

High prevalence of syphilis among street-based female sex workers in Nanchang, China

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ABSTRACT

Background: Female sex workers (FSWs) play a critical role in the heterosexual transmission of human immunodeficiency virus (HIV)/sexually transmitted infections (STIs) in China. Several studies reported that street-based FSWs have higher risk behaviors than establishment-based FSWs. Therefore, street-based FSWs should be specifically targeted for HIV and STIs intervention programs. **Objectives:** This study aims to investigate the prevalence rates and risk factors of HIV and syphilis among FSWs in Nanchang, China. **Materials and Methods:** Using convenience sampling methods, 361 street-based FSWs were recruited from August 2011 to February 2012. All participants completed an anonymous questionnaire on socioeconomic and sex behavioral information and were tested for HIV and syphilis. Risk for HIV and syphilis infection was assessed using univariate and multivariate logistic regression analyses. **Results:** No HIV infections were found. The prevalence rate of syphilis was 43.5%. Nearly 46.1% of street-based FSWs reported having education for no more than 6 years. Having reproductive tract infections at current visit, duration of sex work more than 5 years, indulgence in unprotected sex trade in the last time, unprotected sex trade in the last month, and unprotected sex with boyfriend or spouse in the last month were reported by 35.2%, 43.5%, 33.8%, 60.4%, and 93.1% street-based FSWs, respectively. In multivariate logistic regression analysis, having reproductive tract infections at current visit [odds ratio (OR), 12.10; 95% confidence interval (CI), 6.01-24.37], duration of sex work more than five years (OR, 4.26; 95% CI, 2.40-7.54), and unprotected sex trade in the last month (OR, 1.85; 95% CI, 1.06-3.22) were independently associated with syphilis infection. **Conclusion:** The prevalence rate of syphilis among street-based FSWs is very high. Most street-based FSWs in our survey had low education, long experience of commercial sex, and high rate of inconsistent condom use. Comprehensive interventions targeting this high-risk group, especially scaling up screening and ensuring consistent use of condoms during sex are needed.

Key words: Epidemiology, female sex worker, human immunodeficiency virus, prevalence, risk factor, syphilis

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INTRODUCTION

Syphilis, caused by the spirochete *Treponema pallidum*, results in multiple patterns of skin and visceral disease. Syphilis could enhance the sexual transmission of human immunodeficiency virus (HIV) and exacerbate the course of HIV infection.^[1-3] Although a worldwide battle against syphilis has evolved for several years, the epidemic of syphilis remains on rise, particularly in Africa, Asia, and middle or southern America.^[4-9] In 2012, China had 448,620 officially reported syphilis cases, a 4.4% rise in the reported incidence compared with 2011.^[10] The prevalence of reported syphilis in China (33.3/100,000 in 2012) is substantially higher than that in the United States (14.8/100,000 population in 2011) and in the European Union (4.85/100,000 in 2009) but lower than that in Mongolia (152/100,000 in 2011).^[10-13]

Commercial sex driven by rapid economic development, large income disparities, limited employment opportunities for women, surplus for men, and changing notions of sexuality has re-emerged.^[14-16] Approximately four million sex workers are present in China, which comprise a highly heterogeneous population that includes those from both low-end (ie, streets, beauty salons, roadside motels, and temporary sublets) and high-end venues (ie, karaoke clubs, massage parlors, night clubs, and hotels).^[17-19] Female sex workers (FSWs) play a critical role in the heterosexual transmission of HIV/sexually transmitted infections (STIs) in China.^[19] Studies showed that the prevalence rate of syphilis among FSWs ranges from 9.5% to 15.8% in China.^[20-24] With the expansion of HIV/STIs epidemic in China, trends among specific at-risk populations should be assessed.

