

# Inequalities in socioeconomic status, behaviors, healthcare services and vulnerability to HIV/STIs between brothel-based and street-based female sex workers in Yunnan, China

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## Research article

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**Inequalities in socioeconomic status, behaviors, healthcare services and  
vulnerability to HIV/STIs between brothel-based and street-based female sex  
workers in Yunnan, China**

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## **Abstract**

**Background:** Commercial sex plays a critical role in the transmission of HIV/STI infections in mainland China because female sex workers (FSWs), who tend to be either street-based (SSWs) or brothel-based (BSWs), are extremely prevalent. These two groups had different behaviors and treatment. Few studies investigated due to SSWs group is difficult to reach.

**Methods:** A cross-sectional survey was conducted in Yunnan Province of China with 129 street-based and 185 brothel-based participants. Peer educators conducted anonymous, face-to-face interviews to collect data on socio-demographic characteristics, HIV/STIs-related knowledge, sex work history, sex behaviours, experience of receiving healthcare service, and experience of abuse from clients. Blood samples were taken for HIV and syphilis testing. Urine samples were taken for gonorrhoea and chlamydia testing.

**Results:** Significant differences on socio-economic characters and HIV/STIs prevalence are found between the two types of FSWS. SSWs are older than BSWs; have less education, more dependents, and more clients in one week; receive less healthcare services; and have a higher prevalence of HIV/STIs. Binary logistic regression model

results showed that venue for sex trade and experience of HIV testing were significantly associated with the prevalence of HIV/STIs

**Conclusions:** The SSWs are at lower socio-economic status and have high HIV/STIs mobility, who are more marginalized, receive less healthcare and are, thus, more vulnerable. China's next step in healthcare intervention should focus on the most hard-to-reach-marginalised groups. HIV/STIs testing and socio-psychological support programmes are urgent needed for these neglected people.

**Keywords:** China, HIV infection, STIs prevalence, epidemiology, sex worker, behaviors, healthcare service

## 1. Background

Even though China has made significant progress in HIV/AIDS control and prevention, the epidemic is a continuing challenge<sup>[1]</sup>. With the changing trends in transmission routes, more than 90% of new HIV infections was sexually transmitted path, which is now the primary driver<sup>[2]</sup>. Commercial sex, in particular, plays a critical role in the sexual transmission of HIV/STDs in China. Although the epidemic is largely characterised by a low national prevalence of 0.037%<sup>[3]</sup>, the prevalence of HIV among

all sex workers was 0.19% in 201<sup>[4]</sup>, with certain regions having higher prevalence, especially in low-fee female sexual workers (FSWs) was much higher at 4.7%<sup>[5]</sup>.

The sex industry was virtually eliminated in the 1950s in China but re-emerged and be periodic crackdowns since the 1980s. This increasing trend is from the implementation of open-door and market-economic policies, flourishing synchronously with rapid economic development<sup>[6, 7]</sup>. Several socioeconomic changes are driving commercial sex in China. Rural-to-urban migration had increased, resulting in more women turning to commercial sex and men engaging in high-risk sex with FSWs. Attitudes towards sex are also becoming more liberal with an increase in premarital and extramarital sex<sup>[8, 9]</sup>. It has estimated the number of FSW in China between 2 and 20 million<sup>[10-12]</sup>. Some studies estimated the (FSWs) population to be as high as 3.6% of the total adult female population (15-49 years old) in some areas of China, higher than the proportions in other Asian countries or anywhere else in the world<sup>[13, 14]</sup>

FSWs in China are a heterogeneous group, usually divided by work venue. The two main groups are the brothel-based sex workers (BSWs) who encounter their clients in various entertainment and service establishments (e.g., bars, hotels, guesthouses, saunas, massage parlors, etc.) and the street-based sex workers (SSWs) who solicit on streets or in parks<sup>[15]</sup>. Some studies have estimated the socio-demographics

characteristics, HIV-related knowledge, risky behaviors, and prevalence of HIV/STIs among BSWs and their clients<sup>[16-20]</sup>. However, less studies<sup>[21-25]</sup>, have looked at the SSWs, because of their high mobility and secrecy resulting in challenges in gaining access to them.

