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Factors Associated With HIV Testing History and HIV-Test Result Follow-up Among Female Sex Workers in Two Cities in Yunnan, China

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Abstract

Background—The majority of people living with HIV/AIDS in China are unaware of their serostatus, and increasing the utilization of HIV testing may help to control the epidemic.

Methods—This longitudinal study was conducted among female sex workers (FSWs) in 2 cities in Yunnan Province, China. Participants were surveyed in face-to-face interviews and tested for HIV and STDs. Factors associated with HIV-testing history and HIV-test follow-up were analyzed.

Results—Of the 1642 study participants, 291 (17.7%) had been previously tested and 868 (52.9%) returned for post-test follow-up. Factors associated with having a previous HIV test included attending the Kaiyuan study (aOR: 4.9, 95% CI: 2.3–10.1), ≥9 years of schooling (aOR: 10.9, 95% CI: 2.6–45.5), <5 clients in the recent week (aOR: 1.7, 95% CI: 1.2–2.3), having a regular sexual partner (aOR: 1.9, 95% CI: 1.4–2.5), illegal drug use history (aOR: 2.2, 95% CI: 1.5–3.1), pelvic pain in the past 12 months (aOR: 1.9, 95% CI: 1.1–3.6), HIV-seropositivity (aOR: 1.8, 95% CI: 1.2–2.8), and high perception of HIV risk (aOR: 1.5, 95% CI: 1.1–2.2). FSWs who had ≥9 years of schooling (aOR: 1.4, 95% CI: 1.1–1.9), had <5 clients in the recent week (aOR:

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1.3, 95% CI: 1.1–1.6), or were from another province (aOR: 1.9, 95% CI: 1.4–2.5) or city (aOR: 1.4, 95% CI: 1.1–1.8) were more likely to follow-up.

Conclusions—The low HIV-testing history and follow-up rates found in this is study is a significant public health problem as many high-risk individuals are not aware of their serostatus. Immediate action needs to be taken to increase the utilization of HIV testing services and notify people of their HIV status.

Although HIV prevalence among the general population in China remains low, previous research and surveillance efforts have found staggering prevalence rates in some high-risk populations, such as female sex workers (FSW) and injection drug users (IDU).[1] Of all the Chinese provinces, Yunnan province has the largest number of people living with HIV/AIDS, accounting for 25% of China's cumulative HIV/AIDS cases.[2] The province's proximity to major opium-producing areas in Southeast Asia has led to higher levels of drug trafficking and addiction in Yunnan. Parts of Yunnan have active commercial sex industries and the compounding risks of unsafe sexual and drug injection practices have fueled the HIV/AIDS epidemic in the area.[3] In 2006 and 2007, the HIV prevalence in Honghe Prefecture, Yunnan was about 10 times that of all of China (0.5% vs. 0.05%) and was even higher among the region's high-risk populations of IDUs (59.9%–60.4%) and FSWs (8.3%–11.3%).[4]

Currently, the majority of people living with HIV/AIDS in China are unaware of their serostatus[5] and this lack of status awareness has been one of the main barriers to HIV prevention in China. In response to the growing epidemic, the Chinese Ministry of Health (MOH) has implemented HIV/AIDS policy that has expanded HIV testing through mandatory testing in prison and detoxification settings, testing outreach with high-risk populations, and free voluntary counseling and testing (VCT).[1,6,7] However, underutilization of these services has persisted[5,7–12] and is a challenging public health concern that has not yet been resolved. Of those who do seek HIV tests, large proportions fail to return for posttest counseling and results and thus still remain ignorant of their serostatuses.[8–10] In the face of similar problems regarding poor HIV test follow-up, other countries have expanded the use of rapid HIV testing,[13–16] and whereas rapid testing has been used in China, it has not yet been widely implemented.

Although previous research has identified the structural and interpersonal barriers to VCT utilization,[8–10,12,17–26] few studies have characterized the factors associated with having been previously tested for HIV and returning for HIV results and counseling among FSWs. Understanding these factors may help improve HIV-testing policy and increase testing utilization, which together will lead to better control of the Chinese HIV/AIDS epidemic. In this study, we analyze the risk factors associated with previous HIV-testing and current posttest follow-up among FSWs in Kaiyuan and Gejiu, Yunnan, China.

