populations) from homophobia and violence. Migration that is not accompanied by the rupturing of social networks can also be protective by reducing opportunities for causal/commercial sex [61].

Although mobility has been implicated as a critical determinant of HIV transmission, few studies consider how mobility can have dynamic roles in shaping HIV/STI

epidemiology. The purpose of this review was to examine the linkages between HIV/STI epidemiology and its context among mobile populations in Mesoamerica.

### Mobile Populations in Central America and Mexico

Important mobile populations in the region include undocumented migrants, deportees, trafficked persons, labor migrants, indigenous migrants, and sex workers (SW). Although not mutually exclusive (e.g., indigenous migrants are often also labor migrants), these categories provide a useful rubric for understanding the different experiences of mobile groups in Central America and Mexico.

#### *Undocumented Migrants*

Of an estimated 11.9 million undocumented migrants in the United States in 2008, over 70% were from Mexico and Central America [62]. Approximately 450,000 undocumented Mexicans enter the United States annually [63]. Migrant smuggling, defined as, “the procurement, in order to obtain, directly or indirectly, a financial or other material benefit, of the illegal entry of a person into a State Party of which the person is not a national or a permanent resident” [64] (p. 54–55), is ubiquitous along regional migration routes [65]. Mexican territory is commonly used for these activities, where “*coyotes*” (a Spanish euphemism for human smugglers) transport Northbound migrants [63, 66]. While migrant smuggling is distinct from human trafficking, the lines between smuggling and trafficking are often blurred [67].

#### *Deportees*

In the last decade, repatriations of undocumented migrants from Mexico and the United States have dramatically increased. Mexico repatriated approximately 215,000 Central American migrants in 2004 [63]. Deportations of Mexicans from the United States increased 63% from 2000 to 2008 [68]. In 2008, 693,592 undocumented Mexican nationals were apprehended [68]. Removal of Central Americans from the United States increased over five-fold from 2000 to 2008 (from 15,213 to 79,823); most were from Honduras, Guatemala, and El Salvador. From 2000 to 2008, the proportion of Mexican removals decreased (from 80 to 68%), while the proportion of Central American removals increased from 8 to 25% [68].<sup>1</sup>

<sup>1</sup> These data underestimate the number of repatriated migrants, as they include only *removals* (deportation based on an order of removal, which carries administrative and criminal consequences upon re-entry), which represented less than one quarter of repatriations from 2000–2008. Most deportees are *returned* (deportation not based on an order of removal, which does not carry criminal consequences upon re-entry). *Returns* by country of origin are unpublished.

### Human Trafficking Victims

According to the U.N. Palermo Protocol, “trafficking in persons” is defined as,

“the recruitment, transportation, transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labour or services, slavery or practices similar to slavery, servitude or the removal of organs” [64] (p. 42).

Trafficking for sexual exploitation (i.e., sex trafficking) is distinct from sex work. While both encompass selling or trading sex, the former hinges upon the use of coercion or force, whereas the latter does not necessarily involve such means [69]. Human trafficking is a serious concern in Mesoamerica [66, 70]. While accurate data estimating the number of trafficking victims are problematic [71], large numbers of women from southern and central Mexico are reportedly trafficked to the Mexico-US border for sex annually [66, 67]. The exploitation of Central American women and child migrants has also been reported, especially in border areas, tourist destinations, ports, and areas hosting migrant workers [63, 66, 70].

### Sex Workers (SW), Men Who Have Sex with Men (MSM), and Injection Drug Users (IDU)

Populations traditionally considered to be most at risk for HIV include SW, IDU, and MSM (i.e., gay, bisexual, transgendered, and heterosexual men who sometimes have sex with men). These populations are highly mobile in Central America and Mexico [72]. While some women intentionally migrate for sex work, many practice survival sex to meet subsistence or remittance needs during migration, while others are trafficked. SW often migrate to access better wages and working conditions, such as offered by establishments catering to Americans in Mexico-US border cities [73]. Thriving sex industries in border cities draw women into sex work and attract local and international sex tourists, including heterosexual clients and MSM [73, 74]. IDU, whose mobility is associated with homelessness, insecurity, and access to narcotics [5], are highly mobile in Northern Mexico [75], though IDU has not been detected in high levels nor been associated with HIV elsewhere in the region [11, 72].

### Labor Migrants

Predominantly male labor migrants in the transport, agricultural, construction, and resource-extraction sectors travel internally, regionally, and internationally [11, 45, 76, 77]. An increasing proportion of migrants are now females [78–80]; they often work in the manufacturing, domestic, tourism, and agricultural sectors [81–83].

### Indigenous Migrants

Indigenous groups migrate to neighboring countries and urban areas in search of improved opportunities. Indigenous migrants include the Garífuna (Belize, Guatemala, Nicaragua, and Honduras), Kuna (Panama), Miskito (Nicaragua), Maya (Guatemala, Mexico), and Mixtec (Mexico) [65, 84–87]; the Garífuna, an Afro-Caribbean ethnic minority group, engage in rural–urban, Central American–Caribbean, and international migration.

### Dynamics of Population Mobility in Central America and Mexico

Drivers of mobility include economic inequalities, limited opportunities for women, natural disasters, political upheaval, deportation policies, urbanization, and transnational networks. Central America and Mexico form a key transit route for Northbound regional and international migrants [11]; dehydration, robbery, extortion, and sexual violence are among the risks experienced. Depending on their point of origin, migrants may travel through Mexico and multiple Central American countries (e.g., Guatemala, Honduras, Panama) [63, 88]. Other flows include south-north (e.g., Nicaragua-Costa Rica), Central American–Caribbean, and internal migration.

