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HIV, syphilis, hepatitis C and risk behaviours among commercial sex male clients in Sichuan province, China

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Abstract

Objectives—Commercial sex male clients (CSMC) are at risk of sexually transmitted infections (STI) including HIV. This study reports the prevalence of HIV, syphilis and hepatitis C virus (HCV), a history of STI and HIV-related risk behaviours in a sample of 600 CSMC in three urban areas in Sichuan province, China. The risk factors for prevalent syphilis infection are also examined.

Methods—A cross-sectional survey was conducted with 600 CSMC in Sichuan province, China. Finger stick blood samples were collected for HIV, syphilis and HCV tests. Risk factors for syphilis were assessed using multivariate logistic regression by accounting for variance within and between study sites.

Results—Western blot confirmatory test results indicated that HIV prevalence was 1.5% (n=9). 32 participants (5.3%) screened positive for syphilis and 52 (8.7%) positive for HCV. The overall prevalence of consistent condom use with female sex workers (FSW) was 30.5%. Multivariate logistic regression analyses revealed local household registration (AOR 0.35, 95% CI 0.25 to 0.50), having snorted heroin in the past 6 months (AOR 2.36, 95% CI 1.18 to 4.74), always washing genitals after having sex with FSW (AOR 3.04, 95% CI 1.10 to 9.12) and consistent condom use with FSW (AOR 0.67, 95% CI 0.46 to 0.98) were significant correlates of syphilis infection.

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Competing interests None declared.

Patient consent Obtained.

Ethics approval This study was conducted with the approval of the Institutional Review Boards at Johns Hopkins Bloomberg School of Public Health and Sichuan University.

Contributors CY is responsible for data collection, conceptualisation, data analysis, write-up and finalisation of the paper. CL took part in study design, conceptualisation and assisted in drafting and editing the paper. RL was in charge of data collection and quality control of the study. CW was in charge of the study design and assisted in drafting and editing the paper. KN participated in study design, data collection and write-up of the paper.

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Conclusions—There is a large burden of syphilis infection coupled with high-risk sexual and substance use behaviours among male clients in Sichuan province, China. The data suggest that effective and comprehensive prevention interventions to promote condom use and reduce substance use among male clients in Sichuan province are urgently needed.

By 2007, an estimated 700 000 persons were living with HIV in China and the overall HIV prevalence was 0.05%. Historically, the initial HIV epidemic in China was driven primarily by the large number of infections among plasma donors in the 1990s and increasing rates of infection among injection drug users (IDU).[1] In recent years, the rate of heterosexual transmission has risen rapidly. In 2007, heterosexual transmission contributed to 44.7% of new HIV infections, and it has become the major transmission mode of all HIV infections in China, increasing from 10.7% in 2005 to 37.9% in 2007.[2] Moreover, after sexually transmitted infections (STI) were virtually eradicated by the government's aggressive STI control programme in the 1950s, they have re-emerged since China started the economic reform in the 1980s. STI, particularly those that cause genital ulcers such as syphilis, can contribute to the spread of HIV by increasing the infectiousness of HIV-positive persons and the susceptibility of HIV-negative individuals.[3] A systematic review of seroprevalence studies reported the steepest rises of syphilis prevalence among high-risk populations in China between 2000 and 2005.[4] For example, the syphilis prevalence among incarcerated female sex workers (FSW) has risen by approximately 1.4% per year during this interval.

The increase in HIV/STI in China may be partly due to the flourishing commercial sex industry, which re-emerged in the 1980s during China's economic reforms. Of the few studies that have interviewed commercial sex male clients (CSMC) in China, all have documented a low rate of condom use and an alarmingly high prevalence of HIV/STI.[5–8] In a study of 339 mine workers who paid for sex, HIV prevalence was 1.8% and the syphilis rate was 2.4%.[5] Another recent study reported an HIV prevalence of 6% in a convenience sample of 315 male clients of FSW. Drug use was one of the contributing factors to HIV infections among male clients.[9] Indeed, the number of drug users in China has been consistently increasing in the past decade. The number of registered drug users has increased from 70 000 in 1997 to 1.16 million in 2005, whereas the actual number may have risen to 3.5 million.[10] National behavioural surveillance data showed the prevalence of injection drug use among drug users increased from 35% in 1995 to 49% in 2004.[11] A recent systematic review reported that the hepatitis C virus (HCV) prevalence rates were 66.97% among IDU and 18.30% among non-IDU.[12] In addition, there is a long-standing relationship between STI and illicit drug use.[813–15] Syphilis prevalence among male drugs users in low and middle income countries ranges from 0.7% to 13.9%, with a median of 4.0%, highlighting the fact that drug users retain a significant ongoing sexual risk for STI transmission.[16] Evaluating both risky sexual and substance use behaviours among CSMC in China can better inform future prevention efforts to address issues of sexual health and of drug-related risks among CMSC.[17–19]