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The National AIDS Sentinel Surveillance Guidelines in China require that all types of entertainment establishments should be systematically mapped, classified into high-, middle- and low-tiers based on high-risk behaviors, and sampled proportionately within each tier. Sex work location is directly observable and more frequently used by researchers in China and elsewhere for categorization.^[25] Establishment-based FSWs work in bars, clubs, massage parlors, karaoke bars, and hotels, and provide sex services on a part-time basis to supplement their regular salaries. Street-based FSWs meet their clients on the streets or other places and have no other occupation. Given their illegal status and hidden nature of work, street-based FSWs may have higher risk behavior for STIs. Li *et al.*^[26] showed that the prevalence rates of syphilis among establishment- and street-based FSWs are 5.7% and 15.6%, respectively. Furthermore, a study found that the prevalence rates of lifetime and active syphilis among street-based FSWs (69.7% and 39.8%, respectively) are higher compared with KT, sauna, massage and phone-based FSWs.^[25] Nevertheless, surveillance systems in Nanchang primarily target establishment-based FSWs, leaving a gap in data about street-based FSWs, who may be at greater risk for HIV/STIs. This study therefore aims to determine the prevalence rate and related risk factors of syphilis among street-based FSWs in Nanchang.

MATERIALS AND METHODS

Population and recruitment

The study was conducted in Nanchang, which is located in the north-central portion of Jiangxi Province. Based on the 2010 census, Nanchang has a population of 5,042,865 people. As part of the public health outreach service and case-finding activities, women who identified themselves as street-based FSWs were approached in known locations of commercial sex. The participants were recruited from August 2011 to February 2012 by convenience sampling methods. Street-based FSWs were defined as those who solicited clients in public outdoor places, such as parks, streets, and so forth. After giving written informed consent, the participants answered a questionnaire. Free medical examinations, including syphilis and HIV tests, were offered to all prospective participants along with counseling, condoms, and educational materials. The study was approved by the Ethical Committee of the Dermatology Hospital of Jiangxi Province. Free treatment for syphilis infection was provided according to the national guidelines. HIV-positive participants were referred to HIV care and treatment center in Nanchang.

Laboratory tests

HIV antibody was detected initially by enzyme-linked immunosorbent assay (Beijing Jinhao Biologic Production Co., Beijing, China). Positive results were confirmed by an

HIV-1/2 western blot (Neu Lab-Blot; Pasteur Diagnostics, France). *T. pallidum*-specific antibodies were assessed using a finger-prick rapid point-of-care (POC) syphilis test (Wantai anti-TP antibody rapid test, Wantai Biological Pharmaceutical Co., Ltd., Beijing, China). The diagnosis of syphilis (lifetime syphilis) was determined based on positive POC. All tests were performed by trained doctors and laboratory technicians at the Dermatology Hospital of Jiangxi Province, Nanchang. Free treatment for syphilis infection was provided according to China national guidelines.

Statistical analysis

Original questionnaire and laboratory testing data were entered twice into EpiData software (EpiData version 3.0; The EpiData Association, Odense, Denmark). Univariate logistic analyses were used to explore factors associated with syphilis infection. Variables that were significant in univariate models ($P < 0.05$) or were biologically plausible were included in a multivariable logistic regression model. Those not significant in the multivariable model were eliminated in a stagewise manner, identifying variables that were independently associated with syphilis seropositivity. Variables were retained as significant in multivariable analyses at $P < 0.05$. The P values reported were two sided. Adjusted odds ratios (OR) with 95% confident intervals (95% CIs) were reported. All statistical tests were conducted using SPSS version 11.5 (SPSS, Inc., Chicago, IL, USA).