Most *bi-national mobility* occurs along the Mexico-US, Mexico-Guatemala, and Costa Rica-Nicaragua borders. Economic disparities and transnational networks have drawn Mexican migrants to the United States since the 1970s, when Mexico-US migration began in earnest [85, 88, 89]. Mexicans comprised 32% of US immigrants in 2008—a 17-fold increase since 1970 [89, 90]. The Tijuana-San Diego border forms the world’s busiest international land crossing [91]. Belize, Costa Rica, Panama, and Mexico are important *regional destination countries*. Belize has received the largest foreign population since 1983 [63], which constituted 14.8% of the population in 2000 [63]. Migrants from El Salvador, Guatemala, Honduras, and Nicaragua seek opportunities in neighboring countries [63]. Nicaraguan emigration has been influenced by its poverty level, which ranks second only to Haiti in the region [63]. Guatemala’s 36 year civil war caused the exodus of political refugees [63]; today, undocumented migration

into Mexico is rife [92]. Mexico, El Salvador and Honduras have large US diasporas, from which remittances are substantial [63, 93].

While reviews of mobility and HIV infection have been conducted among Mexico-US migrants, these have mostly encompassed US-based studies. Less is known regarding mobile groups within Central America, who may experience greater risks than those who reach the US, due to higher levels of poverty, mobility and HIV prevalence characterizing Central America. The objectives of this review were to [1] describe the epidemiology of HIV/STIs among mobile populations; [2] analyze how mobility can contribute to social and structural conditions shaping HIV/STI risk; and [3] describe and evaluate the results of HIV/STI prevention interventions among mobile populations in Central America and Mexico.

## Methods

### Inclusion Criteria

Eligible articles were [1] written in English or Spanish, [2] published between January 1, 2000 and August 31, 2010, [3] conducted in Central America or Mexico, [4] specified the number and type of mobile population studied, and [5] described primary research. While our goal was to systematically appraise the highest standard of evidence available, a paucity of studies using experimental or quasi-experimental designs rendered the use of a traditional systematic review “problematic in areas of research dominated by non-trial quantitative evidence” [94] (p. 263); thus, no exclusions were made on the basis of study design or sample size.

### Search Strategy

From July to September 2010, English and Spanish language literature describing [1] HIV/STI prevalence and risk factors; [2] the social and structural context of HIV/STI vulnerability; and [3] HIV/STI prevention interventions among mobile populations in Central America and Mexico was identified. Abstracts were screened for content covering these 3 domains. International (PubMed) and regional databases (LILACS; SciELO) were searched using combinations of mobility terms (‘migration’, ‘migrant’, ‘mobility’, ‘mobile’), medical subject headings for HIV/STIs, and geographic limiters (‘Central America’, ‘Mexico’, ‘Belize’, ‘Costa Rica’, ‘El Salvador’, ‘Guatemala’, ‘Honduras’, ‘Nicaragua’, and ‘Panama’). Relevant journals were hand-searched and key papers were cross-referenced. Due to the limited peer-reviewed studies available, grey literature (e.g., reports, conference proceedings) was

searched using Google Scholar. Key organizations and experts were contacted for information; for example, brief surveys were circulated to country focal points of the Pan American Health Organization. HIV prevalence data reported by UNAIDS in *transit stations*, which are *locations characterized by high levels of mobility, such as borders, ports, and truck stops*, was collected. We included qualitative and quantitative research, in line with the increasing recognition of the need to incorporate both types of research in reviews [95].

### Data Management and Analysis

Endnote was used to manage retrieved items. A Microsoft Excel database was developed to organize and chart study characteristics (authors, year, country, design, population, migrant sample size), key findings, and the following data, where applicable: HIV/STI prevalence, migration-related variables, qualitative findings, or intervention description. We developed a second matrix to chart HIV/STI prevalence in transit stations. These extracted data formed the basis of our analysis. We began by grouping the findings of the epidemiologic studies according to common topics and mobile population, comparing them across studies. Next, we elicited common themes from the qualitative data and compared these across settings (objective 2). Lastly, we analyzed the findings of HIV/STI prevention intervention studies among mobile populations, seeking to draw lessons and exemplars for future interventions (objective 3).

## Results

A total of 2045 article titles and abstracts (where available) were screened by the first author to determine eligibility. 275 full-text articles were reviewed and 22 studies were included, which were supplemented by grey literature (i.e., UNAIDS data, Table 2). Of the 22 studies included, two (i.e., six papers) were published in Spanish; all others were in English. Eleven epidemiological studies reported associations between HIV and mobility (Table 1), 8 qualitative studies described the social and structural context of HIV vulnerability (Table 3), and 3 studies described HIV/STI prevention interventions (Table 4). We describe our results according to three categories: HIV/STI epidemiology, its social and structural context, and prevention interventions.

### Epidemiology of HIV/STIs and Mobility

Available data indicate that HIV/AIDS is concentrated in mobility ‘hot spots’ (i.e., transit stations), and report associations of increased HIV/STIs and risk factors with mobility. A smaller number of studies also reported

**Table 1** Studies describing epidemiologic associations between HIV and mobility in Central America and Mexico, 2000–2010