There were few studies<sup>[26, 27]</sup> in China focus on both SSWs and BSWs. Therefore, we have conducted the much deeper comparative study in China that targets both SSWs and BSWs, comparing socioeconomic factors, sexual behaviors and risky practices, like the experience of verbal or physical abuse, HIV/STIs-related knowledge, HIV/STIs prevalence and their influencing factors, and the efficacy of their health-care.

## **2. Methods**

### **2.1. Study site and field management**

This study was conducted between August and September 2010, in Lingxiang County of Yunnan province, southeast China. Yunnan province has one of the highest HIV prevalence in China, Lingxiang County being one of the epidemic centres<sup>[28]</sup>.

Lingxiang County has a population of 303,600. It borders Myanmar, near Southeast Asia's Golden Triangle region of high opium production. By the end of 2008,

1957 HIV/AIDS cases and 143 AIDS-related deaths were reported in Lingxiang. Even though injecting drug users (IDU) are still the predominant transmission route cumulatively (51.7%), the proportion of heterosexual transmission among new cases increased rapidly from 13.2% in 2004 to 59.5% in 2008 (Lingxiang CDC). Sex work is prevalent in this county, fuelling the concern of HIV transmission from IDUs to the general population. This site was chosen because of the presence of grassroots NGOs working among the FSWs and their active partnership with the local CDC in providing healthcare to the FSWs.

Four FSW peer educators working for an NGO were recruited into the study team. They helped in the mapping out the two FSW groups, recruitment, and interviews using a structured questionnaire after obtaining written informed consent. Blood and urine samples were collected by laboratory staff from the local CDC for HIV/STIs testing. HIV/STIs-related pre-test-post-test counseling, informing of test results, and free STI and Antiretroviral therapy ART treatment are all provided by certified medical staff with the local CDC. This study received approval from the local Yunnan institutional review boards.

## **2.2. Mapping and sampling**

All entertainment establishments (brothels) and locations the SSWs solicit were mapped out before the survey. There were 387 brothel-based FSWs in 53 places in four geographical blocks within the county, and 148 SSW roaming the streets in the north-western part of the county.

For the BSWs, two of the four geographical blocks were randomly selected and 185 of 196 (94.4%) FSWs working for all of the 21 massage salons in the blocks were recruited. For the SSWs, time-location sampling and snowball sampling were adopted, and 129 of 148 (87.2%) participants were recruited. Every participant was provided 20 Yuan (3.5 USD) as an incentive.

### **2.3. Data collection instrument**

A structured questionnaire for FSWs based on *The Family Health International Behavioral Surveillance Survey (FHI-BSS) 2000*(see the supplementary files), was used to collect data on socio-demographic characteristics, HIV/STI-related knowledge, risk perception, sex work history, sex behavior with clients and sex partners, self-report STI symptoms, and experience of receiving healthcare services. Knowledge of transmission and prevention of HIV/AIDS was measured by seven true/false/unknown questions. One point was given for each correct answer, with the score ranging from 0 to 7 points. Knowledge about symptoms of other STIs was similarly measured by ten questions,

with the score ranging from 0 to 10 points. Both focus group discussions and in-depth interviews with FSWs and peer educators were conducted to check the appropriateness of the questionnaire.

#### **2.4. Laboratory testing**

Blood samples were taken for HIV and syphilis testing. HIV was tested using the enzyme-linked immunosorbent assay (ELISA) for screening and the western blot test for confirmation. Screening for syphilis was performed using the rapid plasma reagin (RPR) test and the treponema pallidum particle agglutination (TPPA) test. Positive RPR and TPPA constitute a diagnosis of active syphilis. Urine samples were taken for gonorrhea and chlamydia testing by real-time fluorescent quantitative PCR (FQ-PCR) assay. Our study outcome was defined as testing positive for one or more of these four STIs (HIV, syphilis, gonorrhea, and chlamydia).

#### **2.5. Statistical methods**

Means and proportions compared by using the Mann-Whitney U-test and the Chi-square test. A binary logistic regression model with crude odds ratios (OR), adjusted OR, and 95% confidence intervals (CI) of related factors associated with

HIV/STIs were calculated. All analyses were carried out with the SPSS11.5 (IBM SPSS Co., USA).  $P < 0.05$  was considered statistically significant (two-sided).

