Prevalence of Human Immunodeficiency Virus and Sexually Transmitted Infections and Associated Risk Factors among Female Sex Workers in Guangdong Province, China

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Abstract

Objectives—To assess the prevalence of human immunodeficiency virus (HIV) and sexually transmitted infections (STIs) and associated factors among female sex workers (FSWs) in Guangdong, China.

Methods—Respondent driven sampling was used to recruit 320 FSWs. The recruited participants were interviewed face-to-face using a structured questionnaire and tested for HIV, syphilis, gonorrhea, and Chlamydia.

Results—The prevalence of syphilis, gonorrhea, and Chlamydia were 8.0% (4.6-12.2%), 9.5% (5.6-14.3%) and 3.9% (1.7-6.2%), respectively, and of any STIs was 19.7% (13.9- 26.2%). None of the participants was HIV-positive. The median number of clients during the previous week was 5. The proportion of consistent condom use with the clients during the previous week was 58.0% (50.4, 65.5%), use with regular non-paying partners and non-regular non-paying partners were much lower than that with clients. Multivariate analysis indicated that years of education and perception of HIV risk were protective factors. Awareness of HIV/AIDS, regular sex partners deciding about condom use when having sex, recruiting clients at hotels, hair/beauty salons, or streets instead of massage parlors, and higher charge for last sexual service were associated with STI infection.

Conclusion—Future intervention programs should not only address personal risk factors, but also empower FSWs to require condom use by both clients and non-paying partners.

Keywords

HIV/AIDS; STD; Sex workers; Behavior; China

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Introduction

China is experiencing a rapidly expanding HIV epidemic. The most common modes of HIV transmissions are through heterosexual contact and sharing contaminated needle among injection drug users (IDUs). Heterosexual transmission has been rising in recent years and has become the major driver of the HIV epidemic in China. According to the estimation conducted jointly by Ministry of Health of China, UNAIDS, and WHO in 2007, there were about 700,000 people living with HIV/AIDS at the end of 2007, among whom heterosexual transmission accounted for 40.6%[1]. The results from HIV sentinel surveillance also showed that HIV prevalence among the sex workers has increased in the recent years[2]. Guangdong Province is experiencing the same trend. The proportion of heterosexual transmission among the reported HIV/AIDS cases in Guangdong Province was 4.89% in 2001, 6.53% in 2002, 26.9% in 2006 and rising to 37.9% from January to October 2007[3,4].

The epidemic of STDs has expanded concurrently with the resurgence of the sex industry in China since the late 1970's,. Results from the national STD surveillance system reveal that while the incidence of STDs was 12.32 per 100,000 population in 1989, by 1998 it had increased four fold to 50.68 per 100,000 population. The average annual increase in incidence for all STDs during the period from 1989 to 1998 was about 17.3% [5].

Effective intervention strategies are urgently needed to control the transmission of HIV from injection drug users to FSWs and then to their clients. However, due to the illegal status of sex workers in China, little is known about the HIV/AIDS/STDs epidemic situation and the related risk behaviors among female sex workers. Surveillance for HIV and STDs and studies done among FSWs are mainly focused on the FSWs in the reeducation centers. Some research programs tried to recruit FSWs in the community using convenience sampling or chain referral sampling [6,7,8]. A representative sample from the community was needed to understand the risk behaviors and the HIV/AIDS and STDs status and to better evaluate the potential roles of FSWs in the spread of HIV/AIDS.

Respondent-driven sampling (RDS) is a new method of chain-referral sampling for obtaining a more representative sample from a hidden population. It has been applied in many research programs to sample hard-to-reach and hidden populations such as IDUs and men who have sex with men (MSM) [9-13]. Those studies demonstrated that RDS was a feasible strategy for surveying hard-to-reach populations. However, the RDS method has not been widely applied for recruiting FSWs. The Vietnamese Ministry of Health conducted a survey using RDS to assess HIV prevalence, risk factors and service utilization among FSWs in 2004. The program demonstrated that RDS could reach the less visible FSWs and, thus, may provide better estimates for the population [14].

The present study was conducted to estimate HIV and STD prevalence, and to identify predictors of infection among FSWs in Guangdong Province, China. Respondent driven sampling was used to obtain a probabilistic sample and to get a less biased estimate for the population.