MATERIALS AND METHODS

Study Participants

This longitudinal study was conducted as a part of the China Comprehensive International Program of Research on AIDS (China CIPRA) between March 2006 and April 2007 in the

cities of Gejiu and Kaiyuan of Honghe Prefecture, Yunnan Province, China. Before study implementation, a Community Advisory Board (CAB) of brothel owners, FSWs, and retired local officials was established. CAB members explained study purpose, procedures, benefits, and possible risks of study participation to FSWs before participant recruitment. Outreach workers recruited FSWs directly in commercial sex establishments. Inclusion criteria stipulated that participants were female, at least 16 years old, lived in Gejiu or Kaiyuan, and had engaged in commercial sex work within the past 3 months. All participants provided written informed consent.

Data Collection

Specialists from the National Center for AIDS/STD Control and Prevention (NCAIDS) and the Yunnan Provincial Center for Disease Control and Prevention (CDC) trained local staff members from the Gejiu and Kaiyuan CDCs to give HIV pre- and post-test counseling. Trained staff members provided private, one-on-one HIV pretest counseling to all participants. Subjects were asked a series of questions regarding HIV-testing history, demographic information, HIV/STD knowledge, illegal drug use history, and sexual history through structured interviews. All participants were given the option to decline to answer any questions. Finally, blood specimens, urine samples, cervical secretion swab samples, and vaginal secretion samples were collected. A unique identity code was assigned to each participant's questionnaire and laboratory samples to protect subject confidentiality. Subjects were compensated 50 RMB (USD 7).

FSW participants were instructed to return in 4 weeks to receive HIV/STD test results and attend post-test counseling. Outreach workers and CDC staff contacted participants 1 week before the intended follow-up to remind participants to return for test results. Outreach workers gave direct reminders by seeking out participants in their workplace when they could not be reached by phone. To further protect the privacy of participants, subjects' HIV test results were not disclosed to outreach workers. CDC staff made extensive efforts to notify those who did not return for HIV post-test counseling, especially those who tested HIV-positive. Those who tested positive for one or more STDs were referred to treatment at the Kaiyuan People's Hospital/Kaiyuan Dermatology Hospital and the Gejiu Kafang Hospital/Gejiu Laochang hospital. The study protocol and informed consent forms were approved by the Institutional Review Board of the National Center for AIDS/STD Control and Prevention, Chinese CDC.

Laboratory Testing of HIV/STDs

Serum samples were tested for HIV antibody by enzyme-linked immunosorbent assay (ELISA; Organon Teknika, Boxtel, CO, Ltd., Netherlands). Positive samples were further confirmed by Western blot (HIV Blot 2.2 WB; Genelabs Diagnostics, Singapore). Blood specimens were also tested for herpes simplex virus (HSV-2; Herpe Select-2 ELISA IgG; Focus Technologies, Cypress, CA) and syphilis antibodies. Subjects with plasma positive for both TPPA (Serodia; Fujire-bio, Inc, Fuji, Japan) and RPR (RPR Diagnosis kit; Xinjiang Xindi, China) were considered syphilis positive. Wet mounts were made from vaginal swab specimens at the study site. Samples were classified as *Trichomonas vaginalis* positive if motile organisms were seen. Cervical swab specimens were tested for nucleic acid of

Neisseria gonorrhoeae and *Chlamydia trachomatis* by polymerase chain reaction (Amplicor; Roche Diagnostics, Basel, Switzerland). Urine was tested for trace of opiates (Acon MOP; Acon Biotech, Hangzhou, China).

Statistical Analysis

Data from questionnaires and laboratory testing were entered into and managed by DataFax system (Clinical Data-Fax Systems, Hamilton, ON, Canada), and transferred to a SAS database (SAS 9.1, SAS Institute Inc, Cary, NC) for analysis. Univariate logistic analyses were used to identify factors associated with having had an HIV test before the study and with attending HIV test results and post-test counseling in this study. Variables with $P < 0.2$ in univariate logistic analysis were included in a multivariate stepwise logistic regression analysis model, and those with $P < 0.1$ were kept in the final multivariate model.