### **3. Results**

#### **3.1. Sociodemographic characteristics and sex worker history**

The sociodemographic characteristics of SSWs and BSWs showed in Table 1. SSWs were older, more of them married, had received less education, and had to support more dependents than BSWs ( $P < 0.001$ ). They had begun sex work at an older age, had longer sex worker careers ( $P < 0.01$ ), and received a lower fee per client than BSWs ( $P < 0.001$ ). Consistently, they solicited many more clients per day ( $P < 0.001$ ) than their BSW counterparts.

#### **3.2. Sex behaviors and risky practices**

Risky practices and condom usage described in Table 2. Drug use within the past year and experience of verbal or physical abuse from clients were reported in both groups (SSW versus (vs.) BSW, 6.1 4.5%, non-significant (NS), and 35.4 vs. 45.5%, NS) respectively. Condoms were the most used contraceptive method in both groups (87.3 vs. 89.1%, NS), and 8.1% of SSWs and 19.2% of BSWs had experienced condom breakage or slippage during the previous week ( $P < 0.01$ ). The proportion of consistent

condom use with clients during the previous week was higher among BSWs than among SSWs (98.9 vs. 92.0%,  $P<0.01$ ). Conversely, condom use with a boyfriend or husband was higher in the street-based group (42.1 vs. 31.8 %,  $P<0.05$ ; 52.8 vs. 11.5%,  $P<0.001$ , respectively).

### **3.3. HIV/STIs-related knowledge and risk perceptions, healthcare service, HIV testing, and self-reported symptoms**

The HIV/AIDS-related knowledge score was high in both FSW groups, although without the significance. Conversely, the score of knowledge on STIs was low, and a significant difference found between the two groups ( $P<0.001$ ). Compared with BSWs, SSWs had received less HIV/STIs related health-care services, such as free condom distribution, STIs testing, and treatment, and HIV counseling and testing (37.0 vs. 64.4%,  $P<0.001$ ) (). About two-thirds of the subjects in both groups had had HIV testing in the past (68.5 vs. 65.5%, NS) (Table 3).

In addition, 32.5% of SSWs and 37.3% of BSWs reported having had STIs symptoms during the past year (NS) (abnormal vaginal discharge 21.4 vs. 24.3%, NS, genital ulcers 2.4 vs. 5.1%, NS, dysuria 15.9 vs. 15.8%, NS, and genital itch 16.8 vs. 29.3,  $P<0.05$ ). The risk perception of getting HIV/STIs from clients and of transmitting

HIV/STIs to clients were both higher among SSWs than among BSWs (93.7 vs. 75.3,  $P<0.001$ , and 89.4 vs. 25.1%,  $P<0.001$ , respectively) (Table 3).

### **3.4. HIV/STIs prevalence and related risk factors**

Five of the SSWs and none of the BSWs were confirmed to be infected with HIV ( $P<0.01$ ). Syphilis prevalence was higher in SSWs (7.0 vs. 1.1%,  $P<0.01$ ). Overall, 37.2% of SSWs and 24.9% of BSWs were found to be HIV/STIs infected (Table 4,  $P<0.05$ ).

A binary logistic regression model developed for all of the participants. As independent variables, the exposure variable of interest and all variables independently associated with the total number of STI infections were included (Table 5). SSWs are at a higher risk of having STIs compare with those BSWs (OR =2.07, 95% CI 1.22-3.50), HIV testing is a protective factor for HIV/STI infections (OR=0.42, 95% CI 0.24-0 .71).

## **4. Discussion**

Our results indicated that significant inequalities found between SSWs and BSWs concerning socio-demographics and healthcare service coverage. FSWs both have a high HIV awareness and condom use rate with clients, however, the issue on frequent

condom slippage or breakage well all existed for BSWs and SSWs. The SSWs received a significantly lower level of healthcare service and they are consistently more vulnerable and suffering from a higher incidence of HIV/STI infections than are BSWs.