Sichuan province is one of the epicentres of the HIV/STI epidemic in China. By 2008, there were 19 375 HIV infections reported in Sichuan province, which ranked sixth among all provinces/autonomous regions in China.[2] Injection drug use was the primary route of HIV transmission in Sichuan (75.6%), and yet there has been increasing transmission through

sexual contact in recent years. Understanding the burden of HIV/STI among CSMC and the prevalent risk behaviours is critical for designing effective prevention interventions to curtail the spread of HIV/STI among male clients and the risk of transmission of HIV/STI to the general population.

The objective of this analysis was to characterise the prevalence of HIV, syphilis and HCV infection among a sample of 600 CSMC in Sichuan province, China. We further examined correlates, including substance use behaviours, condom use and genital hygiene practices of prevalent syphilis infection.

METHODS

This study was conducted in Sichuan province, China. From October to November 2008, a cross-sectional study was conducted in three cities in Sichuan province, namely Xichang, Zigong and Leshan. To be eligible for this study, participants had to be men at least 18 years of age, and have given money or valuable gifts in exchange for sexual intercourse at least once in the past 12 months. One recognisable methodological issue in targeting CSMC is that no sampling frame exists, and only one characteristic that clearly unifies and identifies these men is the fact that they pay FSW for sex.[20] Moreover, in many countries, including China, prostitution is illegal, and the sex industry is periodically suppressed by the police. Given strong privacy concerns, using standard probability sampling methods to recruit CSMC is highly problematical. Participants in the present study were recruited by the local department of health through snowball sampling.[21] Local health workers first identified a group of eligible participants from individuals who had sought voluntary HIV testing, or by outreach to methadone clinics or the venues or locations known to be frequented by male clients, such as hair salons and massage parlours. In addition, the initial participants recruited their male friends who may have been eligible to participate in the study. There was no financial incentive for the recruitment.

In each study site, the research team rented a tea house or karaoke club as the study site, which allowed for interviewing in private settings. After each participant's eligibility was determined and oral informed consent was obtained, a brief pre-testing counselling was conducted to provide information about the procedure of the tests and the consequences of both a positive and negative result. Blood samples were collected by finger stick to make a dried blood spot on filter paper. After blood spots were dried, they were stored in individual plastic bags and transported to laboratories within 3 days for HIV, syphilis and HCV tests. Blood sample collection was followed by a 30 min face-to-face interview with a trained interviewer. At the beginning of the study, each male client received a card with a unique identification number. The participants were told to call back to receive the testing results by using their ID number on the card. The ID number was only used to link the testing result and the survey data, and only the participants could link their names to the testing results. All participants were paid 50 yuan (approximately US$7) for their participation. The research protocols were reviewed and approved by the Institutional Review Boards at Johns Hopkins Bloomberg School of Public Health and Sichuan University.

Survey questions included data on age, ethnicity, education level, local household registration, employment, monthly income and current marital status. In addition to their drug using and sexual behaviour with FSW, the participants were asked about their current non-paid regular and casual sex partnerships and substance use, including injecting heroin, snorting heroin, using club drugs (methamphetamine, ketamine, ecstasy). We used an overall rate of consistent condom use with FSW as a global measure of male clients' sexual risk behaviour by asking participants the overall frequency of condom use when having sex with FSW on a five-point response option from 'every time', 'most of the time', 'half of the time', 'rarely' and 'never'. This response was dichotomised so that 'consistent condom use with FSW' indicated using condoms every time when having sex with FSW. The participants were asked about the commercial sex industry rank of FSW that they most often patronised. Options included FSW who worked in high rank (eg, hotels, VIP club), middle rank (eg, karaoke bars, clubs and massage parlours) and lower rank (eg, hairdressing rooms, on the street) of the commercial sex industry. Alcohol use and genital washing during commercial sex visits, and history of STI were also assessed.