Methods

Participants and procedures

The source population was the FSWs who lived or worked in the study county. FSWs were defined as those who had exchanged sex for money or goods in the past six months. It excluded those who exchanged sex for gifts or some other material rewards from their boyfriends or sweethearts. It also excluded those who were younger than 18 years old.

Respondent-driven sampling was used to recruit subjects into the study. Four seeds were recruited through local key informants or pimps to participate in the study. After the seeds completed the interview, each of them was given three coupons for recruiting their peers into the study. All new recruits were offered a dual incentive, one for completing the interview and one for successfully recruiting up to three peers into the study.

An office in the local Dermatology and STD Hospital was set up for the interviews. When the seeds or the participants with the referral coupon came to the office, a screening was conducted to confirm their eligibility. An oral consent was obtained before the interview. The eligible participants were given a face-to-face interview with a standardized questionnaire. The questionnaire was divided into two parts. The first part included questions dealing with knowledge and attitudes about HIV/AIDS and some basic information. The second part was about sexual and/or drug use-related behaviors. For the second part, the participants had the option to be interviewed face-to-face by the interviewer or to use a CD player to listen to prerecorded questions and put their answers on an answer sheet which contained neither the questions nor identifying information [15]. The interviews were anonymous, no identifying information was collected.

After each interview, a free gynecological examination was conducted by a female gynecologist at the outpatient clinic of the hospital. A cervical swab was collected for testing for gonorrhea and Chlamydia. A 5-ml blood sample was also collected for testing for HIV and syphilis.

Testing methods

Blood samples were collected for testing for HIV and syphilis. Serum samples were screened for antibodies to T. pallidum by the rapid plasma reagin (RPR) test (Rongsheng Biotechnical Company, Shanghai, China). Positive specimens were confirmed by T. pallidium hemagglutination (TPHA). Syphilis infection was defined as being positive on both RPR and TPHA tests. HIV antibody testing was done by ELISA (Gibiai Biotechnical Company, Beijing, China). If a test was positive, two further assays (the original assay plus a different assay) were conducted in parallel. If both were negative, the result was recorded as HIV negative. If both were positive or there was discordance in the results, the specimen was sent to the confirmatory lab for Western blot testing.

Cervical swabs were collected for testing for gonorrhea and Chlamydia. The specimen was rolled on the culture plate and incubated in a CO_2 jar at 37°C for 24 hours. The Thayer-Martin selective culture media was used for culturing the N. gonorrhea. For confirmatory tests, oxidase and sugar fermentation tests were done. Typical colonies of oxidase positive, gram-negative diplococci on T-M culture media with a positive glucose fermentation test were used as the criteria for the identification of *N. gonorrhea*. Chlamydia was diagnosed by the enzyme immunoassay (EIA) tests.

All the tests were conducted in the laboratory of the Zhaoqing Dermatology and STD Hospital. The blood samples were also sent to the HIV Confirmatory Center in Guangdong CDC for HIV antibody tests (ELISA assay, Organon Teknika, Netherlands).

Data analysis

The data were double-entered, using Epidata, by two researchers independently and were checked to assure accuracy and completeness.

Inconsistent condom use was defined as not using condoms 100% of the time for all the sex acts during the last week, including any type of sex (oral, vaginal, or anal sex) with any kind

of partner (clients, regular non-paying, or non-regular non-paying partners). STD infection was defined as any positive test for gonorrhea, Chlamydia, and/or syphilis.

The prevalence of STD and the potential predictors were described by measuring the frequency distribution. The frequency distribution was measured as the crude population proportion and the estimated population proportion (EPP) using RDSAT (Respondent Driven Sampling Analysis Tool) which was designed for analyzing RDS data adjusting for the long-chain referral recruitment design based on the linkage of the recruiters and recruitees and the participants' network sizes to produce population estimates.

Multivariate logistic regression was used to examine the associations of independent variables and the outcome (STD infection), simultaneously adjusting for potential confounders using SAS. The individualized weights generated for the dependant variable using RSDAT were used to weight the data set for multivariate analysis [16]. Variables were selected into the multivariate model based on the prior knowledge of the relationship between them and inconsistent condom use. If there was no prior knowledge, variables were selected depending on how much their presence/absence affected the confidence intervals of other variables in the model. The cut-off level of change of the confidence intervals of these variables of interest was predefined to be 10%.