RESULTS

Characteristics of the study population

A total of 407 FSWs were contacted, of whom 46 (11.3%) refused to participate or withdrew from the study because of unwillingness to answer sensitive questions. Refusers showed no significant differences from participants in terms of sociodemographic and risk behavior characteristics. Table 1 shows the sociodemographic characteristics among street-based FSWs. The average age was 36.5 (range 19 to 52) years with 86.7% of women over 30 years old. The majority of participants were of Han ethnicity (95.3%); 56.0% were local residents; 72.9% had no more than six years of education; 91.7% were currently married; 2.5% had ever used injected drugs (IDU); 35.2% had reproductive tract infections at current visit; and 5.6% knew their HIV status in past 12 months. Table 2 shows sexual behaviors among street-based FSWs. For the participants, 39.6% had their sexual debut before 20 years of age; and 43.5% were engaged in sex work for more than 5 years. Most of the street-based FSWs reported never using condoms with their boyfriend or spouse (93.1%); however, 66.2% used condoms at last commercial sex act. Regarding condom use in the recent month with clients, 143 admitted to have used condom each time (39.6%). The number of clients met per day ranged between one and 10 (median of 4) and 37.4% had five or more clients per day. Only 43.5%

of women charged > 50 RMB (approximately US\$ 6.5 at the present time of study) per sexual encounter.

Prevalence of HIV and syphilis

No HIV infections were found. The prevalence rate of syphilis was 43.5% (157/361).

Factors associated with syphilis

Variables associated with the prevalence of syphilis in univariate analysis included older age (41-52 years) (OR, 3.33; 95% CI, 1.55-7.18), education (more than six years) (OR, 0.56; 95% CI, 0.33-0.98), having reproductive tract infections at current visit (OR, 10.02; 95% CI, 6.03-16.67), age at first sex (20 years or more) (OR, 0.57; 95% CI, 0.37-0.88), duration of sex work (5 years or more) (OR, 4.04; 95% CI, 2.59-6.30), doing unprotected sex trade

at last time (OR, 2.23; 95% CI, 1.43-3.48), doing unprotected sex trade in the last month (OR, 1.88; 95% CI, 2.22-2.91), and fee per client more than 50 RMB (OR, 0.65; 95% CI, 0.42-0.99). In multivariate logistic regression analysis, having reproductive tract infections at current visit (OR, 12.10; 95% CI, 6.01-24.37), duration of sex work (five years or more) (OR, 4.26; 95% CI, 2.40-7.54), and doing unprotected sex trade in the last month (OR, 1.85; 95% CI, 1.06-3.22) were independently associated with syphilis infection [Table 3].

DISCUSSION

Syphilis is an ancient disease but remains a major health challenge.^[27] The global prevalence rate of syphilis has again surged because of multiple biological and social factors.^[11,28-30]

Table 1: Association of sociodemographic factors with syphilis infection among street-based female sex workers in Nanchang, Jiangxi province

Factor	No.	Syphilis infection percent (N)	OR (95% CI)	P value
Age (years)				
19-30	48	33.3 (16)	1	0.40
31-40	241	39.8 (96)	1.32 (0.67-2.55)	<0.001
41-52	72	62.5 (45)	3.33 (1.55-7.18)	
Ethnicity				
Han	344	44.5 (153)	1	0.10
Other	17	23.5 (4)	0.38 (0.12-1.20)	
Local resident				
No	159	53.5 (85)	1	0.54
Yes	202	35.6 (72)	0.88 (0.58-1.34)	
Years of education				
≤6	293	46.1 (135)	1	0.04
>6	68	32.4 (22)	0.56 (0.32-0.98)	
Currently married				
No	30	0.6 (18)	1	0.06
Yes	331	42.0 (139)	0.48 (0.23-1.03)	
Ever injected drugs use				
No	352	43.5 (153)	1	0.95
Yes	9	44.4 (4)	1.04 (0.28-3.94)	
Having reproductive tract infections at current visit				
No	234	25.2 (59)	1	<0.001
Yes	127	77.2 (98)	10.02 (6.03-16.67)	
Known HIV status in past 12 months				
No	341	44.3 (151)	1	0.22
Yes	20	10.0 (2)	0.54 (0.20-1.44)	

CI: confidence interval, OR: Odds ratio

Table 2: Association of sexual behavioral factors with syphilis infection among street-based female sex workers in Nanchang, Jiangxi province