Serum specimens were screened for HIV antibodies by ELISA (Modern Gaoda, Beijing, China) and positive tests were confirmed by HIV-1 western blot assay (GS HIV-1 Western Blot; BioRad Laboratories, Hercules, California, USA). Syphilis infection was detected by *Treponema pallidum* particle agglutination assay (Modern Gaoda), and the presence of anti-HCV antibody was detected by enzyme immunoassay kits (ELISA; Modern Gaoda).

Exploratory data analyses were conducted to examine the distribution of the variables and to generate a profile of this sample of male clients. Bivariate logistic regression was used to assess the relationship between independent variables and syphilis seropositivity. Independent variables significant at $p<0.05$ in the unadjusted analysis were chosen for inclusion in the multivariate logistic regression models. General estimating equation was employed to account for variance within and between study sites.[22] Data were analysed using Stata version 10.0.

RESULTS

Demographic characteristics, drug use and commercial sex behaviours

A total of 600 eligible participants provided finger-stick blood samples and completed the survey questions. Sixty-nine participants (11.5%) were local methadone clinic clients. Table 1 presents the sociodemographic characteristics, drug use and commercial sex behaviours of the study participants. The median age of this sample was 38 years, with a range from 18 to 75 years. The vast majority of the participants had local household registration (91.5%). The sample reported a high rate of full-time or part-time employment (82.6%) and over half of the participants (60.1%) had a monthly income more than 1000 yuan (approximately US $143). Less than one-third (20.7%) had at least a senior high school education. More than half (58.4%) were married, the majority had regular partners (ie, wife or girl friend, 82.2%), and approximately half of the participants (45.0%) had non-paid casual partners.

Forty-seven participants (7.8%) reported having injected heroin and 7.7% (n=46) had snorted heroin in the past 6 months. The majority of active IDU (91.5%) and 78.3% of

heroin snorters were methadone clinic clients. The prevalence of using club drugs in the past 6 months was 10.7% (n=64).

The overall prevalence of consistent condom use with FSW was 30.5%. Approximately two-thirds of the sample (60.6%) usually patronised FSW who worked in the middle rank of the commercial sex industry. The majority of participants reported they always wash the genitals after having sex with FSW (82.3%) and 21.4% reported they always drink alcohol before visiting FSW.

HIV, syphilis and HCV prevalence, self-report STI history and consistent condom use with FSW

Table 1 presents the prevalence of HIV, syphilis, self-report STI history and HCV in this sample. Of the total 600 male client sample, western blot confirmatory test results indicated the HIV prevalence was 1.5% (n=9). Less than a third of the participants (31.5%) reported a history of an STI. Thirty-two (5.3%) screened positive for syphilis and 52 (8.7%) were positive for antibodies to HCV. There was no HIV/syphilis co-infection case. Among participants who tested positive for syphilis, 62.5% self reported no history of having an STI.

Table 2 compares the prevalence of HIV, syphilis, HCV, self-report STI history and consistent condom use with FSW between methadone clinic clients and non-methadone clinic clients. Among 69 methadone clinic clients, the prevalence of HIV was 11.6% (n=8), the prevalence of syphilis was 5.8% (n=4) and the prevalence of HCV was 66.7% (n=46). The HCV/ HIV co-infection rate was 11.6% (n=8) and all HIV-seropositive methadone clients also screened positive for antibodies to HCV. The HCV/syphilis co-infection rate among methadone clinic clients was 4.3% (n=3). There were no significant differences in the prevalence of syphilis and condom use with FSW between methadone clinic clients and non-methadone clinic clients.