Results

Introduction of recruitment process (RDS)

A total of 320 participants, including the four seeds, were recruited for the study in five months. Each of the four seeds from street-based sex workers, massage parlor-based sex workers, hotel-based sex workers, and hair/beauty salon-based sex workers recruited 65, 209, 3, and 39 participants into the study, respectively. The longest recruitment tree had 16 recruitment waves. In total, 864 recruitment coupons were distributed, among which 316 (36.6%) were returned and 548 (63.4%) were not. Overall, the equilibriums with respect to the social and demographic characteristics were obtained after two to ten waves.

Characteristics of sample and EPP

Table 1 presents the characteristics of the FSWs. The median age of the 320 participants was 26 years. Most of the participants were Han nationality (the majority ethnic group) and had a junior middle school education (nine years of education). Over half (59.2%) of the participants had been married. Most of the participants were from Guizhou, Hunan, Sichuan and Guangxi Provinces.

The FSWs were classified into four types according to the places where they recruiting their clients or their working places: 1) massage parlors, karaoke bars, and drinking bars based FSWs; 2) resort centers and hotels based FSWs; 3) hair/beauty salons based FSWs; and 4) streets, parks, malls, construction sites, rented apartments, and restaurants based FSWs. FSWs from the above four places accounted for 25.3%, 22.6%, 25.6%, and 26.4%, respectively, of the total.

Sexual-related behaviors

The age at the first sex experience ranged from 10 to 27 years old, the median age was 19 years old (Table 2). The age for initiating commercial sex ranged from 16 to 47 years old and the median age was 23 years old.

The charge for the last commercial sex ranged from 10 RMB Yuan ($1.25) to 2000 RMB ($250) Yuan. The median was 150 RMB Yuan (about $19). The number of paying clients

during the last week ranged from 0 to 30 with a median of 5. The estimated population proportion who had regular non-paying partners and non-regular non-paying partners during the last week was 46.6% (40.1, 53.2) and 11.0% (6.9, 16.1) respectively.

Condom use with sex partners

Table 3 presents condom use with paying clients and non-paying partners among the FSWs. 93.5% (90.7, 96.5) of the participants used a condom the last time they had sex with a client while 6.5% (3.6, 9.5%) of them did not. The proportion of consistent condom use with clients during the last week was 58.0% (50.4, 65.5%).

Incorrect condom use including using condoms just before ejaculation, rupture or breaking of the condoms, or not using the condoms during the entire sex act was not unusual among the FSWs. The proportion using condoms incorrectly during the previous month was 39.8% (33.0, 46.6%).

70.9% of the participants used a condom the last time they had sex with a non-regular non-paying partner. The proportion of consistent condom use with non-regular non-paying partners during the last week was 43.1% (19.8%, 64.4%).

Only 38.7% of the participants used a condom the last time they had sex with a regular non-paying partner. The proportion of consistent condom use with regular non-paying partners during the last week was 20.5% (13.6%, 28.7%).

Drug use

None of the participants used heroin, cocaine or valium. 9.75% (31/318) had used the drug "ecstasy". Six participants had used drugs in the past six months. 1/28 (3.57%) of the participants had exchanged sex for drugs.

HIV and STI prevalence

None of the participants was HIV positive. The adjusted prevalence of syphilis, gonorrhea and Chlamyida was 8.0% (4.6-12.2%), 9.5% (5.6-14.3%), and 3.9% (1.7-6.2%), respectively. The adjusted prevalence of any STD was 19.7% (13.9- 26.2%).

Predictors for STD infection

The multivariate logistic regression model indicated that years of education and self perception of the risk of HIV infection were protective factors independently associated with STD infection. Awareness of HIV/AIDS, regular sex partners deciding condom use when having sex, recruiting clients at hotels, hair/beauty salons, or streets instead of massage parlors, and higher charge for commercial sex last time, were risk factors independently associated with STD infection. (Table 4). Other factors such as the number of sex partners, condom use and drug use were not found to be associated with STD infection.

