

COMMENTARY

High risk populations and HIV-1 infection in China

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ABSTRACT

China is currently experiencing one of the most rapidly expanding HIV epidemics in the world. Although the overall prevalence rate is still low, with a population of 1.3 billion, high-risk factors which have contributed to the HIV/AIDS epidemics worldwide continue to prevail in China, including a high rate of injecting drug use and needle sharing, commercial sex with low rates of condom use, and concurrent sex with both commercial sex workers and noncommercial casual or steady sex partners. In addition, there are increasing “double risk” populations overlapping drug users and sex workers, as well as increasing rates of STDs and HIV among high-risk populations. Sexual transmission, therefore, may serve as a bridge connecting high-risk populations with general populations. There is an urgent need to prevent the spread of HIV from these high-risk populations into the general population of China.

Keywords: HIV, high risk, China.

INTRODUCTION

HIV has spread to all of China's 31 provinces, autonomous regions and municipalities, creating one of the fastest-growing HIV/AIDS epidemics in the world [1,2]. The HIV/AIDS epidemic in China has gone through three phases: the Entry Phase (1985 -1988), the Spreading Phase (1989-1994) and the Expansion Phase (1995-present). The striking increase of HIV-1 infections over the past few years may herald entry into a new fourth phase that will include much larger numbers of infected people, involvement of more risk categories and the general population. By the end of 2004, the cumulative number of reported HIV positive cases was 89,067, with significant increases in reported infections since 2002 [3], and the estimated number of people living with HIV was 840,000, which translates into an overall HIV prevalence of 0.07%. There is a particular concern about the epi-

dem in China; although the overall prevalence rate is low, with a population of 1.3 billion, the rate of spread of the epidemic is among the highest in the world [3,4].

In most Asian countries, HIV epidemics follow a chain of transmission of injecting drug users, sexual contact, and mother to child transmission [2,5-7]. The Chinese HIV-1 epidemic initiated in injecting drug users (IDUs) in the late 1980s, documented with spreading in blood donors and transfusion recipients in the early 1990s; subsequently, transmission occurred among commercial sex workers (CSWs) and their clients, and the clients' female sexual partners. Finally, the spread of HIV in China has reached the stage of mother-to-child transmission. Therefore, IDUs, CSWs, patients with sexually transmitted diseases, former plasma donors, and men who have sex with men are at high risk for acquiring HIV infection. The HIV infection rate among high-risk groups has increased dramatically. Efforts targeting the high-risk “bridge” populations are of urgent need. Here we provide a review of the HIV epidemic in each of the high-risk populations in China.

INJECTING DRUG USERS (IDUS)

HIV transmission through sharing needles and syringes has been the major transmission mode in the western world

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and southeastern Asia. In China, the first HIV case among IDUs was detected in 1989 in Yunnan province. Since then, HIV has spread among IDUs nation wide. By the end of 2002, all 31 provinces had reported HIV infection among IDUs [8]. Intravenous drug use continues to rank first among all transmission modes in China, and was estimated to account for 43.9% of all HIV infections in 2003 [3].

The overall number of reported drug users continues to increase, from 70,000 in 1990 to 910,000 in 2001, while the actual number of drug users was estimated to be about 6 million [8]. The prevalence of high risk behaviors among drug users has also climbed, as behavioral data collected from the HIV/AIDS sentinel surveillance program in 2000 showed that 53.3% of drug users use injection to administer drugs and most shared needles and syringes. It is conservatively estimated that there are 450,000-750,000 needles and syringes being shared daily [8]. The proportion of IDUs among drug users nationwide was 13.5% in 1988 [9], 42% in 1994, and 50% to 60% during 2000 to 2004 [10]. The proportion of IDUs sharing needles ranged from 0 to 93%, averaging 45% [3].

The overall HIV infection rate among drug users reached 7.2% in 2003 in China [3], and as high as 70% to 80% among IDUs in some regions, including Yunnan and Guangxi [11, 12], as 40-55% reported sharing needles. Our study in Guangdong found that HIV transmission through IDU continues to increase, from 0.02% in 1996 to 5.4% in 2004. HIV infection among drug users in the Pearl River Delta Region (PRDR) of Guangdong province was 29.0% [13]; 99.5% of the drug users were IDUs, of whom, 75.4% had prior experiences sharing injection paraphernalia.