Risk factors for syphilis

Bivariate and multivariate logistic regression analyses were undertaken to identify risk factors associated with syphilis infection. Table 3 presents the regression results of syphilis infection. Male clients with local household registration were less likely to be syphilis seropositive (adjusted odds ratio (AOR) 0.35, 95% CI 0.25 to 0.50). Significant risk factors included having snorted heroin in the past 6 months (AOR 2.36, 95% CI 1.18 to 4.74) and always washing their genitals after having sex with FSW (AOR 3.04, 95% CI 1.10 to 9.12). Always drinking alcohol before visiting FSW was marginally significant in the multivariate logistic regression model (AOR 1.58, 95% CI 0.94 to 2.67). Consistent condom use with FSW was a significant protective factor for syphilis infection (AOR 0.67, 95% CI 0.46 to 0.98).

DISCUSSION

The HIV prevalence in this sample of male clients was 1.7%, which was comparable with an earlier study that reported an HIV prevalence of 1.8% among male mine workers who had commercial sex experiences in China.[5] In the present study, eight out of nine HIV-

seropositive cases were methadone clinic clients. The attributable risk factor of HIV can be drug use directly, due to parenteral exposures, or indirectly, through unsafe sex.[23] The present study finding of co-infection with syphilis and HCV among methadone clinic clients indicates both an increased risk of sexual and injection acquisition of HIV and transmission among male clients who were IDU. IDU who acquired HIV by means of parenteral exposures and patronise FSW are likely to be important as a bridge population in transforming the current concentrated HIVepidemic among IDU into the general population when unprotected sex is normative.[2425]

We did not find a significant difference in the rate of condom use between methadone clinic clients and non-methadone clinic clients. However, the interpretation of this result needs to take into consideration that methadone clinic clients were more likely to have been exposed to HIV prevention messages. In addition, the rate of syphilis was slightly higher in the methadone clinic patients (5.8% vs 5.3%), albeit this difference was not statistically significant. Among participants who tested positive for syphilis, almost two-thirds (62.5%) reported no STI history, suggesting that this high-risk population may have commonly had STI that went undiagnosed and untreated.

Of the participants who have snorted heroin in the past 6 months, 21.7% were not methadone clinic clients. In examining the association between substance use and syphilis infection, we found snorting heroin was a significant risk factor for syphilis infection in both bivariate and multivariate logistic regression models. However, no associations have been observed for heroin injection or club drug use (methamphetamine, ketamine, ecstasy). Always drinking alcohol before visiting FSW was significant in the bivariate analyses but only marginally significant in the adjusted model. Previous research suggested that sexual risks associated with substance use vary by the different types of substance used.[26] However, studies on this association have shown inconsistent findings.[27–29] An increased understanding of the association between substance use and HIV/STI-related sexual risks may be abetted by incorporating information about the social context of commercial sex.

We found that male clients without local household registration had significantly higher rates of syphilis infection. HIV/ STI-related risks among Chinese migrants who do not have local house registration have been well documented.[173031] Lack of access to health care and prevention programmes in the city increases migrants' vulnerability to numerous health problems.[32] The high cost of health care may also lead to a delay in diagnosis and treatment of HIV/STI, which could exacerbate the further spread of these diseases. There is a need to link HIV/STI-related prevention, treatment and care to improving the national healthcare system.

The frequent reports of always washing their genitalia after having sex with FSW suggest that these men may be aware that sex with FSW carried a risk of HIVand other STI. However, they may be misinformed and believe that genital washing will provide them protection from these infections. We found a significant positive association between genital washing after having sex with FSW and syphilis infection. Without information about the prevalence of genital washing after having sex with non-paid regular or casual partners, we do not know if the association was due to genital washing with FSW in particular or due to

the general practice of genital washing. Yet this result was consistent with the findings of a recent study in Rakai, Uganda, which reported that HIV incidence was associated with washing genitals after sexual intercourse among men.[33] The potential explanation was that penile washing may remove acidic vaginal secretions, which may impair HIV survival, or water with a neutral pH may assist HIV survival and infectivity. A previous study has documented vaginal douching as a common practice among FSW in China, and FSW who douched were less likely to report consistent condom use.[34] In the current study, male clients who practised genital washing were more likely to report consistent condom use, and consistent condom use was a significant protective factor in syphilis infection. Given the present study finding of the prevalent genital washing practice among CSMC, additional studies are needed to examine the relationship between genital washing, condom use and STI. Moreover, HIV/STI prevention intervention efforts should address the heath risks associated with genital washing.