Our findings indicate that violence abuse is a significant risk factor for HIV/STIs infections in FSWs population. Consistent with studies in Zimbabwe<sup>[28]</sup>, Swaziland<sup>[29]</sup>, American<sup>[30]</sup>, our results suggest that efforts to reduce violence are a key component of STI/HIV prevention and control in this vulnerable population. Violence Abuse from FSW clients has little studied in China or in other parts of the world. The illegal status of FSWs, the strong stigma and discrimination toward them in Chinese traditional culture, the fear of having their profession unmasked to family and acquaintances, and gender inequality are all factors that have contributed to their marginal situation and their vulnerability to abuse and violence<sup>[31]</sup>. At the same time, human resources are seriously limited within local health sectors in China<sup>[32]</sup>. therefore, most interventions would occur among the BSWs. Compared to BSWs, SSWs usually have no protectors or permanent venue; hence, they are more marginalized<sup>[33]</sup>, usually excluded from public healthcare sectors and surveillance systems and they are much harder to get the protection.

We also found HIV testing to be a protective factor against HIV/STIs, which suggests that seeking testing should be promoted strongly in both groups and that more studies promoting HIV testing should be encouraged in relation to this population<sup>[34, 35]</sup>. Promotion of HIV testing and counselling (VCT) through the social media now become a new strategy in mainland China<sup>[3, 36]</sup>. In last decades, the number of HIV testing facilities increased from 7,600 to 30,500 and the annual number of HIV tests increased from 45 million to 201 million (from 3.4% to 14.5% of the whole population)<sup>[37]</sup>.

Our multivariate analysis results highlight the importance of socioeconomic support in relation to HIV/STIs infection. All the three independent factors—work venue, experience of HIV testing, and abuse from clients—are strongly related to the socioeconomic background of FSWs. Most of the previous AIDS-related studies and interventions in China have been limited to biomedical issues only, with ideas for preventive efforts being almost entirely limited to the health sector. Even fewer studies have integrated HIV/STIs-related problems with other public health issues by looking at multiple-sector cooperation or using multi-disciplinary approaches<sup>[38, 39]</sup>. Consequently, the generalization of the research findings are usually limited, as well as the efficacy of prevention intervention. Therefore, socio-epidemiologic studies and interventions considering social-economic and sociocultural backgrounds should be encouraged for

examining future HIV/STIs preventive approaches in China. Social support approaches, such as professional re-training and re-employment support, social support networks, and cooperation with non-health sectors should be considered for FSWs.

The difficulty of reaching this population is a challenge for AIDS prevention in many countries. SSWs usually are not included in routine AIDS-related healthcare intervention or sentinel inspection as a result of their high mobility, mistrust of government, and lack of manpower in local healthcare sectors. In current study, our experience in integrating governmental and grassroots resources suggests that involvement of such organizations and peer educators is important, that skill training should be developed for peers, and that the public health sector and NGOs should be encouraged to integrate their work. Many international and national NGOs are dealing with many sensitive healthcare issues, large space remains for promoting cooperation between government sectors and NGOs on HIV/STIs prevention among high-risk groups in China<sup>[40, 41]</sup>. Through assigning some of the routine work with FSWs to NGOs, the governmental healthcare can encourage such NGOs to involve themselves through planning, management, and implementation of healthcare services. The NGOs, on the other hand, should feel free to avail themselves of China's CDC laboratories and technical support.

SSWs were more hard to reach than BSWs, through close cooperation between a local Chinese CDC and grassroots NGO, we gathered both biological and behavior indicators on participants. The participates in this study successfully represented the whole FSWs in Lingxiang County. Based on no one rejected the interview, we thought there was no response bias. However, in the questionnaire, there were some sensitive questions so that the information bias maybe not avoided. In the meantime, we did much more in-depth comparative research from the risky behavior (themselves to the clients and partners) by using the FHIBSS, which use reliable methods to track HIV risk behaviors over time as part of an integrated surveillance system, which monitors various aspects of the epidemic. They are especially useful in providing information on behaviors among sub-populations who may be difficult to reach through traditional household surveys, but who may be at especially high risk for contracting or passing on HIV, especially for sex workers and their clients. Our results, which demonstrate the efficacy of combining resources at various levels to access these hard-to-reach groups, suggested that outreach programs to these kinds of vulnerable groups are of the utmost importance. The main weakness of this study is its limited scale. As described above, this cross-sectional survey conducted only in one spot. Hence, generalization of the results is limited, and more studies on a broader scale needed.