| Reference                   | Location  | Design  | Population  | N  | Associations reported   |
|-----------------------------|---|---|---|--|---|
| Brouwer et al. [113]        | Tijuana, Mexico                                     | Cross-sectional (RDS)                                 | Injection drug users (IDU)                                    | Total: 219<br>Deportee: 35 (16%)<br>Mobile: 64 (29%) | Deportation history was inversely associated with receiving drug treatment (OR: 0.41, 95% CI: 0.19–0.89), recent medical care (OR: 0.37, 95% CI: 0.13–1.00), or HIV testing (OR: 0.44, 95% CI: 0.19–1.02)   |
| Fosados et al. [103]        | Cuauhtemoc, Colima and Tonal, Jalisco, Mexico       | Cross-sectional (non-probabilistic)                   | Sexually active men who resided in the US in the past 3 years | Total: 354<br>Mobile: 354 (100%)                     | Reporting 2 or more trips to the US was significantly associated with consistent condom use (OR: 3.09). Having 2 or more sex partners in past year (OR: 2.76), a mistress (OR: 8.00), friend (OR: 3.34), or non-monomagous sex partner (OR: 4.93) were also associated with consistent condom use among migrants  |
| Magis-Rodriguez et al. [96] | 5 states, Mexico                                    | Cross-sectional (RDS)                                 | Adults in 5 Mexican states with high levels of US migration   | Total: 2775<br>Mobile: 1539 (55.5%)                  | Male migrants reported more sex partners (28.4% vs. 20.4%, $p < 0.05$ ) than non-migrants, but also reported more protective behaviors than non-migrants, including condom use at last sex (40.9% vs. 30.8%, $p < 0.05$ ) and ever having an HIV test (28.0% vs. 17.6%, $p < 0.05$ )  |
| Ojeda et al. [112]          | Tijuana, Mexico                                     | Cross-sectional (non-probabilistic)                   | SW  | Total: 471<br>Mobile: 370 (79%)                      | Migration was protective against any STI in unadjusted models (OR: 0.61, 95% CI: 0.39–0.97). There was no association between migration and STIs in adjusted models   |
| Paz-Bailey et al. [115]     | 8 Garífuna communities Honduras                     | Population-based seroprevalence and behavioral survey | Urban and rural Garífuna population                           | Total: 817<br>Mobile: N/A                            | Prevalence of HIV, syphilis, Chlamydia, and Gonorrhea were measured at 4.5, 2.4, 6.8, and 1.1%, respectively. Urban, poor Garífuna had higher HIV prevalence (8%). Low consistent condom use was reported with casual (41.1%) and stable (10.6%) partners   |
| Rangel-Gomez et al. [108]   | Nuevo Laredo and Ciudad Hidalgo, Mexico             | Cross-sectional (time-location)                       | SW with truck driver clientele                                | Total: 200<br>Mobile: 98 (49%)                       | SW in Chiapas had 5 times the odds of having lived for less than 5 years in Cd. Hidalgo. SW in Nuevo Laredo were more likely to report a recent STI symptom (25% vs. 6%). SW in Chiapas were more likely to report bad working conditions (19% vs. 9%, $p = 0.03$ )   |
| Sirotnin et al. [130]       | Tijuana, Mexico                                     | Cross-sectional (non-probabilistic)                   | SW  | Total: 410<br>Mobile: 89 (22%)                       | Being a non-migrant was inversely associated with SW registration (11.1% of registered vs. 30.4% of unregistered SW, $p < 0.001$ ); unregistered SW were significantly more likely to work on the street, have any STI, or be infected with syphilis. Non-migrant status was independently inversely associated with registration (Adjusted OR: 0.35, 95% CI: 0.17, 0.70)   |
| Soto et al. [109]           | El Salvador, Guatemala, Honduras, Nicaragua, Panama | Seroprevalence (sentinel surveillance)                | SW in 5 countries, including largest cities and ports         | Total: 2,466<br>Mobile: 630 (25.6%)                  | Of SW, in El Salvador, Nicaragua, and Honduras <2% were foreign-born; 59% in Guatemala ( $n = 315$ ) and 68.1% in Panama ( $n = 294$ ) were foreign-born. Most worked in brothels, appointment houses, bars or nightclubs. HIV prevalence ranged from 0.2% in Nicaragua and Panama to 9.6% in Honduras, where estimated HIV incidence was highest (3.2 per 100 person-years); 77% and 72% of SW reported consistent condom use with new and regular clients, respectively |
| Strathdee et al. [114]      | Tijuana, Mexico                                     | Cross-sectional (RDS)                                 | IDU   | Total: 1,056<br>Mobile: 707 (67%)                    | Length of time in Tijuana was associated with HIV infection among females, while shorter length of stay was associated with HIV among males. There was an interaction between gender and length of time lived in Tijuana. The odds of HIV infection were four-fold higher among males deported from the US, compared to other males   |

**Table 1** continued

| Reference                | Location                  | Design                              | Population     | N                                 | Associations reported   |
|--------------------------|---------------------------|-------------------------------------|----------------|-----------------------------------|---|
| Uribe-Salas et al. [106] | Socomsusco region, Mexico | Cross-sectional (non-probabilistic) | SW             | Total: 484<br>Mobile: 351 (75%)   | Most SW initiated SW in Mexico (88.2%). HIV prevalence in Guatemala (1.0%) and Mexico (0.8%) account for all HIV cases, though there were no significant differences by country of origin   |
| Viani et al. [102]       | Tijuana, Mexico           | Seroprevalence                      | Pregnant women | Total: 1,496<br>Mobile: 479 (32%) | HIV prevalence did not significantly differ among migrants and Tijuana residents (1.46% vs. 0.69%, $p = 0.16$ ). Tijuana residents were significantly more likely to report high-risk behavior for HIV, including use of injection drugs (7.4% vs. 4.0%) or other drugs (10.7% vs. 6.9%), or to have a partner who used injection drugs (12.5% vs. 7.1%) or other drugs (32.8% vs. 21.7%) |

<sup>a</sup> Note: for studies that included both mobile and non-mobile populations, we represent the findings only as they pertain to mobile populations (e.g. SW) as much as possible; wherever possible, the results specifically discuss the situation of migrant and mobile groups, though not all studies provided data broken down by migration status

associations between protective behaviors, such as condom use, and mobility [96, 97].

Geographic Distribution of HIV/AIDS

Central America is the sub-region of Latin America most affected by HIV/AIDS [98]. Belize faces a generalized epidemic, with HIV prevalence consistently over 1% among pregnant women [99]. In most other Central American countries and Mexico, epidemics are concentrated in vulnerable groups such as SW, MSM, prisoners, and indigenous populations.