Several limitations of the current study should be noted. The primary limitation of this study is the use of a cross-sectional study design, which limits our ability to make a causal inference regarding the relationship between risk factors and syphilis infection. We used snowball sampling to recruit the male clients, which may limit generalisability.[21] Therefore, the current study may have limited generalisability. In addition, the self-report of illegal behaviours may be influenced by social desirability response bias. Finally, with the western blot results as the reference, the sensitivity of the *T pallidum* particle agglutination assay for syphilis testing was 91.5%, which was lower than ELISA.[35] Therefore, we may have underestimated the syphilis seroprevalence.

In conclusion, there is a large burden of syphilis infection coupled with high-risk sexual and substance use behaviours among male clients in Sichuan province, China. In the absence of effective interventions to prevent HIV transmission to the male client population, the current epidemic may expand into the general population.[20] Understanding the characteristics of male clients and their HIV-related sexual and substance use behaviours could inform future intervention strategies aimed at preventing the further spread of syphilis and HIV among male clients and from male clients to their sexual partners in China. Our data suggest that an effective and comprehensive prevention intervention programme to promote condom use and reduce substance use among male client populations in Sichuan province is urgently needed. Furthermore, measures should be taken to ensure that the male clients already infected with HIV/STI have adequate access to treatment.

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Key messages

- There is a large burden of HIV, HCV, syphilis infection coupled with high-risk sexual and substance use behaviours among male clients in Sichuan province, China.
- Significant correlates of syphilis infection among male clients included not having local household registration, snorting heroin and washing genitals after having sex with FSW.
- Effective and comprehensive prevention interventions to promote condom use and reduce substance use among male clients in Sichuan province are urgently needed.

Table 1

Demographics and risk behaviours and associations with syphilis infection among 600 male clients

	Total N=600 N (%)
Demographics	
Age: median, years (range)	38 (18–75)
>38	264 (44.0)
≤38	336 (56.0)
Yi ethnicity	
Yes	22 (3.7)
No	578 (96.3)
Household registration	
Local	549 (91.5)
Other	51 (8.5)
Employment*	
Employed	471 (78.5)
Unemployed	105 (17.5)
Monthly income (yuan)†	
>1000	358 (60.1)
≤1000	238 (39.9)
Education	
At least senior high school	124 (20.7)
Less than senior high school	476 (79.3)
Married	
Yes	351 (58.5)
No	249 (41.5)
Having non-paid regular partner	
Yes	493 (82.2)
No	107 (17.8)
Having non-paid casual partner	
Yes	270 (45.0)
No	330 (55.0)
Drug use behaviours	
Methadone clients	
Yes	69 (11.5)
No	531 (86.5)
Injected heroin**	
Yes	47 (7.8)
No	553 (92.2)
Snorted heroin**	
Yes	46 (7.7)
No	554 (92.3)

	Total N=600 N (%)
Used club drugs** ††	
Yes	64 (10.7)
No	536 (89.3)
Commercial sex behaviours	
Consistent condom use with FSW	
Yes	183 (30.5)
No	417 (69.5)
Ranks of commercial sex work‡	
Low	172 (28.7)
Middle	363 (60.6)
High	64 (10.7)
Always wash the genitals after having sex with FSW§	
Yes	492 (82.3)
No	106 (17.7)
Always drink alcohol before visiting FSW¶	
Yes	128 (21.4)
No	470 (78.6)
HIV	
Positive	9 (1.5)
Negative	591 (98.5)
Syphilis	
Positive	32 (5.3)
Negative	568 (94.7)
Self-report STI history	
Yes	186 (31.5)
No	404 (68.5)
HCV	
Positive	52 (8.7)
Negative	548 (91.3)

* 24 Cases were missing.

† Four cases were missing.

‡ One case was missing.

§ Two cases were missing.

¶ Two cases were missing.