Factor	No.	Syphilis infection percent (N)	OR (95% CI)	P value
Age at first sex				
<20	143	51.8 (74)		0.01
≥20	218	38.1 (83)	0.57 (0.37-0.88)	
Duration of sex work (years)				
<5	204	27.0 (55)		<0.001
≥5	157	59.9 (94)	4.04 (2.59-6.30)	
Having unprotected sex trades at last time				
No	239	36.8 (88)		<0.001
Yes	122	56.6 (69)	2.23 (1.43-3.48)	
Having unprotected sex trades in the last month				
No	143	57.8 (49)		0.004
Yes	218	24.8 (108)	1.88 (2.22-2.91)	
Having unprotected sex with boyfriend or spouse in the last month				
No	25	60.0 (15)		0.09
Yes	336	42.3 (142)	0.49 (0.21-1.12)	
Number of clients per day				
<5	226	39.8 (90)		0.07
≥5	135	49.6 (67)	1.49(0.97-2.29)	
Fee per client (RMB)				
≤50	204	31.9 (65)		0.047
>50	157	42.0 (66)	0.65 (0.42-0.99)	

CI: confidence interval, OR: Odds ratio

Table 3: Factors associated with syphilis infection among street-based female sex workers in Nanchang, Jiangxi Province, as predicted by a multiple logistic regression model

Factor	OR (95% CI)	P value
Having reproductive tract infections at current visit		
No	1	<0.001
Yes	12.10 (6.01-24.37)	
Duration of sex work (years)		
<5	1	<0.001
≥5	4.26 (2.40-7.54)	
Having unprotected sex trades in the last month		
No	1	0.03
Yes	1.85 (1.06-3.22)	

CI: confidence interval, OR: Odds ratio

To date, syphilis has imposed considerable health and economic burden on many countries, especially the developing countries.^[29,31,32]

To our knowledge, the overall syphilis prevalence rate of 43.5% (157/361) is substantially higher than that reported among FSWs in China.^[20,22-24,33,34] The data we collected in this study may explain the serious epidemic syphilis among street-based FSWs. First, the education level of most street-based FSWs was lower than high school. Good education can help sex workers to acquire knowledge on STIs and safe sex; inadequate education may predispose them to STIs.^[33,35,36] As a result, a high prevalence rate was observed among street-based FSWs with low education. Second, more than half of street-based FSWs in our study were engaged in selling sex for five years or more. Moreover, street-based FSWs had to solicit more clients because of their low sex charge. Given that syphilis in clients of FSWs is not rare,^[24] we suggest that street-based FSWs with more clients and longer experience of selling sex would be more vulnerable to syphilis. Third, inconsistent condom use during sex with clients in our survey was common. However, as an effective physical barrier against the transmission of sexual pathogens, condoms remain a good strategy to reduce the risk of acquiring STIs (if uninfected) or transmitting STIs (if infected).^[37,38] One major reason for not using condoms during commercial sex is client refusal. In fact, the status of sex workers vis-a-vis their clients is obviously different because sex workers rely on the financial support of their clients.^[39] Thus, street-based FSWs encountering clients refusing to use condoms may have limited room for negotiation if they want to keep the client's business. Moreover, intrauterine devices (IUDs) are commonly used by married women to prevent pregnancy in

China. Sex workers who use IUDs may have less incentive to use condoms for contraception during intercourse.

FSWs working in low-tier venues (on the streets or public outdoor places) have a higher risk of HIV infection than other venues because they may be related to greater numbers of clients per day, lower rates of condom use with clients who can pay extra for unsafe sex, or more frequently changing work locations.^[40-42] Furthermore, Wang *et al.*^[43] has showed illegal drug use, particularly with injection drugs, is the single greatest risk factor for HIV infection among FSWs in China. Another data from China suggested that the HIV prevalence among FSWs was consistently low in most regions, and the province-specific HIV prevalence rates higher than 1% were clustered in Yunnan, Xinjiang, Guangxi, Sichuan, and Guizhou provinces, where injection drug use was common among FSWs.^[44] However, only a few of the street-based FSWs (1.1%) in our study are injection drug users. This factor may be the main reason why no participants in our study were positive for HIV.