Surveillance data implicate mobility in the spread of HIV outside capital cities, such as along transit routes and in ports [98, 99]. In Honduras, the highest concentration of AIDS cases has been observed along the northern coast [100]. In Nicaragua, the late detection and early containment of HIV has been attributed to its isolation during its civil war and economic blockade [65]; from 1987 to 2004, the Northern and Central Pacific regions were the most affected, though prevalence in the Atlantic has also increased [65]. Panama’s location as a bridge connecting the Americas has been cited as one reason for the diffusion of HIV [86]; high prevalence regions include urban centers and indigenous border areas [86]. Mexico-US border cities, where risks are shaped by mobility and drug and sex trades, are disproportionately affected; in Tijuana, adult prevalence is estimated to be as high as 0.8% among adults (vs. 0.03% nationally), and HIV prevalence among MSM, SW and IDU in Mexican states bordering the US is 16.6, 8, and 6%[73, 101, 102].

HIV Prevalence and Epidemiology Among Mobile Populations

*Labor Migrants*

In Mexico, US migrants are at higher risk of HIV than non-migrants [96] (Table 1). Across five Mexican states, migrants reported more recent HIV risk behaviors than non-migrants (e.g., number of sex partners and use of non-injected drugs). However, migrants also reported increased protective behaviors (e.g., condom use; HIV testing) [96]. Among recent male migrants (n = 354), making two or more trips to the US was associated with a three-fold higher odds of consistent condom use. Among migrants, consistent condom use was positively associated with recent multiple, casual, and non-monogamous sex partners [103].

SW

Mexico, Belize, Costa Rica, Guatemala, and Panama attract migrant SW [104–108]. Among SW across five

countries, the foreign-born proportion in El Salvador, Nicaragua, and Honduras was negligible (<2%), yet much higher in Guatemala (59%) and Panama (68.1%) [109]. Mobility circuits in Central America and Mexico form in response to changing demands for transactional sex (e.g., during harvest season) and in search of better pay [107, 110]. In La Cruz, a truck crossing along the Costa Rica-Nicaragua border, the majority of SW are Nicaraguan, have mobile clients, and cross into Costa Rica daily, where sex work is legal and more lucrative [110]. Among 484 SW in Chiapas, Mexico, most were migrants from Guatemala (n = 191), Honduras (n = 85), and El Salvador (n = 75) [106]. In Panama, most SW are Colombian and Dominican [107]; in Belize, most originated from El Salvador, Guatemala and Honduras [107, 111]. Studies reporting HIV prevalence and risk factors among mobile SW are sparse. Of 471 SW in Tijuana, 79% were born in another state. Among migrants, the prevalence of HIV, syphilis, and any STI were 6.6%, 12.3%, and 31.1% [112]. While migrant status was protective against any STI in unadjusted models, there was no adjusted association. UNAIDS data among SW in transit stations indicate that prevalence is higher in transit stations than in the capital city in all but one country (Table 2). For example, HIV prevalence among SW in Puerto San Jose, Guatemala (7.9%) more

than doubled that of the capital (3.3%) in 2002. San Pedro Sula, a major transport and trading hub in Honduras, represents the highest prevalence among SW in Mesoamerica (13.0%) [99].

### MSM

No studies among mobile MSM were identified. According to data reported by UNAIDS, the highest HIV prevalence among MSM (16.10%) in Honduras is in San Pedro Sula, doubling that of the capital [99]. High HIV prevalence among MSM in other transit stations has also been reported, though comparisons with the capital were not possible. HIV prevalence is 9.3% in Acapulco, Mexico, a major sex tourism destination, and 10.6% in Panama city, located along a key international transit route [99]. Epidemiologic studies are needed to assess the intersections between mobility, sex tourism, and HIV among MSM.

### IDU and Deportees

Observational studies have documented associations between HIV and deportation along the Mexico-US border [113, 114]. Among 898 male IDU in Tijuana, 67% had been deported from the United States; of these, 5.8% were HIV-positive. The adjusted odds of HIV infection were four-fold higher among male IDU who were deported than non-deported males [114]. Among 219 IDU in the same setting, deportation was inversely associated with drug treatment, recent medical care, and HIV testing, suggesting that deportation impedes access to HIV prevention [113]. We did not identify any epidemiologic studies among deportees in Central America.

### Indigenous Migrants

Few epidemiologic data exist among indigenous migrants. Higher HIV prevalence in San Pedro Sula and other parts of Honduras is believed to be linked to the mobility of indigenous groups. The Garífuna represent 5% of new infections in the region, among whom prevalence is 4.5% [98, 115]. The HIV epidemic among the Garífuna is reportedly “rooted squarely in the economic realities of labor migration” [116] (p. 458) and linked to Central American-Caribbean mobility [117], though this has not been systematically evaluated.

While some quantitative evidence suggests a relationship between mobility and HIV infection and risk, most pertains to Mexico-US migrants. Research with deportees, trafficked persons, indigenous migrants, truck drivers, agricultural workers, and drug-using populations, especially in Central America, is needed.

**Table 2** HIV prevalence among sex workers in transit stations in Central America and Mexico, 2002

| Transit station    | Station type       | HIV prevalence (%) |
|--------------------|--------------------|--------------------|
| <i>El Salvador</i> |                    |                    |
| Acajutla           | Port               | 3.60               |
| San Salvador       | Capital            | 4.00               |
| <i>Guatemala</i>   |                    |                    |
| Escuintla          | Along highway      | 2.30               |
| Puerto Barrios     | Port               | 4.20               |
| Puerto San Jose    | Port               | 7.90               |
| Guatemala city     | Capital            | 3.30               |
| <i>Honduras</i>    |                    |                    |
| Puerto Cortes      | Port               | 8.60               |
| San Pedro Sula     | Transportation hub | 13.00              |
| Tegicugalpa        | Capital            | 8.10               |
| <i>Nicaragua</i>   |                    |                    |
| Bluefields         | Port               | 1.90               |
| Corinto            | Port               | 1.10               |
| Managua            | Capital            | 0.2                |
| <i>Panama</i>      |                    |                    |
| Colon              | Port               | 2.20               |
| Panama City        | Capital            | 1.80               |

Source UNAIDS/WHO/UNICEF epidemiological fact sheets on HIV and AIDS, 2008

## The Social and Structural Context of HIV/STI Vulnerability Among Mobile Populations

The following social and structural factors were linked to HIV/STI risk among mobile groups: social isolation, socio-economic impacts of displacement, gender inequalities, and stigma and discrimination (Table 3). These were primarily linked to increased HIV/STI risk, though some protective effects were described.