** In the past 6 months.

†† Methamphetamine, ketamine, ecstasy.

p<0.10;

* p<0.05;

** p<0.01;

*** p<0.001.

FSW, female sex worker; HCV, hepatitis C virus; STI, sexually transmitted infection.

Table 2

HIV, syphilis and HCV prevalence and consistent condom use between methadone clients and non-methadone clients

	Methadone clinic clients (n=69) N (%)	Non-methadone clinic clients (n=531) N (%)	p Value*
HIV	8 (11.6)	1 (0.2)	<0.001
Syphilis	4 (5.8)	28 (5.3)	0.86
HCV	46 (66.7)	6 (1.1)	<0.001
Self-report STI history	42 (60.9)	114 (27.6)	<0.001
Consistent condom use with FSW	23 (33.3)	160 (30.1)	0.59

*p Values of χ^2 test statistics are reported.

FSW, female sex worker; HCV, hepatitis C virus; STI, sexually transmitted infection.

Table 3

Bivariate and multivariate analyses of the factors associations with syphilis infection

	Syphilis seropositive N=32 N (%)	OR (95% CI)	AOR (95% CI) N=596
Demographics			
Age: median, years (range)			
>38	20 (7.6)	2.21 (1.08 to 4.55)*	2.15 (0.72 to 6.36)
≤38	12 (3.6)		
Yi ethnicity			
Yes	1 (4.6)	0.84 (0.46 to 1.54)	
No	31 (5.4)		
Household registration			
Local	27 (4.9)	0.48 (0.39 to 0.58)***	0.35 (0.25 to 0.50)***
Other	5 (9.8)		
Employment			
Employed	28 (5.9)	1.51 (0.31 to 7.26)	
Unemployed	4 (4.0)		
Monthly income (yuan)			
>1000	16 (4.5)	0.70 (0.41 to 1.18)	
≤1000	15 (6.3)		
Education			
At least senior high school	3 (2.4)	0.38 (0.19 to 0.77)**	0.46 (0.21 to 1.03)+
Less than senior high school	29 (6.1)		
Married			
Yes	20 (5.7)	1.19 (0.28 to 5.16)	
No	12 (4.85)		
Having non-paid regular partner			
Yes	25 (5.1)	0.76 (0.25 to 2.32)	
No	7 (6.5)		
Having non-paid casual partner			
Yes	13 (4.8)	0.83 (0.43 to 1.59)	
No	19 (5.8)		
Drug use behaviours			
Methadone clients			
Yes	4 (5.8)	1.11 (0.70 to 1.75)	
No	28 (5.3)		
Injected heroin#			
Yes	1 (2.1)	0.37 (0.13 to 1.07)	
No	31 (5.6)		
Snorted heroin#			
Yes	4 (8.7)	1.79 (1.11 to 2.89)*	2.36 (1.18 to 4.74)*
No	28 (5.1)		

	Syphilis seropositive N=32 N (%)	OR (95% CI)	AOR (95% CI) N=596
Used club drugs[#†]			
Yes	2 (3.1)	0.54 (0.22 to 1.34)	
No	20 (5.6)		
Commercial sex behaviours			
Consistent condom use with FSW			
Yes	6 (3.3)	0.51 (0.42 to 0.62)***	0.67 (0.46 to 0.98)*
No	26 (6.2)		
Ranks of commercial sex work			
Low	10 (5.8)		
Middle	19 (5.2)	0.89 (0.55 to 1.45)	
High	3 (4.7)	0.80 (0.23 to 2.75)	
Always wash the genitals after having sex with FSW			
Yes	29 (5.9)	3.26 (1.15 to 9.26)*	3.04 (1.01 to 9.12)*
No	2 (1.9)		
Always drink alcohol before visiting FSW			
Yes	11 (8.6)	2.01 (1.63 to 2.48)***	1.58 (0.94 to 2.67)+
No	21 (4.5)		
Self-report STI history			
Yes	12 (6.5)	1.32 (0.61 to 2.89)	
No	20 (5.0)		

+ p<0.10;

* p<0.05;

** p<0.01;

*** p<0.001.

† Methamphetamine, ketamine, ecstasy.

AOR, adjusted odds ratio; FSW, female sex worker; STI, sexually transmitted infection.