Several limitations of the study are worth noting. First, convenience sampling, which was employed in our study, is not generalizable to larger regions.^[45] Given the illegal status and hidden nature of FSWs, a special method was needed to obtain a more representative sample for the population. This method is respondent-driven sampling (RDS), which has been used to recruit hidden populations such as IDUs and men who have sex with men.^[46,47] It is a variant of chain-referral sampling that offers an incentive for being interviewed and an additional incentive for recruiting peers. RDS reportedly reduces the biases generally associated with chain-referral methods. Second, self-reports are subject to numerous biases and serious underreporting. Moreover, symptoms for STIs do not necessarily lead to accurate assessment of prevalence. Considering that the majority of infections are asymptomatic, diagnoses based on symptomatic assessments may miss a large subset of infections, or lead to incorrect diagnoses. Assessment of risk behaviors followed by expanded laboratory testing to support diagnoses may be a better approach. Third, POC tests are simple, rapid, inexpensive, and might help expand syphilis screening programs. However, these tests pose some challenges, such as false-negative results (suboptimum sensitivity), persistent positive tests, and lack of titers to follow, which are important for clinical management algorithms.^[48] Persistent positive treponemal tests caused by previously treated syphilis infections introduce the risk of unnecessary treatment in areas with many patients treated for syphilis. However, most participants in our study (94.5%) did not know their syphilis status in the past 12 months. Thus, the issue of previously treated syphilis infections was minor.

Evidence supporting the role of STIs, particularly ulcerative STIs, as HIV cofactors is extensive and indisputable.^[1-3] Reducing the prevalence of STIs removes cofactors, making HIV transmission less efficient. Therefore, the World Health Organization-endorsed global strategy for the prevention and control of STIs in May 2006 featuring scale-up of effective STIs services, promotion of strategies to enhance STIs-prevention impact, and support for new technology development for STIs prevention are the key points for action.

All these findings in our study highlight the need for comprehensive efforts to increase education on safe sex and ensure consistent use of condoms during sex. The fact that street-based FSWs are not well educated indicated that counseling on HIV/AIDS and STDs should be fundamental and group specific. Furthermore, low education level may be associated with a lack of basic profession training. Thus, some street-based FSWs are forced to sell sex to survive. In China, the major reason for not using condoms during commercial sex is client refusal.^[49] Thus, equal emphasis on advocating condoms for street-based FSWs and their acceptance and use by clients is important. In addition, street-based FSWs reported few or no condom usage with their steady partners, such as boyfriend or spouses. These sexual partnerships could then act as bridges between sex workers and the general population.^[39] Thus, further interventions should also promote consistent condom use during sex with steady partners.^[50] Many FSWs are reluctant to access health services because of stigma and confidentiality concerns.^[51] Like most other migrant workers in China, FSWs often do not have health insurance.^[52] High health care costs combined with a lack of awareness and understanding about HIV/STIs may leave many infections untreated, leading to further spread.^[53,54] Thus, expanded services for management of FSWs should be accompanied by scaling up the coverage of health insurance and promotion of health care-seeking behavior.

In conclusion, the prevalence of syphilis among street-based FSWs in Nanchang of China is very high. Most of the street-based FSWs in our survey had low education, long experience of commercial sex, and high rate of inconsistent condom use. Comprehensive interventions targeted to this high-risk group, especially scaling up screening and ensuring consistent use of condoms during sex are needed.

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Ethical approval

Ethical approval was sought from the Ethical Committee of the Dermatology Hospital of Jiangxi Province before commencement of the study.

Patient consent

Obtained.

Contributors

This project was designed and planned by Xiao Hua Tao, Dan Shao, Wei Xue, and Fa Shun Ye. Outreach service and data collection were conducted by Xiao Hua Tao, Dan Shao, Wei Xue, and Ming Wang. Laboratory testing of syphilis infection and data interpretation were coordinated by Xiao Hua Tao and Mei Hua He. Data analyses and drafting were carried out by Xiao Hua Tao and Tao Jiang. All authors read and approved the final manuscript.

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