### *Social Isolation*

Migration often involves the rupturing of social networks and poses barriers to social, linguistic, and cultural integration. To cope, male labor migrants and deportees seek new sex partners and binge on drugs and alcohol [104, 118–120]. In Oaxaca City, Mexico, HIV-positive migrants described family separation, language and cultural barriers, and efforts to conceal one's undocumented status as resulting in extreme social isolation during their time in the United States, which led them to seek new sexual partners [119]. Deportees along the Mexico-US border described the extreme isolation they experienced after being repatriated to a place where they had little social support or cultural familiarity [118]. Many had lived in the United States their entire lives. Deportees described transactional sex, increased drug use, and casual sex as coping mechanisms for social isolation in Tijuana, where ample opportunities for these activities exist [118]. Interestingly, the liberal sexual cultures in migration destinations may also promote risk reduction; in the United States and along the El Salvador-Guatemala border, migrants described engaging in protective behaviors to offset risk [96, 120].

Social isolation may also pose barriers to the development of support networks to mitigate risk among mobile populations. Among SW, the formation of peer networks—an important pillar of HIV prevention in other contexts—is hindered by the constant mobility of SW, who “cannot establish trusting relationships with each other or with others [...] [and consequently] cannot demand protected and secure working conditions” [107] (p. 250).

Mobility for other purposes (e.g., family reunification) may buffer social isolation; however, we did not identify research assessing this. Additional empirical studies assessing the psychosocial impacts of social isolation, such as on mental health, are also warranted.

### *Socio-Economic Effects of Displacement*

“I’ve met a few that got deported. They’re HIV positive now. I thank god I’m still clean. I’ve met them ‘cuz their family, they don’t care for them. They got deported and they lose hope.... They know the

risk of using someone else’s syringe and the risks of catching AIDS and they still do it.”

[Deportee, Tijuana, Mexico, in [118], p. 4]

Deportation from the United States (and Mexico) has emerged as a potential contributing factor to the regional HIV epidemic. Upon repatriation, deportees typically find themselves without shelter or economic resources [118]. In a study of deported clients of SW in Tijuana, most were unable to find steady employment after being deported from the US, and became economically reliant on Tijuana’s thriving sex and drug trades for survival. Many doubted their ability to engage in HIV prevention while remaining dependent on these activities [118]. Deportees often responded to feeling socially and economically uprooted by engaging in known HIV risk behaviors (e.g., syringe sharing; unprotected sex with SW) [118]. Nevertheless, some perceived their migration experience as protective; for instance, HIV prevention accessed in the US helped some mitigate risk in Tijuana [118].

Although deportees in Central America also experience extreme marginalization [121], we did not identify any published studies primarily dedicated to the analysis of HIV risk among deportees in Central America. Research on deportees’ structural experiences before and after repatriation (e.g., poverty, homelessness, criminality) and their HIV risk is needed.

### *Gender Inequalities*

Gender-based power dynamics often limit women’s sexual agency. Cultural norms which “grant sexual rights, knowledge, and decision-making to males, (e.g., *machismo*) and require ‘decent’ women to be passive and sexually submissive” [111] (p. 31) tend to tacitly ignore or sanction infidelity among male migrants [111, 119]. Among HIV-positive migrants in Oaxaca, Mexico, condom use was perceived as a sign of decreased masculinity, possibly explaining their infrequent use [119]. Across countries, migrants’ female partners acknowledged the risks posed by their partner’s infidelity. Most cited barriers to condom use with long-term partners [111, 116, 122, 123], including male resistance against condom use or refusal of sexual contact [123]. In indigenous migrant-sending Mexican villages, HIV among rural women has been linked to challenges negotiating safe sex with return migrants [122]. In Central America, among Garífuna women “questions of power, sexuality and affective expectations about partners complicate the situation for women hoping to prevent infection” [116]. Of married truck drivers with extramarital partners in Cd. Hidalgo, Mexico, 64% reported that they decided on condom use, 24% reported that they and their partner decided, and 10% reported that their partner decided [124].



**Table 3** Studies describing the social and structural context of HIV vulnerability among mobile populations in Central America and Mexico, 2000–2010