Discussion

This study found that none of the participants were HIV-positive, suggesting that the HIV epidemic in Guangdong Province is still concentrated among IDUs and had not expanded to general FSWs in the study county. The expansion of the HIV epidemic from injection drug users to the FSWs relies on the overlap of the two populations; that is, the FSWs who are also injection drug users or who have drug using clients. Tran [17] reported a prevalence of HIV of 12% among FSWs in Hanoi. The HIV prevalence among IDU-FSWs was 33%, 3.9% among non-injecting drug user-FSWs, and 1.6% among non-drug-using FSWs. Thus, sharing injecting equipment was the primary cause of the rapid increase of HIV infection among the FSW

population in Hanoi. In his study population, there was a high proportion of drug use (38% used drugs, up to 83% of whom injected drugs). In our study, none of the participants were found to be injection drug users and only a few reported drug use by their sex partners. This may be the main reason for the low level of HIV observed among this population.

HIV sentinel surveillance among FSWs was conducted in the reeducation centers. It has been reported that the incarcerated FSWs had a higher risk of HIV infection. In our study, we found, in the field assessment, that the FSWs who used drugs were more likely to be caught by police and sent to the reeducation center. Only two of our participants had been caught by police and none of them had been sent to the reeducation centers. The HIV prevalence in the sentinel surveillance which was conducted in the reeducation centers was higher than that in the comprehensive behavioral surveillance which was conducted in the community. The comprehensive behavioral surveillance in Guangdong Province found no HIV positive cases in 2005 and 2007, while the HIV prevalence observed in the sentinel surveillance in 2005 and 2007 was 0.27% and 0.21%, respectively [3].

The study found the prevalence of syphilis, gonorrhea, and Chlamydia to be 8.0% (4.6-12.2%), 9.5% (5.6-14.3%) and 3.9% (1.7-6.2%) respectively. The prevalence of syphilis and gonorrhea was much higher than among female market vendors (1.31% and 1.36% respectively) in Fuzhou, China reported by Wu et al [18]. However, Wu reported a higher prevalence of Chlamydia (11.2%) among the female market vendors in Fuzhou. Alhough the HIV prevalence among the FSWs in our study was 0%, the prevalence of STDs in our study population was relatively high, which is an indicator of high frequency of risk behaviors. Condom use was low among this population. Though the proportion of condom use for last sex with the clients was high (93.5%), the proportion of consistent condom use with clients during the last week was only 58.0%. Condom use with non-paying partners was even lower.

The study indicated that years of education and self perception of the risk of HIV infection were protective factors independently associated with STD infection. Awareness of HIV/ AIDS, regular sex partners deciding condom use, recruiting clients at hotels, hair/beauty salons, or streets instead of massage parlors, and higher charge for commercial sex last time, were risk factors independently associated with STD infection.

Baltazar reported that illiteracy was associated with acquiring a sexually transmitted infection and/or reproductive system infection among FSWs [19]. Tran reported that being a low social-economic FSW, having higher income compared with peers, and perception of self being at low risk for HIV were associated with HIV infection among non-institutionalized FSWs [17]. These reported risk factors for HIV were quite similar to those we found for STD infections, which suggested that HIV infection and STD infection share some common risk factors.

Regular non-paying partners deciding condom use was independently associated with having an STD infection after controlling for confounders in our study. This suggested that lack of power in condom use decision-making was a risk factor for STD infection, which suggested that future interventions not only need to target FSWs, but also need to target their clients.

Respondent driven sampling (RDS) was used to recruit the FSWs in this study. It is a new method of chain-referral sampling utilizing an incentive for being interviewed and another incentive for recruiting peers to be interviewed. Heckathorn asserted "RDS produces samples that are independent of the initial subjects from which sampling begins and RDS reduces the biases resulting from voluntarism and masking, and provides means for controlling the biases resulting from differences in the sizes of personal networks" [20]. An underlying assumption of RDS is that the long-chain recruitment represents a first-order Markov process that reaches a dynamic equilibrium between the tendencies of persons with similar characteristics to associate with each other, relative network sizes, and underlying makeup of the target