RESULTS

Study Population

In total, 1657 FSWs were approached for participation in the study. Four of those approached declined the invitation to participate and 11 were less than 16 years old and thus not eligible to participate. The remaining 1642 participants provided informed consent and were enrolled in the study. Of the 1642 FSWs surveyed, 237 (17.7%) reported having been previously tested for HIV. In the HIV/STI testing of the current study, 168 (10.2%) participants tested HIV-positive, 170 (10.4%) were *N. gonorrhoeae* positive, 432 (26.3%) were *C. trachomatis* positive, 179 (10.9%) were *T. vaginalis* positive, 136 (8.3%) were syphilis positive, and 1099 (66.9%) were HSV-2 positive. In all, 233 women tested positive for urine opiates and of them, 133 self-reported injection drug use within the past 3 months. Of these drug-using and injection-drug-using FSWs, 39.5% and 46.7% were HIV-positive, respectively.

Table 1 highlights the differences in demographic and behavioral characteristics between HIV-negative and HIV-positive FSWs. More HIV-positive FSWs were older and were from outside of Yunnan or from other cities in Yunnan. When compared to HIV-negative FSWs, more HIV-positive FSWs reported engaging in certain risk behaviors including having ≥ 5 clients in the recent week (44.0% vs. 32.0%, $P < 0.002$), failing to use a condom with last client (19.0% vs. 13.2%, $P = 0.04$), and injecting drug use (51.2% vs. 5.8%, $P < 0.001$). However, condom use with regular sexual partners did not differ significantly between HIV-negative and HIV-positive FSWs and HIV-positive FSWs were more likely to have had a previous HIV test (32.1% vs. 16.1%, $P < 0.001$) and know the results of that test (17.3% vs. 7.5%, $P < 0.001$).

HIV-Testing History

Overall, previous HIV testing rates were low. Only 32.1% of HIV-positive FSWs had been tested before the study and an even smaller proportion (16.1%) of the HIV-negative FSWs had been previously tested. Of those who had been tested for HIV before, only 47.8% knew the result of that test. Only 937 (57.1%) FSWs had heard of an HIV test before participating in this study.

Table 2 shows the factors associated with having previously been tested for HIV. In multivariate analysis, those who attended the Kaiyuan study site (aOR: 4.9, 95% CI: 2.3–10.1), had ≥9 years of schooling (aOR: 10.9, 95% CI: 2.6–45.5), had <5 clients in the recent week (aOR: 1.7, 95% CI: 1.2–2.3), had regular sexual partners (aOR: 1.9, 95% CI: 1.4–2.5), a history of illegal drug use (aOR: 2.2, 95% CI: 1.5–3.1), or who had reported severe or persistent pelvic pain in the past 12 months (aOR: 1.9, 95% CI: 1.1–3.6) were more likely to have previously sought testing. FSWs who tested HIV-seropositive in this study (aOR: 1.8, 95% CI: 1.2–2.8) or perceived themselves at high risk for HIV (aOR: 1.5, 95% CI: 1.1–2.2) were also more likely to have previously undergone HIV testing.

Impact of Previous HIV Testing on Behavior

The majority of participants who had been previously tested for HIV reported that their posttest behaviors had changed; 81 (58.3%) reported increased condom use, 53 (38.1%) decreased sexual contact, 22 (15.8%) decreased needle sharing behaviors, and 34 (24.5%) visited physicians more frequently.

Returning for HIV Post-Test Counseling and Test Results

Of those tested, 868 (52.9%) returned for HIV/STD testing results and HIV posttest counseling. Seventy-seven (45.8%) HIV-positive and 697 (47.3%) HIV-negative FSWs did not return to learn HIV/STD results. Of those who did not return, 232 (30.0%) of them were successfully contacted and reported that they did not return, fearing an HIV-positive result. A total of 21 of the 168 FSWs who had been tested for HIV before and knew the result of that test returned for testing follow-up in the current study. All 21 reported that they were notified of their HIV-positive status at the result disclosure of the previous test. At least 90.9% of the HIV-positive FSWs who did not return to test-result follow-up were unaware of their HIV-positive serostatus. For those who did return and had regular sexual partners, only 17.9% (28/156) of HIV-negative FSWs and 17.2% (5/29) of HIV-positive FSWs had plans to notify their partners of the results.

Table 3 presents the characteristics associated with returning for HIV post-test counseling and test results among the 1621 FSWs who did not know their HIV status or previously tested HIV-negative. FSWs who had ≥9 years of schooling (aOR: 1.4, 95% CI: 1.1–1.9), had <5 clients in the recent week (aOR: 1.3, 95% CI: 1.1–1.6), were from outside of Yunnan (aOR: 1.9, 95% CI: 1.4–2.5) or from cities in Yunnan other than the 2 study sites (aOR: 1.4, 95% CI: 1.1–1.8) were more likely to return for result disclosure and counseling.