Though the Chinese health sector has made much progress in health education and interventions with both the general population and high-risk-groups<sup>[32, 37]</sup> efforts to reach the most marginal and highest risk FSWs remain poor. As this is a cross-sectional design study, the next step for researchers is to design an approach for accessing the hard-to-reach FSWs, as interventional studies needed to examine how to improve healthcare toward this vulnerable population.

## **5. Conclusion**

The inequality between BSWs and SSWs is significant and quite visible. The Chinese healthcare system has made significant progress on AIDS/STIs-related interventions among high-risk populations, including health education and heightened condom use. However, more particular technical training and instruction on condom usage is need, and evaluation of the efficacy of intervention programs is need.

## **Abbreviations**

FSWs:female sex; BSWs:brothel-based sex workers; SSWs:street-based sex workers

## **Declarations**

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## **Authors' contributions**

G C, Y L and F H designed the study. G C, Y L, and Jp Z collected the data. G C, Y L, Z H and F H analyzed the data. G C, Y L, J W, and Jm Z drafted the manuscript. F H contributed to the interpretation of the results and critical revision of the manuscript for important intellectual content and approved the final version of the manuscript. All authors have read and approved the manuscript.

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### **Availability of data and materials**

Not applicable.

### **Ethics approval and consent to participate**

Written informed consent was sought from each potential participant. This study was approved by the Biomedical Ethics Review Committee of Yunnan, China.

### **Consent for publication**

Not Applicable.

### **Competing interests**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Table 1. Economic demographic characteristics of street-based and brothel-based FSWs\* in Yunnan, China, 2010.

Variable	Street-based (n1)		Brothel-based (n2)		P value
	n	(mean, SD)/	n	(mean, SD)/	
		(median, IQR)/%		(median, IQR)/%	
Age (mean, SD,** years)	129	34.0 (8.3)	182	25.1 (6.0)	<0.001 <sup>a</sup>
Age of sex debut (mean, SD, year)	127	20.0 (2.8)	178	18.1 (2.4)	<0.001 <sup>a</sup>

Age of starting sex work (mean, SD, year)	125	30.3 (7.5)	172	22.4 (5 .7)	<0.001 <sup>a</sup>
Length of time as an FSW (median, IQR,*** year)	125	4 (3.5, 1.25)	172	3 (3.0, 1.12)	<0.01 <sup>b</sup>
Charge per client (mean, SD, RMB <sup>c</sup> )	128	25.0 (13.0)	177	102.0 (34.0)	<0.001 <sup>a</sup>
No. of clients in last working day (median, IQR, person)	127	5 (3.0, 0.11)	170	1 (1.0, 0.6)	<0.001 <sup>b</sup>
No. of clients in last working day (mean, SD)	127	4.9 (2.4)	170	1.5 (1.3)	<0.001 <sup>a</sup>
No. of dependents (median, IQR, person)	129	3 (2.0, 0.6)	182	1 (2.3, 0.7)	<0.001 <sup>b</sup>
Ethnic group					0.309 <sup>a</sup>
Non-Han ethnicity	32	24.8	51	28.0	
Han ethnicity	97	75.2	131	72.0	
Marital status					<0.001 <sup>a</sup>
Married	78	60.5	52	28.4	
Unmarried	15	11.6	107	58.5	
Divorced	28	21.7	24	13.1	
Widowed	8	6.2	0	0	
Educational level					<0.001 <sup>a</sup>
No schooling	42	32.6	11	6.0	

Grade 1-6	61	47.3	63	34.4	
Grade 7-9	25	19.4	94	51.4	
Grade 10 or over	1	0.8	15	8.2	
No. of dependents					
0	9	7.0	57	31.3	<0.001 <sup>a</sup>
1 or 2	51	39.5	80	44.0	
3 or over	69	53.5	45	24.7	

<sup>a</sup> Chi-square test (2-sided)

<sup>b</sup> Mann-Whitney U test (2-tailed)

<sup>c</sup> 1 USD=6.5 RMB.

Note: Percentages do not always add up to 100% because of rounding down; missing data is not calculated.