population. By tracking the linkage of the recruiters and recruitees and by recording the relative network sizes of participants, the biases inherent in the referral recruitment can be quantified and adjusted for in the analysis. Data for the adjusted analyses are sufficient when the sample reaches "equilibrium". In this program, the overall equilibriums with respect to the social and demographic characteristics were obtained after two to ten waves. This study is the first study using RDS to recruit subjects among FSWs in China. It showed that RDS was feasible among FSWs in China and provided a probabilistic sample for understanding the risk behaviors and HIV/STDs among FSWs. However, the number of the participants was very different from the four seeds ranging from 3 to 209. The results are dominated by the disproportionately large seed recruiting 209 participants. Another limitation in this study was that only 36.6% of the potential subjects returned with the distributed coupons. The subjects who did not return with the coupons may have different risk behaviors.

This study found a high prevalence of STD in spite of finding no HIV-positive in FSWs. It also revealed a high proportion of inconsistent condom use especially when having sex with non-paying partners. This indicates the high potential for HIV transmission if the epidemic spread to FSWs and their clients. In this project, we found little overlap of FSWs and IDUs. This indicates that now is an excellent time to introduce intervention programs to reduce HIV transmission from the injection drug users to general population through FSWs. Therefore, effective intervention programs for FSWs in this area should be implemented immediately.

Acknowledgments

References

1. Ministry of Health, People's Republic of China, Joint United Nations Programme on HIV/AIDS, World Health Organization. 2007 update on the HIV/AIDS epidemic in China. Dec;2008

2. Ministry of Health China, UNAIDS and WHO. Update on HIV/AIDS Epidemic in China. Nov;2006

3. Center for Disease Control and Prevention of Guangdong province. HIV/AIDS epidemiology annual report in 2006 in Guangdong province, China. Dec;2007

4. Department of health, Guangdong. Update on HIV/AIDS epidemic in Guangdong. Nov;2007

5. Zhang D, Lv F, Wang L, et al. Estimating the population of FSWs in two Chinese cities on the basis of the HIV/AIDS behavioural surveillance approach combined with a multiplier method. Sex Transm Infect 2007 Jun;83(3):228–31. [PubMed: 17090568]

6. Chen X, Yin Y, Liang G, et al. Sexually transmitted infections among FSWs in Yunnan, China. AIDS Patient Care STDs 2005;19:853–860. [PubMed: 16375618]

7. Van HA, Fu Y, Dukers N, et al. High prevalence of syphilis and other STD among sex workers in China: potential of fast spread of HIV. AIDS 2001;15(6):753–759. [PubMed: 11371690]

8. Ruan Y, Cao X, Qian H, et al. Syphilis among FSWs in Southwestern China: potential for HIV transmission. Sexually transmitted diseases 2006;33(12):719–723. [PubMed: 16708055]

9. Stormer A, Tun W, Guli L, et al. An analysis of respondent driven sampling with injection drug users (IDU) in Albania and the Russian Federation. Journal of Urban Health: Bulletin of the New York Academy of Medicine 2006;83(7):i73–i82. [PubMed: 17075727]

10. McKnight C, Jarlais DD, Bramson H, et al. Respondent-driven sampling in a study of drug users in New York City: Notes from the field. Journal of Urban Health: Bulletin of the New York Academy of Medicine 2006;83(7):i54–i59. [PubMed: 16977493]

11. Ma X, Zhang Q, He X, et al. Trends in prevalence of HIV, syphilis, hepatitis C, hepatitis B, and sexual risk behavior among men who have sex with men. J Acquir Immune Defic Syndr 2007;45(5):581–587. [PubMed: 17577125]

12. Millett GA, Ding H, Lauby J, et al. Circumcision status and HIV infection among black and Latino men who have sex with men in 3 US cities. J Acquir Immune Defic Syndr 2007;46(5):643–650. [PubMed: 18043319]

13. Ma X, Zhang Q, He X, et al. Trends in prevalence of HIV, syphilis, hepatitis C, hepatitis B, and sexual risk behavior among men who have sex with men: results of 3 consecutive respondent-driven sampling surveys in Beijing, 2004-2006. J Acquir Immune Defic Syndr 2007;45(5):581–587. [PubMed: 17577125]

14. Johnston LG, Sabin K, Hien MT, Huong PT. Assessment of Respondent Driven Sampling for Recruiting FSWs in Two Vietnamese Cities: Reaching the Unseen Sex Worker. Journal of Urban Health 2006;83(7):116–128.