DISCUSSION

Low HIV testing utilization is a major public health concern that needs to be addressed by the Chinese government. The persistence of this problem could not only lead to increased transmission in high risk groups and the general population, but could also lead to higher disease burden as people living with HIV who are unaware of their serostatus will fail to begin treatment that can prevent disease progression. The results of this study suggest that FSWs are not benefiting from current VCT services and has significant implications for both policy change and HIV intervention and education programs.

Despite high HIV prevalence rates (10.2%) and high-risk behaviors identified in this population of FSWs, only 17.7% reported having been previously tested for HIV. Consistent with previous research of high-risk populations, the majority (61.2%) of those previously tested reported a posttest increase in condom use.[7,10,27] Analysis of the factors associated with previous HIV testing gives further insight into the low utilization of HIV testing services. Although condom use with regular sexual partners was low, FSWs who had regular sexual partners were more likely to have previously sought testing. Regular partners may serve as an incentive to undergo HIV testing, but to target FSWs who do not have regular partners, benefits of testing, including protecting one's own health, should be emphasized in HIV education and testing campaigns. Drug users were more than twice as likely to have been previously tested for HIV and this could be due to HIV testing offered in drug treatment settings. Significantly, pelvic pain and self-perceived high HIV risk were predictors for having a previous HIV test. Previous research has found that those who feel at risk because of behaviors or prevalent STD symptoms, are more likely to seek testing.[10,17] However, sex workers with more clients were less likely to have previously been tested. Some FSWs may underestimate their risk and thus may have chosen to forgo past HIV-testing opportunities.[9,18,21,23,26,28,29] Intervention and education programs need to help raise HIV awareness,[18] and the general public should be educated to understand that HIV infections are often asymptomatic.[10] Helping FSWs to more accurately assess their risk-behaviors, could help increase HIV test utilization.

Perhaps more alarming than low testing rates, less than half (47.8%) of those who reported previous HIV testing had returned for counseling and result disclosure. In this study, only 52.9% of FSWs returned for posttest counseling and results, which is significantly lower than the national average (72.3%).[1] Efforts to increase testing among high-risk populations are only useful if they also increase the number of individuals who know their HIV status. However, without this awareness, FSWs are unlikely to change their risk behaviors and those who are HIV-positive will miss opportunities for treatment that can improve their own health and decrease their infectiousness.[30] Furthermore, those who do not follow-up may not receive treatment for prevalent STDs, which can further increase their probability of acquisition of HIV and, if already HIV-positive, their infectiousness.[31,32] The high prevalence of STDs found in this study is also an indicator of low access to treatment and linking the gap between testing and treatment is crucial in controlling the prevalence and spread of HIV and STDs.

In this study, fear of an HIV-positive result was the main reason FSWs gave for failing to attend HIV post-test counseling, and previous studies have suggested that the fear of an HIV-positive diagnosis and resultant discrimination are barriers to testing utilization.[7,8,20,21,28] FSW-specific studies have also found that some FSWs avoid testing because of fear that VCT utilization will publicize the nature of their work.[10] Perhaps in part because of these types of stigma, FSWs from other parts of or outside of Yunnan were more likely to follow-up in comparison to those from Gejiu and Kaiyuan, who might face higher risks of being "outted" in closer proximity to their hometowns. Normalizing HIV testing could help to increase testing utilization and decrease stigma, but assuring confidentiality for all those tested is also an important part of expanding access to and use of HIV testing services.[10]

Significantly, FSWs can act as a bridge of infection to the general population[33,34] and interventions that expand the full use of testing in China are urgently needed to control the HIV epidemic. In the long term, adaptations in pretest counseling that put more emphasis on posttest follow-up and the benefits of knowing one's status will likely help to increase follow-up and reduce fear of testing. However, increasing the availability of HIV rapid testing, which removes the barrier of follow-up, has the potential to have a larger impact in reducing the number of people living with HIV/AIDS who are unaware of their status in China. Specific interventions emphasizing the use of rapid HIV testing through door-to-door, street-based, and peer-to-peer outreach may help to increase HIV testing acceptability and utilization,[35] but further standardization of rapid testing is needed to reach those most at-risk. HIV risk awareness is low in some high prevalence areas and awareness campaigns could not only increase testing utilization, but could also help decrease risk behaviors.