\*FSWs, female sex workers; \*\*SD, standard deviation; \*\*\*IQR, interquartile range.

**Table 2.** HIV/STIs-related risks and history of sex work in street-based and brothel-based FSWs in Yunnan, China, 2010.

Items	Street-based	Brothel based	Street/Brothel Crude OR (95%CI)	P value <sup>1</sup>
	(n1)	(n2)		
	Frequency/ Percentage (%)	Frequency/ Percentage (%)		
	<b>Drug use in past 1 year (n1=33, n2=177)</b>			

No	31(93.9)	169(95.5)	1.0(ref)	
Yes	2(6.1)	8(4.5)	1.36 (0.28-6.72)	
<b>Condom breakage or slippage in past 7 days (n1=124, n2=172)</b>				<b>0.007</b>
No	114(91.9)	139(80.8)	1.0(ref)	
Yes	10(8.1)	33(19.2)	0.37 (0.18-0.78)	
<b>Verbal or physical abuse by clients in past 1 month (n1=127, n2=178)</b>				<b>0.078</b>
No	82(64.6)	97(54.5)	1.0(ref)	
Yes	45(35.4)	81(45.5)	0.66 (0.41-1.05)	
<b>Frequency of condom use with clients in past 1 week (n1=125, n2=177)</b>				<b>0.003</b>
Every time	115(92.0)	175(98.9)	1.0(ref)	
Sometimes	10(8)	2(1.1)	7.61 (1.64-35.36)	
<b>Frequency of condom use with boyfriend(s) in 1 week (n1=57, n2=107)</b>				<b>0.001</b>
Every time	24(42.1)	34(31.8)	1.0(ref)	
Sometimes	33(57.9)	73(68.2)	0.34 (0.17-0.66)	
<b>Frequency of condom use with husband in past 1 week (n1=53, n2=26)</b>				<b>&lt;0.001</b>
Every time	28(52.8)	3(11.5)	1.0(ref)	
Sometimes	25(47.2)	23(88.5)	0.12 (0.03-0.44)	
<b>Use of condom as contraceptive method (n1=126, n2=175)</b>				<b>0.623</b>

No	16(12.7)	19(10.9)	1.0(ref)
Yes	110(87.3)	156(89.1)	0.84 (0.41-1.70)

<sup>1</sup>Chi-square test (2-sided)

**Table 3.** HIV/STIs healthcare service, knowledge, and risk perception of street-based and brothel-based FSWs\* in Yunnan, China, 2010.

	Street-based (n1=129)	Brothel-based (n2=185)	Crude OR (95%CI)	P value <sup>1</sup>
	Frequency/Percentage(%)	Frequency/Percentage(%)		
<b>Ever receive any AIDS-related health service (n1=127, n2=177)</b>				<0.001 <sup>1</sup>

No	80(63.0)	63(35.6)	1.0	
Yes	47(37.0)	114(64.4)	0.33 (0.20-0.52)	
<b>Experience of HIV testing (n1=127, n2=177)</b>				0.588 <sup>1</sup>
No	40(31.5)	61(34.5)	1	
Yes	87(68.5)	116(65.5)	1.14 (0.70-1.86)	
<b>Self-reported STIs symptoms in past 1 year (n1=126, n2=177)</b>				0.394
No	85(67.5)	111(62.7)	1	
Yes	41(32.5)	66(37.3)	0.81 (0.50-1.31)	
<b>Know some PLWHA or people who died of AIDS (n1=112, n2=177)</b>				<0.001 <sup>1</sup>
No	53(47.3)	165(93.2)	1	
Yes	59(52.7)	12(6.8)	15.31 (7.65-30.63)	
<b>Correctly answered all 7 HIV-related items (%) (n1=126, n2=177)</b>				0.800 <sup>1</sup>
AIDS knowledge score less than 7	38(30.2)	51(28.8)	1	
AIDS knowledge score is 7	88(69.8)	126(71.2)	0.94 (0.57-1.55)	
<b>Knowledge score of STIs symptoms 0-2=0, 3-10=1 (n1=120, n2=170)</b>				<0.001 <sup>1</sup>