COMMERCIAL SEX WORKERS (CSWS)

Although HIV infection has been mainly reported among IDUs, sexual transmission of HIV is becoming more prevalent in China, which is likely to make HIV control more difficult. The proportion of sexually transmitted HIV infections increased from 5.5% in 1997 to 19.8% by the end of 2004 [3]. This suggests that HIV transmission is currently spreading from high risk populations into the general population through unsafe sexual behaviors, which might become one of the key risk factors of a generalized HIV epidemic in China.

Commercial sex is illegal in China, but after emerging in the 1980's it has become more and more prevalent in many areas of the nation. It was estimated by Newsweek that more than 10 million women were engaging in commercial sex in mainland China in 2003 [10]. The majority of CSWs are in their teens and early 20s, with a poor education of less than a middle school level [14-16]. CSWs find their clients in many public places including bars, clubs,

hotels, massage and sauna parlors, barber shops, bus stations, and on busy city streets [15, 17]. Most CSWs are highly mobile, moving from one establishment to another approximately every 3 to 4 months [16] and/or frequently moving between cities [18].

Behavioral surveys show that unprotected sex is still common among CSWs. Condom use remains extremely low among CSWs at about 10% from 1995 to 2000 [8]. In the 2003 survey, 62% of respondents said they used a condom during their last commercial encounter, but this figure varied from 8 to over 90% [3]. Sexually transmitted infections remained consistent in this population at around 30% to 67%, but the HIV infection rate increased about 60-fold from 0.02% in 1995 to 1.32% in 2001. According to the data from national sentinel surveillance in 2004, the average HIV prevalence rate among CSWs was 1.0%. Results from the 2003 epidemiological survey showed the prevalence rates were between 3.3-6.7% at four sites [3]. In Guangdong province, it has been estimated that there are over 300,000 female CSWs. Those CSWs usually lack knowledge about STDs and AIDS [19], and less than 35% use a condom regularly. Data from sentinel surveillance showed that HIV infection among CSWs has increased from 0.14% in 1998 to 2.25% in 2003.

Despite an increasing number of policies developed to support interventions among CSWs, and the successes of the pilot studies, the overall coverage of those prevention programs is still very low. Due to the illegal status of sex workers in China, CSWs migrate frequently and are hard to reach, making outreach programs very costly and difficult to conduct. There is an urgent need to explore more effective and practical strategies for interventions among CSWs [20].

“DOUBLE RISK” POPULATION (OVERLAPPING DRUG USE AND COMMERCIAL SEX)

Commercial sex activities are very common among the increasing group female drug users. Of all drug users in China, female drug users now account for 19%. More than half of female drug users were also engaged in commercial sex to exchange for money or drugs [8,21]. A qualitative study among female IDUs performed in Guangdong in 2002 showed that needle sharing and having multiple sex partners were common among female IDUs [22].

On the other hand, many HIV positive CSWs are also drug users. In 2001, 20%, 50% and 100% of HIV positive CSWs reported using drugs in Yunnan, Xinjiang and Guangxi respectively [8]. Studies reporting drug use behaviors in CSWs indicate that 5% to 25% of CSWs were drug users [13,15,23,24]. Data from Guangdong showed that about 30% of female IDUs had been CSWs and 29%

of male users had commercial sex experience (unpublished data). In 2003, Feng *et al* surveyed 300 drug users in Shenzhen and found approximately 76% of the respondents were IDUs and 40% (18.3% of all females and 21.7% of all males) had regularly shared needles with others. About 44% of male and 57% of female respondents had engaged in commercial sex in the 6 months preceding the survey (71.7% for female IDU). Only about 11% and 33% of these male and female respondents, respectively, consistently used condoms with their commercial sex partners [25,26].

Needle sharing, multiple sex partners, and unprotected sex are common in this overlap population, and expose them to a “double risk” of HIV infection and transmission. This overlap also creates a bridge for HIV transmission from infected drug-using populations to the general population via sex workers and their clients.

PATIENTS WITH SEXUALLY TRANSMITTED DISEASES (STDs)

STDs as a group are currently the third most common infectious disease after dysentery and hepatitis in China. The national STD surveillance data has shown that the number of STDs has increased during the past decade [8]. In 2002, 744,848 STD cases were reported from all 31 provinces including autonomous regions and municipalities [27]. Experts estimate that the actual annual STD caseload is at least 5 to 10 times this reported figure. The HIV prevalence among STD patients is relatively low. In the provinces where HIV infection is reported among STD patients, the prevalence rate was less than 1.8%. But in some individual HIV sentinel surveillance sites in Yunnan, the prevalence rate among STD patients was as high as 8% [8]. Of great concern is the increase in genital ulcerative infections, including herpes and syphilis, given their role in facilitating HIV-1 transmission.