Our study had significant findings but was not without its limitations. First, to protect the privacy of participants, we did not ask subjects the result of previous HIV tests during the initial survey period. However, we did collect information regarding previous testing results among HIV-positive FSWs at post-test follow-up. Second, our sample of FSWs only included those who were willing to be tested for HIV/STIs. Thus the sample may be biased as those with a stronger aversion to testing may be less likely to participate in the study. Third, we asked sensitive questions and social-desirability bias may have impacted our results. Finally, we surveyed and tested a population of FSWs from Gejiu and Kaiyuan and these results may not reflect the general FSW population of these cities and may not be applicable to FSWs in other parts of China.

Although the policy of the Chinese MOH goes beyond traditional VCT by actively seeking out high-risk groups to undergo testing and counseling, the low previous testing rates and test follow-up rates among this group of FSWs suggests that the current policy is failing them. The Chinese government currently offers free antiretroviral treatment to eligible HIV-positive individuals through the "Four frees and one care program," but lack of HIV status awareness is still a barrier to successful treatment and prevention. Interventions not only need to implement measures to break down the stigma around seeking an HIV-test, but also need to emphasize the importance of knowing one's status. Furthermore, Chinese MOH and local outreach organizations should work to expand the availability of rapid HIV-testing as this could help inform more people of their serostatuses. Changes in policy that emphasize wide testing, adopt the concerns of HIV and FSW stigma, and offer other testing opportunities, such as HIV rapid-testing, could also increase full utilization of HIV testing services. However, without interventions to increase HIV status awareness, the virus could be unknowingly spread, putting a greater population at risk and compromising the health of those who are HIV-positive.

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References

1. State Council AIDS Working Committee Office, China Ministry of Health, UN Theme Group on HIV/AIDS in China. A joint assessment of HIV/AIDS prevention, treatment and care in China. State Council AIDS Working Committee Office; Beijing: 2007. 2007. Available at: http://www.chinaids.org. Accessed December 31, 2009
2. Lu L, Jia M, Ma Y, et al. The changing face of HIV in China. Nature. 2008; 455:609–611. [PubMed: 18833270]
3. Xu JJ, Wang N, Lu L, et al. HIV and STIs in clients and female sex workers in mining regions of Gejiu City, China. Sex Transm Dis. 2008; 35:558–565. [PubMed: 18354344]
4. Zhang WY, Dai JP, Zhang XL, et al. HIV screening among high risk population of Honghe Prefacture in 2004. J Dis Monit Control. 2007; 1:94–96.
5. Wu Z, Rou K, Cui H. The HIV/AIDS epidemic in China: History, current strategies, and future challenges. AIDS Educ Prev. 2004; 16(suppl A):7–17. [PubMed: 15262561]
6. Wu ZY, Sullivan SG, Wang Y, et al. Evolution of China's response to HIV/AIDS. Lancet. 2007; 369:679–690. [PubMed: 17321313]
7. Wu Z, Sun X, Sullivan SG, et al. Public health: HIV testing in China. Science. 2006; 312:1475–1476. [PubMed: 16763133]
8. Obermeyer CM, Osborn M. The utilization of testing and counseling for HIV: A review of the social and behavioral evidence. Am J Public Health. 2007; 97:1762–1774. [PubMed: 17761565]
9. Vermund SH, Wilson CM. Barriers to HIV testing: Where next? Lancet. 2002; 360:1186–1187. [PubMed: 12401241]
10. Wang Y, Li B, Zheng J, et al. Factors related to female sex workers' willingness to utilize VCT service: A qualitative study in Jinan City, northern China. AIDS Behav. 2009; 13:866–872. [PubMed: 18770027]
11. The Ministry of Health of the People's Republic of China, Joint United Nations Programme on HIV/AIDS and World Health Organization. update on the HIV/AIDS epidemic and response in China. State Council AIDS Working Committee Office; Beijing: 2005. 2005. Available at: http://www.chinaids.org. Accessed December 31, 2009
12. Rou K, Guan J, Wu Z, et al. Demographic and behavioral factors associated with HIV testing in China. J Acquir Immune Defic Syndr. 2009; 50:432–434. [PubMed: 19322039]
13. Malonza IM, Richardson BA, Kreiss JK, et al. The effect of rapid HIV-1 testing on uptake of perinatal HIV-1 interventions: A randomized clinical trial. AIDS. 2003; 17:113–118. [PubMed: 12478076]
14. Valdiserri RO, Moore M, Gerber AR, et al. A study of clients returning for counseling after HIV testing: Implications for improving rates of return. Public Health Rep. 1993; 108:12–18. [PubMed: 8434087]
15. Kassler WJ, Dillon BA, Haley C, et al. On-site, rapid HIV testing with same-day results and counseling. AIDS. 1997; 11:1045–1051. [PubMed: 9223740]
16. World Health Organization. On-site, rapid HIV testing with same-day results and counseling. Geneva, Switzerland: World Health organization; 2004.
17. Sivaram S, Gurcharan SS, Das M, et al. Reasons for Seeking HIV-test: Evidence from a private hospital in rural Andhra Pradesh, India. J Health Popul Nutr. 2008; 26:431–441. [PubMed: 19069622]
18. Zhou L, Guo JQ, Fan LJ, et al. Survey of motivation for use of voluntary counseling and testing services for HIV in high risk area of Shenyang, China. BMC Health Serv Res. 2009; 9:23.doi: 10.1186/1472-6963-9-23 [PubMed: 19196456]
19. Li XM, Wang B, Fang XY, et al. Short-term effect of a cultural adaptation of voluntary counseling and testing among females sex workers in China: A quasi-experimental trial. AIDS Care Prev. 2006; 18:406–419.
20. He N, Zhang JL, Yao JJ, et al. Knowledge attitudes and practice of voluntary HIV counseling and testing among rural migrants in Shanghai, China. AIDS Educ Prev. 2009; 21:570–581. [PubMed: 20030500]