| Reference  | Location   | Design   | Population   | N   | Contextual factors described  |
|--|--|--|--|---|---|
| Bronfman et al. [121], Bronfman et al. [104, 110, 120], Caballero et al. [125], Dreser et al. [107], Infante et al. [129], Leyva-Flores et al. [141] | 11 transit stations in Central America & Mexico        | Household surveys, ethnography, qualitative interviews | Households, SW, migrants, MSM, NGOs, key informants                | Total (interview): 833<br>Total (survey): 4720<br>Mobile (interview): 285 (34.2%) | Across the countries studied, human rights violations, violence, poverty and corrupt authorities were reported across transit stations. Transactional sex and survival sex, rape, and other forms of sex trade happen in conditions that increase HIV risk in regional transit stations                   |
| Cuadra et al. [126]  | Cd. Hidalgo and Chetumal, Mexico                       | Qualitative  | SW   | Total: 20;<br>Mobile: N/A   | Survival sex work is common in these Mexican border cities (i.e., due to a lack of work/travel permits; poverty), where sex work regulations are more punitive than protective and tend to violate human rights. The stigmatizing effects of regulation result in clandestine SW                          |
| Goldenberg et al. [118]  | Tijuana, Mexico  | Qualitative  | Deported male clients of SW  | Total: 30;<br>Mobile: 20 (66.7%)  | Clients perceived deportation as resulting in social isolation and economic dislocation, which were linked to HIV through substance use and unprotected sex with SW   |
| Infante et al. [105]   | Tapachula & Cd. Hidalgo, Mexico; Tecun Uman, Guatemala | Qualitative  | Key informants, migrants, sex workers                              | Total: 61;<br>Mobile: 30 (49.2%)  | Migrants were seen as the cause of social problems, including HIV. SW in local brothels are primarily Central American. Stigma and discrimination were particularly directed at migrants from certain countries (e.g., El Salvador) and ethnic groups (e.g., indigenous)                                  |
| Porras et al. [127]  | Escuintla, Guatemala                                   | Qualitative  | SW   | Total: 35;<br>Mobile: 28 (80%)  | Temporary workers and other mobile clients visit SW. SW reported poor access to prevention and care due to stigma and poor quality of public services   |
| Ragsdale et al. [111]  | Orange walk town, Belize                               | Qualitative  | SW   | Total: 33;<br>Mobile: 33 (100%)   | Sex workers' countries of origin included Guatemala (79%), El Salvador (15%), and Honduras (6%). Their clients include agricultural workers, factory workers, truckers, military, and tourists. 47% migrated for sex work and 53% initiated sex work when they couldn't meet subsistence/remittance needs |
| Sowell et al. [119]  | Oaxaca city, Mexico                                    | Qualitative study                                      | HIV+men and women who became infected in the US or by a US migrant | Total: 10;<br>Mobile: 10 (100%)   | Condom use is perceived as a sign of decreased masculinity, posing barriers to safer sex. Social isolation and loneliness in the US provided the motivation to seek out new sexual partners during their time away from home  |
| Stansbury and Sierra [116]   | Las Espinas, Honduras                                  | Qualitative  | Garifuna population in Las Espinas                                 | Total: 72<br>Mobile: N/A  | The Garifuna are aware of HIV risks associated with migration, but negotiating risk is a process that pits knowledge and the risks of male labor migration against affective expectations for partners and gender roles   |

<sup>a</sup> *Note:* for studies that included both mobile and non-mobile populations, we represent the findings only as they pertain to mobile populations (e.g. SW) as much as possible; wherever possible, the results specifically discuss the situation of migrant and mobile groups, though not all studies provided data broken down by migration status

Gender inequities and their consequences for HIV vulnerability appear to be exacerbated in transit stations, as in other migrant communities internationally (e.g., South African mining towns). Females are typically outnumbered by males during migration. Gender-based violence (e.g., sexual harassment) is normalized, and sex is often positioned as a necessary resource for female migration [125]. To receive protection from violence and ensure safe passage, some females become sexual partners of “*coyotes*” [125]; others report sexual favors as part of everyday interactions with authorities, smugglers, and truck drivers [110, 124]. Approximately 60% of migrant females surveyed across the region reported sexual experiences during their journey, including rape, coerced sex, and intimate relationships [104, 125]. Migrant females also engage in survival sex to obtain money, shelter, or food [104, 121, 125]. They often began sex work in their migration destination, viewing this as a temporary strategy to meet subsistence/remittance needs [107, 111]; among Central American SW along the Mexico-Guatemala border, 88.2% initiated sex work in Mexico [106]. Survival SW often experience barriers to HIV prevention, as immediate needs often supersede safer sex considerations [126]. High numbers of clients, poor access to care, client pressures for unprotected sex, and violence during condom negotiation shape HIV risk among SW [127, 128]; mobile SW often work in isolated roadside motels, truck stops, and truck drivers’ vehicles, which increase the potential for violence or coercive sex [107].

Trafficking for sexual exploitation also disproportionately affects females. Trafficking is a complex process, with experiences ranging from complete force (e.g., kidnapping) to nuanced cases of coercion. The decision to begin and continue sex work can be understood as a continuum, with trafficked females on one end and women who choose to engage in sex work on the other [69]. However, women who begin sex work by means of trafficking often eventually view themselves as voluntary sex workers, blurring these boundaries [69]. Across the region, sex work was generally perceived as necessary to facilitate migration or economic survival. SW in transit stations were primarily motivated by poverty [110], though some were tricked, forced, or coerced [107, 125]. Sex trafficking has been described in border areas, ports, areas hosting migrant workers, and tourist destinations. Along the Costa Rica-Nicaragua border, truck drivers reported sex with undocumented Nicaraguan SW as young as 13 [110]. SW from certain countries are also moved between cities or establishments in border areas to provide clients with a supply of “new” women, suggesting the existence of trafficking networks [106, 107].

Trafficked females in other contexts experience high levels of HIV/STIs and physical, sexual, and psychological abuse; however, we did not locate any studies reporting the

circumstances shaping HIV risk among sex trafficked females. Research teasing out trafficking, mobility, sex work, and the reasons for sex work initiation is needed.

### *Stigma and Discrimination*

Stigmatization and discrimination by authorities (e.g., immigration officials), community members, and health care providers exacerbate HIV risk among mobile populations [121]. In most transit stations, undocumented migrants, women, SW, indigenous populations, and MSM were highly stigmatized and often perceived to be vectors for HIV [107, 121, 129]. Among migrant women, stigma can pose barriers to HIV prevention [104, 121, 124]. Migrant SW were particularly stigmatized as whores, “husband stealers”, “loose women”, and transmitters of HIV [121, 125]:

“Here in Guatemala, all the prostitutes come from other countries. Those from Honduras and El Salvador are the hottest, but they also have more AIDS. Honduras is an important country, a “number one” in AIDS cases. Lots of *sidosos* [pejorative term referring to people with HIV] live in Honduras.”