Commensurate with the HIV epidemic, the epidemic of STDs has expanded rapidly in Shanghai during the last twenty years. Due to various reasons, Shanghai and its neighboring cities in the delta area of the Yangzi River have been major epidemic areas for STDs in China. The prevalence of chlamydia, gonorrhea, and syphilis was 3.5%, 0.5%, and 1.0%, respectively [28]. In the meantime, risky sexual behaviors among young adults and adolescents in Shanghai have been increasing, implying a potential spread of the STD epidemic and the importance of sex/STD education programs in Shanghai [28,29].

Since STDs facilitate the transmission of HIV, the large-scale epidemic of STDs threatens to promote a large-scale epidemic of sexually transmitted HIV/AIDS in China. Therefore STD control remains an essential measure for HIV control. However, health services for STDs remain

particularly problematic throughout the country. With the reintroduction of STDs in the late 1970s, strengthening of the technical infrastructure was done through development of specialist clinics, rather than through integration with primary health care providers. Therefore, STD treatment has become increasingly ‘medicalised’ rather than responding to a public health rationale. This has had a number of effects including poor health, poor adherence to treatment, high cost for services, and frequent misdiagnosis. More cost-effective and accessible STD treatment services should be developed and instituted on a national scale.

MEN WHO HAVE SEX WITH MEN (MSM)

Although men who have sex with men (MSM) are widely regarded as being at high risk for HIV infection, very limited data on the prevalence of HIV/AIDS among MSM are available in China. Due to cultural and social reasons, MSM in China had been reluctant to identify themselves in public and were unlikely to be approached by HIV/AIDS prevention and intervention programs that might be specifically designed for them. In recent years however, the social environment has become more open to MSM in China, making it easier to conduct HIV/AIDS research and intervention projects among them.

In 2003, the Guangdong CDC conducted a cross-sectional study among MSM in Guangzhou using snow-ball sampling. The prevalence of HIV infection was 1.7% (2/117) (Lin P *et al*, personal communication). The study results showed that 61.5% had unprotected anal intercourse (UAI) with regular partners and 46.6% had UAI with casual partners during the previous six months. MSM are an important risk group to study in the HIV/AIDS epidemic because they may facilitate transmission to the general population.

Recently, a pilot investigation was initiated to examine HIV/AIDS-related knowledge and behaviors among MSM including sex workers (“money boys”) in Shanghai (He N. *et al*, personal communication). These types of studies will provide useful information for determining the prevalence of HIV infection in this population and subsequently controlling the HIV epidemic.

BLOOD/PLASMA DONORS

The commercial plasma industry and black-market blood trade has fueled the transmission of HIV in China more efficiently than any other route. In the early 1990s, thousands of underground, for-profit blood/plasma collection centers were established in China, particularly in rural areas. The majority of paid donors were adults aged 20 to 50 years [30]. In these illegal blood/plasma collection centers, unsterilized blood-collecting equipment was of-

ten reused, and pooled blood cells were reinjected back to plasma donors after filtering the plasma [31-33]. These blood/plasma collection practices placed blood donors at risk for acquiring HIV infection. Since the mid-1990s, a large number of HIV infections have been reported among blood donors in many provinces, especially in central China [8]. The HIV prevalence rate among blood donors in Henan, Anhui, Shanxi, Hebei, Shandong, and Guizhou provinces was 10% to 20%, with certain communities having rates as high as 60% [8]. Consequently, the Chinese government has made efforts to prevent further spread of HIV through blood collection, including outlawing all unlicensed blood collection centers and enforcing HIV testing for all blood donors [10]. Thus, most donor infections occurred before 1996, though unsafe blood-collecting practices continue in some areas [10, 34].