21. Ma W, Detels R, Feng Y, et al. Acceptance of and barriers to voluntary HIV counseling and testing among adults in Guizhou Province, China. AIDS. 2007; 21(suppl 8):S129–S135.
22. Gu YB, Chen X, Liu ZD. Survey of HIV VCT among female sex workers in Funan County, *Anhui Province China*. Trop Med. 2006; 6:2256–2257.
23. Xiao M, Wang XC. Factors associated with the use of voluntary counseling and testing (VCT) service among female sex workers. China Prac Med. 2007; 2:27–30.
24. Li L, Lei JL, Wang T, et al. Study on internal factors influencing the acceptance of HIV voluntary counseling & testing(VCT) among female sex workers(FSWs). Chin J AIDS STD. 2007; 13:544–546.
25. Tian LG, Hu W, Ruan YH, et al. Survey on HIV counseling and testing and desirability to sex partner notification among female sex workers in Xichang of Sichuan Province, *China*. Chin J Nat Med. 2006; 8:176–180.
26. Shi WD, Zhang WH, Li Gang, et al. Comparison of the use of HIV voluntary counseling and testing (VCT) services among female sex workers(FSWs). Chin J AIDS STD. 2008; 14:489–491.
27. Jin X, Smith K, Sun YL, et al. Association between testing for human immunodeficiency virus and changes in risk behaviors in injecting drug users in southern China. Sex Transm Dis. 2009; 36:473–477. [PubMed: 19455077]
28. Luseno WK, Wechsberg WM. Correlates of HIV testing among South African women with high sexual and substance-use risk behaviours. AIDS Care. 2009; 21:178–184. [PubMed: 19229686]
29. Li L, Wang JY, Lei JL, et al. Case-control study on influence factors of HIV voluntary counseling and testing among female sex workers. Occup Health. 2008; 24:2683–2684.
30. Sufka SA, Ferrari G, Gryszowka VE, et al. Prolonged CD4+ cell/virus load discordance during treatment with protease inhibitor-based highly active antiretroviral therapy: Immune response and viral control. J Infect Dis. 2003; 187:1027–1037. [PubMed: 12660916]
31. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: The contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sex Transm Infect. 1999; 75:3–17. [PubMed: 10448335]
32. Grosskurth H, Gray R, Hayes R, et al. Control of sexually transmitted diseases for HIV-1 prevention: Understanding the implications of the Mwanza and Rakai trials. Lancet. 2000; 355:1981–1987. [PubMed: 10859054]
33. Qu S, Liu W, Choi K, et al. The potential for rapid sexual transmission of HIV in China: Sexually transmitted diseases and condom failure highly prevalent among female sex workers. AIDS Behav. 2002; 6:267–275.
34. Hesketh T, Zhang J, Qiang DJ. HIV knowledge and risk behaviour of female sex workers in Yunnan Province, China: Potential as bridging groups to the general population. AIDS Care. 2005; 17:958–966. [PubMed: 16176892]
35. Seña AC, Hammer JP, Wilson K, et al. Feasibility and acceptability of door-to-door rapid HIV testing among Latino immigrants and their HIV risk factors in North Carolina. AIDS Patient Care STDS. 2010; 24:165–173. [PubMed: 20214484]