15. Liu HJ, Detels R. An approach to improve validity of response in a sexual behavior study in a rural area of China. AIDS and Behavior 1999;3(3):243–249.

16. RDS Incorporated. RDS analysis tool v5.6 user manual. Dec;2006

17. Tran TN, Detels R, Long HT, et al. HIV infection and risk characteristics among Female Sex Workers in Hanoi, Vietnam. J Acquir Immune Defic Syndr 2005;39(5):581–586. [PubMed: 16044011]

18. Wu Z, Rotheram-Borus MJ, Li L, et al. Sexually transmitted diseases and risk behaviors among market vendors in China. Sex Transm Dis 2007 Dec;34(12):1030–4. [PubMed: 18080357]

19. Baltazar Reyes MC, Rivera Rivera L, Cruz Valdez A, et al. Prevalence of sexually transmitted infections and associated risk factors among female commercial sex workers in Cuautla, Morelos. Ginecol Obstet Mex 2005 Jan;73(1):36–47. [PubMed: 15847147]

20. Heckathorn DD. Respondent driven sampling: a new approach to the study of hidden populations. Social Problems 1997;44(2):174–199.

Table 1
Demographic characteristics of the 320 recruited FSWs

Characteristics	SPP (%)	EPP (%)	95% CI for EPP (%)
Age group			
18-29	71.6 (229/320)	66.5	(56.6, 76.4)
30-48	28.4 (91/320)	33.5	(23.6, 43.4)
Nationality			
Han nationality	96.6 (309/320)	97.1	(95.2, 98.8)
Minorities	3.4 (11/320)	2.9	(1.2, 4.8)
Education			
Illiteracy	3.1 (10/319)	5.6	(2.3, 9.1)
Primary school (1-6 years)	27.3 (87/319)	35	(28.5, 42.7)
Junior middle school (7-9 years)	58.9 (188/319)	51.1	(42.9, 58.9)
High school (10-12 years)	9.7 (31/319)	7.9	(4.5, 11.4)
Higher (over 12 years)	0.9 (3/319)	0.4	(0.0, 1.1)
Registered residence			
Guangdong	7.2 (23/320)	7.8	(3.2, 14.1)
Not-Guangdong	92.8 (297/320)	92.2	(85.9, 96.8)
Marital status			
Ever married	51.4 (164/319)	59.2	(50.5, 67.4)
Never married	48.6 (155/319)	40.8	(32.6, 49.5)
Living status			
Living with partner	42.3 (132/312)	39.6	(32.0, 46.5)
Not living with partner	57.7 (180/312)	60.4	(53.5, 68.0)
Supporting family			
Supporting family	85.3 (273/320)	85.2	(80.9, 89.5)
Not supporting family	14.7 (47/320)	14.8	(10.5, 19.1)
Working places			
Type 1	34.3 (109/318)	25.3	(16.7, 35.0)
Type 2	22.3 (71/318)	22.6	(16.1, 29.8)
Type 3	19.2 (61/318)	25.6	(17.8, 33.5)
Type 4	24.2 (77/318)	26.4	(18.6, 34.7)

Note: EPP, Estimated population proportion; SPP, Sample population proportion.

Type 1: Massage parlor, karaoke bar, drinking bar-based sex workers; Type 2: Resort center and hotel-based sex workers; Type 3: Hair/beauty salon-based sex workers; Type 4: Street-based, rented apartment and restaurant-based sex workers

Table 2
Sex-related characteristics and the numbers of sex partners of FSWs

	SPP(%)	EPP(%)	95% CI for EPP(%)
Age at first intercourse	19[*] (10-27)[&]		
Age at first commercial sex	23[*] (16-47)[&]		
Duration of being a CSW	2 years [*] (1 month-16 years) [&]		
Charge for commercial sex	150[*] (10-2000) [&]RMB Yuan		
Number of sex partners			
Numbers of clients last week	5[*](0-30)[&]		
Number of regular non-paying sex partners last week			
0	51.9 (165/318)	53.4	(46.8, 59.9)
1-2	48.1 (153/318)	46.6	(40.1, 53.2)
Number of non-regular non-paying partners last week			
0	91.8 (292/318)	89.0	(83.9, 93.1)
1-3	8.2 (26/318)	11.0	(6.9, 16.1)