[Local resident, Mexico-Guatemala border, in [105], p. 8]

Stigma and discrimination within the health care sector sometimes reinforce these perceptions. Sex work in many Mexican and Central American border cities is regulated, though regulations were described as punitive and as barriers to effective care [106, 110, 121, 126]. These regulations are diverse, but generally include mandatory registration, STI/HIV screening, and confinement to specific sex work districts. Unregistered SW are subject to imprisonment or fines; extortion by authorities is common. In Guatemala, Belize, and Mexico, regulatory systems were described as discriminatory, leading SW to bypass them [111, 127]; along Mexico’s borders with Guatemala and Belize, SW outside the workplace are required to follow a dress code to “protect social order” [126]. Regulations generally exclude undocumented migrants, minors, HIV-positive women, and those working outside of red light districts. Consequently, clandestine SW experience additional barriers to prevention and care, exacerbating risks [107, 126, 130].

### Interventions and Initiatives in Central America and Mexico

The only region-wide HIV/STI prevention intervention identified that has been evaluated was the Global Fund-supported *Mesoamerican Project* (Table 4). Its components included *behavior change communication and condom*

**Table 4** Studies describing HIV prevention interventions among mobile populations in Central America and Mexico, 2000–2010

| Reference             | Location  | Description of intervention   | Population                              | N   | Key findings   |
|-----------------------|---|---|---|---|--|
| Bronfman et al. [124] | Cd. Hidalgo, Mexico   | HIV/AIDS information and condom promotion, informed by ethnography  | Truck drivers                           | Total: 307; mobile: 307 (100%)                                | Perceptions of risk for HIV/AIDS were lower for truck drivers in the intervention group compared with baseline, an effect associated with greater reported condom use by truck drivers in this group   |
| Leyva et al. [128]    | Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama | Performance audit of the <i>Mesoamerican Project</i> , detailing the results of an individual-level intervention (e.g., behavior change communication, condom distribution) conducted to provide comprehensive HIV-related care to mobile populations   | FSW and youth (between 15–24 years old) | Total: 1586; mobile (SW): 460 (85%); mobile (youth): (78.79%) | FSW: A significant increase in the proportion using condoms with intimate partners and clients; the proportion last tested for HIV in their community and who received information during the visit; and the proportion that received a gynecological exam in last 3 months. Youth: A significant increase in the proportion reporting condom use at last sex, free condom availability locally, and being offered an HIV test locally |
| Sabido et al. [131]   | Escuintla, Guatemala  | Multi-level <i>biomedical</i> (setting up STI clinics, public laboratory strengthening), <i>behavioral</i> (condom negotiation workshops with SW and bar owners), and <i>structural</i> intervention (advocacy with establishments, police, and policymakers to reform sex work regulations) for SW | FSW                                     | Total: 1554; mobile: 575 (37%)                                | A significant increase in the proportion of FSW who reported consistent condom use with new & regular clients and who reported condoms as an effective preventive measure, but also a reduction in condom use with regular partners. STI incidence significantly declined except syphilis. Global HIV incidence significantly dropped from 1.85/100 person-years in 2005 to 0.42 in 2008   |

*distribution*. It was evaluated among 868 SW and 718 youth (ages 15–24) in transit stations in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. A significant increase in condom use and in the proportion who were last tested for HIV, received information during the visit, and received a gynecological exam was reported among SW. Among youth, a significant increase in recent condom use and the proportion who were offered free condoms or an HIV test were reported; however, no significant effects on sexual behavior were found [128].

Two experimental or quasi-experimental evaluations were identified among country-level interventions.<sup>2</sup> The *biological, behavioral, and structural intervention* among SW in Guatemala (including 575 mobile SW) achieved a significant decrease in HIV incidence, from 1.85/100 to 0.42/100 person-years, with significant declines in most STIs and increased consistent condom use with clients. However, migrant SW were more likely to be lost to

follow-up, among whom the intervention may be less effective [131]. In an ethnographically-informed intervention for truck drivers in Mexico, *tailored information and condom promotion* reduced perceptions of HIV/AIDS risk [124].

Among interventions that have not been formally evaluated, *targeted social marketing* has been employed among truck drivers in El Salvador<sup>3</sup> and the Garífuna in Honduras.<sup>4</sup> *Increased access to care* has been implemented in El Salvador, including the establishment of border clinics,<sup>4</sup> mobile outreach units,<sup>5</sup> and training of medical providers in transit stations.<sup>4</sup> Efforts to *engage authorities* have occurred in El Salvador, by providing condoms to police and immigration officials<sup>4</sup> and in Costa Rica through trainings on human rights, HIV, and sex trafficking.<sup>6</sup> *Peer education* has been undertaken among mobile indigenous groups in Mexico [132] and Panama.<sup>7</sup>

<sup>3</sup> UCJSC, 2005, unpublished data.

<sup>4</sup> HCP, unpublished data.

<sup>5</sup> MOH, 2002, unpublished data.

<sup>6</sup> FUNDESIDA, unpublished data.

<sup>7</sup> ACNUR, unpublished data.

<sup>2</sup> While other successful HIV prevention interventions among the general population or most at risk groups have been published, those that did not specify the migrant population sampled were not eligible for inclusion.

## Discussion

Epidemiologic evidence linking HIV to Mexico-US migration indicates harmful (e.g., increased sexual partners, drug use), and protective effects (e.g., condom use) [96, 97, 103]. Research suggests that mobility has gendered health implications, which may be partly attributable to the different reasons that men and women migrate [78, 114, 125]. In Central America, HIV prevalence is high in transit stations, especially among SW. There is a paucity of published epidemiologic data in Central America, especially from Nicaragua, Panama, Belize, and Costa Rica. Given high levels of mobility in Panama and Belize, which also represent the highest regional HIV prevalence, data collection should be supported.