TABLE 1

Basic Characteristics of HIV-Negative and HIV-Positive Female Sex Workers

	HIV-Positive FSWs (N = 168)		HIV-Negative FSWs (N = 1474)			
Characteristics	**n**	**%**	**n**	**%**	χ^2	***P***
Age (yr)						
16–20	14	8.3	477	32.4		
21–25	48	28.6	451	30.6		
26–54	106	63.1	546	37.0	56.569	<0.001
Ethnicity						
Han	110	65.5	950	64.5		
Yi	24	14.3	204	13.8		
Hani	10	6.0	137	9.3		
Others	24	14.2	183	12.4	2.346	0.50
Schooling (yr)						
0–6	64	38.1	618	41.9		
7–9	84	50.0	688	46.7		
10–15	20	11.9	168	11.4	0.921	0.63
Marital status						
Single	81	48.2	767	52.0		
Divorced	32	19.0	262	17.8		
Lives with partner	26	15.5	212	14.4		
Married	17	10.1	163	11.1		
Separated	6	3.6	48	3.3		
Widowed	6	3.6	22	1.5	4.676	0.46
Migrant status of FSW participants						
Local cities	81	48.2	348	23.6		
From other city in Yunnan Province	75	44.6	862	58.5		
From outside of Yunnan Province	12	7.14	264	17.9	50.409	<0.001
Having regular sexual partners						
Yes	75	44.6	735	49.9		
No	93	55.4	739	50.1	1.645	0.20

Characteristics	HIV-Positive FSWs (N = 168) n	%	HIV-Negative FSWs (N = 1474) n	%	χ^2	*P*
Condom use with regular sexual partners						
Always use	9	12.0	123	16.7		
Occasionally use	27	36.0	232	31.6		
Never use	39	52.0	380	51.7	1.356	0.51
No. clients in recent week						
<5	99	56.0	1002	68.0		
≥5	74	44.0	472	32.0	9.827	<0.002
Condom use with last client						
Yes	136	81.0	1280	86.8		
No	32	19.0	194	13.2	4.402	0.04
Had previous HIV test						
Yes	54	32.1	237	16.1		
No	114	67.9	1237	83.9	26.690	<0.001
Know the results of previous HIV test						
Yes	29	17.3	110	7.5		
No	139	82.7	1364	92.5	18.689	<0.001
Followed up for results in current study						
Yes	91	54.2	773	52.4		
No	77	45.8	701	47.6	0.180	0.67
Drug use behavior *						
Yes	86	51.2	86	5.8		
No	82	48.8	1388	94.2	330.829	<0.001

*Self-reported injection drug using behavior.

TABLE 2

Characteristics Associated With Having Previous HIV Test Among Female Sex Workers