Note: EPP, estimated population proportion; SPP, sample population proportion

[*] median;

[&] range

Table 3
Condom use with clients and non-paying sex partners of FSWs

	SPP(%)	EPP (%)	95% CI of EPP (%)
Condom use with clients last time			
Yes	93.4 (296/317)	93.5	(90.7, 96.5)
No	6.6 (21/317)	6.5	(3.6, 9.5)
Frequency of consistent condom use with clients last week			
Used condoms consistently	58.1 (182/313)	58.0	(50.4, 65.5)
Did not use condoms consistently	41.9 (131/313)	42.0	(34.5, 49.6)
Incorrect condom use* with clients in the past month	42.9 (135/315)	39.8	(32.9, 46.2)
Suggestion of condom use when having sex with clients usually			
The FSWs decide	53.6 (170/317)	50.2	(43.3, 57.3)
The clients decide	4.4 (14/317)	5.0	(2.4, 8.2)
Both sides decide	42.0 (133/317)	44.8	(38.1, 51.0)
Condom use with non-regular non-paying partners last time			
Yes	71.4 (20/28)	70.9	(54.0, 87.2)
No	28.6 (8/28)	29.1	(12.8, 46.0)
Frequency of condom use with non-regular non-paying partners last week			
Used condoms consistently	44.8 (13/29)	43.1	(19.8, 64.4)
Did not use condoms consistently	55.2 (16/29)	56.9	(35.6, 80.2)
Suggestion of condom use when having sex with non-regular non-paying partners usually			
The FSWs decide	33.3 (11/33)	37.3	(19.1, 59.5)
The partners decide	24.2 (8/33)	21.0	(5.4, 35.6)
Both sides decide	42.4 (14/33)	41.7	(20.8, 62.6)
Condom use with regular non-paying partners last time			
Yes	38.2 (86/225)	38.7	(32.3, 46.2)
No	61.8 (139/225)	61.3	(53.8, 67.7)
Frequency of condom use with regular non-paying partners last week			
Used condoms consistently	17.4 (29/167)	20.5	(13.6, 28.7)
Did not use condoms consistently	82.6 (138/167)	79.5	(71.3, 86.4)
Suggestion of condom use when having sex with regular non-paying partners usually			
The FSWs decide	29.0 (62/214)	30.9	(23.1, 39.5)
The partners decide	19.1 (41/214)	18.6	(13.9, 25.3)
Both sides decide	51.9 (111/214)	50.4	(41.5, 57.5)

Note: EPP, Estimated population proportion; SPP, Sample population proportion.

*Incorrect condom use includes using condoms just before ejaculation, rupture or breaking of the condoms, or not using the condoms during the entire sex act.

Table 4

Factors associated with STIs -results from logistic regression

Independent variables	AOR	95% CI for OR	P value
Years of education	0.825	(0.710, 0.959)	**0.01**
Self perception of the risk of HIV infection	0.384	(0.152, 0.969)	**0.04**
Aware of HIV/AIDS	4.749	(1.572, 14.349)	**<0.01**
Amount of charge for commercial sex last time	1.119	(1.032, 1.213)	**<0.01**
The regular non-paying partners deciding whether to use condoms	4.876	(1.774, 13.398)	**<0.01**
Type 2 working place (Resort center and hotel-based sex workers)[*]	8.949	(1.468, 54.564)	**0.02**
Type 3 working place (Hair beauty salon-based sex workers)[*]	18.859	(2.980, 119.361)	**<0.01**
Type 4 working places (Street-based, rented apartment and restaurant-based sex workers)[*]	12.886	(2.205, 75.294)	**<0.01**

STD infection: infection of gonorrhea, syphilis, and/or Chlamydia

[*] The reference group was type 1 working place (massage parlor, karaoke bar, drinking bar-based sex workers)

The model controlled for marriage status, whether living with partners, period of living in the study county, consistent condom use with clients last week, 100% success persuading the clients to use condoms, number of clients last week, having regular non-paying partners during the past week, and having non-regular non-paying partners during the past week