We identified social and structural forces, including social isolation, gender inequalities, human rights violations, and socio-economic effects of displacement as “fundamental causes” of HIV risk among mobile populations. In transit stations, the mixing of vulnerable groups, high levels of risk behaviors and HIV prevalence, and poor access to prevention create an HIV “*risk environment*” [133]. This is understood by local residents, who regard border areas as inherently risky [121]. Researchers have called for a shift in the way we conceptualize the relationship between mobility and HIV [7], since “efforts to reduce risk by changing behavior may be hopelessly ineffective if there is no clear understanding of the process that leads to exposure” [36] (p. 85). Thus, interventions should be shifted away from *risky individuals* and instead prioritize “*risk environments*”. Efforts to create enabling environments for HIV prevention in transit stations, where targeted prevention may have a disproportionately large impact, should be prioritized.

Mobile populations are heterogeneous and possess diverse motivations (e.g., poverty, family reunification). The different reasons and conditions under which people migrate “must be considered to understand the effects of mobility on disease emergence and diffusion” [8] (p. 947); for example, forced migrants generally experience greater HIV risks than voluntary migrants [39, 114, 118, 134]. Although qualitative studies have provided insights into the experiences of SW and undocumented migrants in Central America, few studies include the most vulnerable groups, such as trafficking victims. More traditional forms of migration (e.g., labor migration) have been comparatively well-researched in Mexico, though lacking in Central America. We did not identify any studies of HIV/STI vulnerability among resource-extraction workers, and few covering truck drivers, indigenous groups, and internal migrants. We recommend that future studies focus on the experiences of under-studied mobile populations (e.g., MSM, indigenous populations, deportees, and trafficking victims).

Mobility is a non-linear process; thus, challenges exist in linking where and how mobility is related to behavioral, social, and structural changes. While there remains little doubt that a relationship exists between mobility and HIV, this review was limited by a dearth of longitudinal or comparative epidemiologic data regarding HIV incidence and risk factors, especially in Central America. We identified a large need for the conduct and evaluation of HIV prevention interventions for mobile populations in the region. While qualitative research generally indicates that the circumstances related to mobility entail risks, the epidemiologic data available does not provide conclusive evidence of this; it is possible that mobile groups are predisposed to take greater risks. Culturally sensitive studies employing more sophisticated measures (e.g., time away from home; number and concurrency of sexual partners), and longitudinal, comparative studies (e.g., in sending and receiving communities) are needed. Empirical research on social and structural factors among migrants, such as examining the role of violence as a feature of the HIV “*risk environment*”, is also recommended; studies using multi-level methods (e.g., GIS; mixed methods) or comparing the impacts of structural factors across different risk environments (e.g., border posts with different sex work and immigration policies) are also needed. Finally, studies of sexual and drug-using networks of mobile populations (e.g., sex tourism in neighboring countries; bi-national sex partners) would be instrumental to future interventions.

## Strengths and Limitations

Since too few studies exist in this area to employ quality-based inclusion criteria or meta-analysis, we employed a systematic methodology that best met our objectives [135]. As well, the categories we employed to organize our analysis of social and structural factors represent *artificial separations*; for example, although we categorized survival sex as a gender-based issue, it is also related to stigma and socio-economic dislocation. While other sources of social and structural vulnerability were also identified, our categories reflect the most common themes.

This bi-lingual review is, to the best of our knowledge, the first rigorous synthesis of evidence linking mobility and HIV across Central America and Mexico. While prior reviews have assessed Mexico-US migrants [97, 136], the only review including Central America was conducted in 1998, did not use a systematic methodology and focused mostly on Mexico [137]. In the decade and a half since, mobility has become the subject of greater attention [128], and immigration and border enforcement policies have dramatically changed. The current review examined and evaluated these trends among recently identified groups, such as deportees. While most studies have focused on

individual-level behaviors, the inclusion of qualitative data and use of the “fundamental causes” framework to analyze them facilitated an in-depth understanding of how mobility-related social and structural disruptions shape HIV risk.

### Public Health Implications

Evidence from other settings demonstrates the importance of addressing mobility-related risks early in an epidemic, such as in most Central American countries and Mexico. South African modeling scenarios indicate that early in an epidemic, frequent migration between populations with different HIV prevalence rates and changes in migrants’ sexual risk behaviors may accelerate HIV diffusion [15].

*Priority interventions* should target transit stations at multiple levels (e.g., *individual; interpersonal; environmental*) and be based on approaches with demonstrated success. Components of the *biomedical* (e.g., setting up STI clinics), *behavioral* (e.g., peer-led condom negotiation workshops), and *structural* intervention (e.g., engaging establishment owners and police) in Guatemala may be effective in neighboring countries [131]. Large-scale mobility, different policies, and under-resourcing require regional integration of interventions. Lessons can be learned from the Avahan project in India, which provides integrated prevention to mobile populations in high-impact communities along trucking routes, including branded roadside clinics which offer a range of health services, including HIV/STI testing and risk reduction counseling [13]. Although the *Mesoamerican Project* represents a key step in addressing the needs of mobile groups [128], multi-level, tailored approaches are needed.

Tailored interventions are necessary for vulnerable populations, who may be the least able to positively respond to population-based approaches [138]. Culturally tailored interventions, paralleled by appropriate communication and public awareness, are recommended to avoid further stigmatization [7, 12]. Since incongruities between the assumptions of public health practitioners, policymakers, and vulnerable groups may limit the potential effectiveness of interventions [139], participatory approaches and civil society partnerships are needed. Recommended intervention components for specific mobile groups include appropriate medical, psychological, legal and economic assistance to reduce harm among *trafficking victims*, who receive an “alarming” lack of support [70]. Health services and related support (e.g., shelter, HIV/STI testing, drug treatment) are also essential for enabling HIV prevention among *deportees*, who receive little or no government support [114, 121].

To address the health and social impacts of mobility, including HIV, substance abuse, mental health, and chronic diseases, and achieve substantial and lasting health improvements, policies addressing their “fundamental

causes” are needed [140]. These may include economic and social development, and ensuring that immigration and public health policies are not at odds with one another. In the shorter-term, reducing stigma and providing accessible health and social services to migrants can create “the sense of security and the sense of community that is necessary for health” [7] (p. 828).

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