Characteristics	Total FSWs (N = 1642)		
	OR (95% CI)	AOR (95% CI)	*P*
STD symptoms in past 12 mo			
Abdominal pain	1.4 (1.0–1.8)*	—	—
Severe or persistent pelvic pain	2.0 (1.1–3.6)*	1.9 (1.1–3.6)	0.040
Study site (Kaiyuan vs. Gejiu)	6.9 (3.4–14.3)†	4.9 (2.3–10.1)	<0.001
Age (≥21 vs. <21 yr)	0.3 (0.2–0.4)†	—	—
Age at initiation of commercial sex work (≥20 vs. <20 yr)	1.8 (1.4–2.4)†	—	—
Years of schooling (≥9 vs. <9 yr)	18.5 (4.6–76.9)†	10.9 (2.6–45.5)	0.001
Duration of commercial sex work (>2 vs. ≤2 yr)	2.7 (2.1–3.5)†	—	—
Migrant status			
Hometown (another city in Yunnan vs. Kaiyuan/Gejiu)	0.7 (0.5–0.9)‡	—	—
Hometown (city outside of Yunnan vs. Kaiyuan/Gejiu)	1.4 (1.0–2.0)†	—	—
Had not heard of HIV/STD before	0.1 (0.1–0.2)†	—	—
Have regular sexual partner	2.0 (1.6–2.6)†	1.9 (1.4–2.5)	<0.001
Average charge per service (<100 Yuan vs. ≥100 Yuan)	0.6 (0.4–0.8)†	—	—
Number of clients in recent week (<5 vs. ≥5)	1.5 (1.1–2.0)‡	1.7 (1.2–2.3)	0.001
Perceive oneself as incapable of coping with HIV-positive diagnosis	0.3 (0.2–0.5)†	—	—
Trichomonas vaginalis positive	0.5 (0.3–0.8)‡	—	—
HSV-2 positive	1.3 (1.0–1.8)*	—	—
History of illegal drug use	2.9 (2.1–3.9)†	2.2 (1.5–3.1)	<0.001
Inconsistent condom use with male clients in past week	0.4 (0.3–0.6)†	—	—
HIV-positive (in results of this study)	2.5 (1.7–3.5)†	1.8 (1.2–2.8)	0.005
Self-perceived at high-risk for HIV	1.8 (1.2–2.6)‡	1.5 (1.1–2.2)	0.048

*$P < 0.05$.

†$P < 0.001$

‡$P < 0.01$.

TABLE 3

Characteristics Associated with Returning for HIV Post-Test Counseling and HIV Result Among Female Sex Workers

	Total FSWs (N = 1621*)		
Characteristics	**OR (95% CI)**	**AOR (95% CI)**	***P***
Had previously been tested for HIV and received results	1.3 (1.0–2.4)	—	—
STD symptoms in past 12 mo			
Abdominal pain	1.1 (0.9–1.4)	—	—
Pain during vaginal intercourse	1.4 (1.1–1.9)†	—	—
Severe or persistent pelvic pain	0.9 (0.7–1.2)	—	—
Study site (Kaiyuan vs. Gejiu)	1.0 (0.7–1.3)	—	—
Age (≥21 vs. <21 yr)	0.7 (0.6–0.9)	—	—
Age at initiation of commercial sex work (≥20 vs. <20 yr)	1.2 (1.0–1.5)†	—	—
Years of schooling (≥9 vs. <9 yr)	1.5 (1.1–2.0)†	1.4 (1.1–1.9)	0.032
Duration of commercial sex work (>2yr vs. ≤2 yr)	1.0 (0.8–1.2)	—	—
Migrant status			
Hometown (another city in Yunnan vs. Kaiyuan/Gejiu)	1.4(1.1–1.7)‡	1.4 (1.1–1.8)	0.006
Hometown (city outside of Yunnan vs. Kaiyuan/Gejiu)	1.9 (1.4–2.6)§	1.9 (1.4–2.5)	<0.001
Had not heard of HIV/STD before	1.0 (0.7–1.3)	—	—
Have regular sexual partner	1.0 (0.8–1.2)	—	—
Average charge per sex act (<100 Yuan vs. ≥100 Yuan)	0.8 (0.6–0.9)†	—	—
Average number of clients in recent week (<5 vs. ≥5)	1.4 (1.1–1.7)†	1.3 (1.1–1.6)	0.008
Perceive oneself as incapable of coping with HIV-positive diagnosis	1.0 (0.7–1.3)	—	—
Trichomonas vaginalis positive	0.7 (0.5–0.9)†	—	—
History of illegal drug use	0.8 (0.6–0.9)†	—	—
Inconsistent condom use with male clients in past week	1.1 (0.8–1.4)	—	—
HIV-positive	1.0 (0.8–1.5)	—	—
HSV-2 positive	0.9 (0.7–1.0)	—	—
Self-perceived at high-risk for HIV	0.9 (0.7–1.3)	—	—

*This analysis excludes the 21 participants who had tested seropositive before this study and knew the results of that test

†$P < 0.05$.

‡$P < 0.01$.

§$P < 0.001$