0-2	85(70.8)	62(36.5)	1	
10-mar	35(29.2)	108(63.5)	0.24 (0.14-0.39)	
<b>Perception: risk of getting HIV/STIs from clients (n1=126, n2=170)</b>				<b>&lt;0.001<sup>1</sup></b>
No	8(6.3)	42(24.7)	1	
Yes	118(93.7)	128(75.3)	4.84 (2.18-10.73)	
<b>Perception: risk of transmitting HIV/STIs to client (n1=123, n2=171)</b>				<b>&lt;0.001<sup>1</sup></b>
No	13(10.6)	128(74.9)	1	
Yes	110(89.4)	43(25.1)	25.19 (12.88-49.26)	

<sup>1</sup>Chi-square test (2-sided), b: Mann-Whitney U test

(2-tailed)

\*FSWs: female sex

workers

**Table 4.** HIV/STIs test results of street-based and brothel-based FSWs\* in Yunnan, China, 2010.

Items	Street-based (n1=129)	Brothel-based (n2=185)	Street/Brothel	P
	Frequency/ Percentage (%)	Frequency/ Percentage (%)	Crude OR (95%CI)	value <sup>1</sup>
<b>HIV</b>				<b>0.007</b>
Negative	124(96.1)	185(100)	-	
Positive	5(3.9)	0(0)	-	

<b>Syphilis</b>				0.005
Negative	120(93.0)	183(98.9)	1	
Positive	9(7.0)	2(1.1)	6.86 (1.46-32.31)	
<b>Gonorrhoea</b>				0.248
Negative	111(86.0)	167(90.3)	1	
Positive	18(14.0)	18(9.7)	1.51 (0.75-3.02)	
<b>Chlamydia</b>				0.417
Negative	99(76.7)	149(80.5)	1	
Positive	30(23.3)	36(19.5)	1.25 (0.73-2.17)	
<b>Any of the upper 4 STIs tested positive</b>				0.019
No	81(62.8)	139(75.1)	1	
Yes	48(37.2)	46(24.9)	1.79 (1.10-2.92)	

<sup>1</sup>Chi-square test (2-sided)

\*FSWs: female sex workers

**Table 5.** Factors associated with STIs prevalence of street-based and brothel-based FSWs\* in Yunnan, China, 2010.

	n (%)	%STIs +	OR (95%CI) Univariate	OR (95%CI) Multivariate	P
<b>Street01(n=314)</b>					
Brothel-based	129 (41.1)	24.9	1	1	0.007
Street-based	185 (58.9)	37.2	1.79 (1.10-2.92)	2.07 (1.22-3.50)	

**Dependence (n=311)**

0	66 (21.0)	24.2	1.0
1 or 2	131 (41.7)	31.3	1.42 (0.73-2.79)
3 or over	114 (36.3)	31.6	1.44 (0.73-2.87)

**Ever receive any AIDS-related health service (n=304)**

Yes	143 (53.0)	25.2	1
No	161 (47.0)	34.8	1.59 (0.96-2.61)

**Experience of HIV testing****(n=304)**

No	101(33.2)	23.6	1	1	0.001
Yes	203 (66.8)	44.6	0.80 (0.23-0.64)	0.42 (0.24-0.71)	

**Charge per client (in RMB) (n=305)**

0-50	131 (43.0)	36.6	1.76 (1.07-2.89)
>50	174 (57.0)	24.7	1.0

**Verbal or physical abuse by clients in past 1 month (n=305)**

No	179 (58.7)	26.3	1	1	0.067
Yes	126 (41.3)	35.7	1.56 (0.95-2.56)	1.64 (0.97-2.79)	

**Frequency of condom use with clients in 1 week (n=302)**

Every time	290 (96.0)	29.0	1
Sometime	12 (4.0)	58.3	3.43 (1.06-11.12)

**Correctly answer to all of the 7 HIV-related items (%)**

**(n=303)**

AIDS knowledge score is less than

7	89 (29.4)	38.2	1
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AIDS knowledge score is 7	214 (70.6)	27.6	0.62 (0.37-1.04)
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Note: The multivariate model includes the exposure variables of interest, and variables independently associated with STI

infections.

\*Female sex workers

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Questionnaire.pdf](#)