Anhui province is one of several provinces in central China that have been severely affected by commercial plasma donations. By the end of March 2004, there were 2068 reported HIV infections in Anhui province. Most of these had resulted from paid plasma donations in the early 1990s [30, 35]. The number of reported HIV infections has continued to rise to more than 3000 presently, after massive HIV screening efforts among former plasma donors throughout 2004 and 2005. A study conducted by Ji *et al* among 1997 rural residents from 40 randomly selected villages in Anhui province in 2003 revealed that the HIV prevalence was 15.2% (95% CI: 11.4-18.9%) among former plasma donors and was 4.9% (95% CI: 2.7-7.2%) among non plasma donors (G JI, R DETELS *et al*, 2005, unpublished data). The overall HIV prevalence was 10.8% (95% CI: 7.9%-13.7%). This study suggests that plasma donation behavior that had occurred 8-9 years ago was still the major cause of the current HIV/AIDS epidemic. However, nearly 5% of non plasma donors were found to be HIV-positive, suggesting that HIV has spread from former plasma donors to the general population through sex with low rates of condom use. Similarly with Anhui, the HIV transmission in Shanxi province has been primarily through former plasma donations. About two-thirds of the reported cases were former plasma donors and 14.4% of the cases were infections resulting from transfusions of contaminated blood during surgeries [36].

OTHER HIGH-RISK POPULATIONS INCREASING HIV-1 TRANSMISSION

One of the populations that may have significant impact on the HIV-1 epidemic in China is the migrant population. China has nearly 121 million migrants and most of them are rural-to-urban, temporary economic migrants [37]. According to official registered migration data, 60% were male, 40% were aged 20 to 24 years [38] and 40%

had no more than a primary school education [37]. Most of the migrants were unmarried or married but living apart from their spouses and/or children [10]. The majority of migrants move from rural to urban areas to find jobs, and have limited knowledge of HIV/AIDS or STD prevention. Since they leave their homes for long periods of time, they may become vulnerable to HIV risk behaviors, including providing or purchasing commercial sex or drug use. According to HIV sentinel surveillance data from 1997, more than 70% of HIV positive cases in China were among migrant drug-using populations. It has been reported in a cross-sectional survey that the HIV prevalence among rural-to-urban migrants was 1.8 times higher (15.6% vs. 8.8%) than among rural residents who did not migrate to cities [39].

Recently, we identified 18 HIV infected individuals from 113 married women in rural villages of Shanxi province, all of whom were migrants and married with local villagers [40]. All infected women came from other provinces and even Myanmar. Some were previously sex workers or had multiple sex partners in their former places of work and were suspected to have been infected with HIV at that time. Four out of 12 husbands who received HIV testing were seropositive for HIV. Therefore, the floating population should be a major target population of HIV/AIDS prevention and control programs.

The general population, with low awareness and limited knowledge of HIV/AIDS, are also vulnerable to HIV risk behaviors. A national survey carried out in 2000 indicated that 20% of respondents knew nothing about AIDS and 26% did not know the modes of transmission of HIV. Only 45.8% believed that condom use could prevent sexual transmission of HIV. 62.5% said that they were embarrassed to buy condoms in shops or drug stores. A number of studies have shown that rural residents of Anhui province have low awareness of the HIV/AIDS epidemic, very limited knowledge about HIV/AIDS, and negative attitudes toward HIV infected individuals and their families [41-43]. Risk-taking behaviors such as premarital sex, unprotected commercial sex, and multiple sex partners have also been increasingly observed among rural residents. Taken together, a potential rapid spread of the HIV epidemic could be expected if no effective HIV prevention and intervention activities are taken in the general population.

CONCLUSIONS

Although many HIV/AIDS cases resulted from injecting drug use, and former commercial blood and plasma donations are still the major group of infections overall, most of the cases from blood donations occurred before 1996. Currently, the main HIV transmission route is through injecting drug use, with a proportion of HIV infections by

sexual transmission and mother-to-child transmission increasing in recent years. Specifically, heterosexual transmission is emerging as an important route that will have a major impact on the expansion of the epidemic in China for years to come. High-risk factors that contributed to the heterosexual epidemics worldwide, including large numbers of CSWs, low rates of condom use during commercial sex, and concurrent sex with both CSWs and non-commercial casual or steady sex partners [44], exist in China. The increasing “double risk” populations overlapping female drug users and female sex workers, as well as increasing rates of STDs and HIV among high-risk populations, may act as a “bridge” between high-risk populations and the general population and may currently be promoting a new fourth phase of HIV/AIDS epidemic in China. Effective measurements are urgently needed to prevent the spread of HIV from high-risk populations to the general population.

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