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# Vulnerabilities, health needs and predictors of high-risk sexual behaviour among female adolescent sex workers in Kunming, China

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## ABSTRACT

**Objectives** This study assessed social and behavioural predictors for sexual risk taking and sexually transmitted infections (STIs) including HIV among adolescent female sex workers (FSWs) from Kunming, China. Additionally, health services needs and use were assessed.

**Methods** A cross-sectional survey was conducted in 2010. Using snowball and convenience sampling, self-identified FSWs were recruited from four urban areas in Kunming. Women consenting to participate were administered a semi-structured questionnaire by trained interviewers identified from local peer-support organisations. Following interview, a gynaecological examination and biological sampling to identify potential STIs were undertaken. Descriptive and multivariable logistic regression analyses were performed.

**Results** Adolescent FSWs had a mean age of 18.2 years and reported numerous non-paying sexual partners with very low rate of consistent condom use (22.2%). Half (50.3%) the respondents had sex while feeling drunk at least once in the past week, of whom 56.4% did not use condom protection. STI prevalence was high overall (30.4%) among this group. Younger age, early sexual debut, being isolated from schools and family, short duration in sex work, and use of illicit drugs were found to be strong predictors for unprotected sex and presence of an STI. Conversely, having access to condom promotion, free HIV counselling and testing, and peer education were associated with less unprotected sex. The majority reported a need for health knowledge, free condoms and low-cost STI diagnosis and treatment.

**Conclusions** There is an urgent need to improve coverage, accessibility and efficiency of existing interventions targeting adolescent FSWs.

## BACKGROUND

Young people aged 15–24 years, predominantly young women, account for 41% of all new HIV infections globally.<sup>1</sup> A nationwide study in China assessing sexual and reproductive health services among youth indicated that women aged 15–19 years with low education and those who are mobile are most at risk of sexual and reproductive health problems, including unplanned pregnancies and sexually transmitted infections (STIs) such as HIV.<sup>2</sup> In particular, girls involved in sex work and those who use illegal substances and alcohol are at increased risk and are the new face of the HIV/STI pandemic.<sup>3–4</sup> Importantly, adolescent female sex workers (FSWs) have often been neglected by HIV/STI strategies and service providers, partly due to

the traditional assumption that adolescents should attend school with family support and abstain from sexual intercourse despite being legally old enough (the legal age for sex in China is 14 years).

Yunnan Province is a multiethnic area<sup>5</sup> located in the ‘Golden Triangle’, a major international business and drug trafficking route, with relatively high HIV prevalence.<sup>6–7</sup> By 2010, Yunnan accounted for 26% of China’s reported cases, though it only makes up 3% of China’s population. Kunming, the capital city of Yunnan province, has over 6 million inhabitants including 3.1 million women.<sup>5</sup> Rapid economic growth resulted in large-scale rural-to-urban migration with widening income gaps, which is an important driver of entry into sex work. In addition, more tolerant sexual attitudes and increased tourism boost the development of the commercial sex industry.<sup>8</sup> A 2008 size estimation exercise in Kunming estimated there were 10 196 (95% CI 9488 to 10 903) FSWs (approximately 0.33% of Kunming’s female population).<sup>9</sup> However, this might be an underestimate due to a police crackdown likely impacting on the census method.<sup>10–11</sup> Despite sex work being criminalised by law in China, many entertainment establishments (eg, karaoke clubs, night clubs, dancing halls, discos, bars) or personal service sectors (eg, hair washing rooms, hair salons, massage parlours, saunas, restaurants, hotels) are to some extent involved in facilitating sex services.<sup>12</sup> Mainstream entertainment venues often also provide easy access to illicit drugs, including amphetamine-type stimulants, heroin and cannabis.<sup>13–14</sup> Existing studies reveal a great heterogeneity among FSWs in China in terms of their working environment; yet, interventions do not sufficiently consider the diversity of contextual and social factors that influence the sexual behaviours of FSWs.<sup>12–15–16</sup> Limited data exist on young FSWs aged 15–19 years regarding their socio-demographic characteristics, working context, sexual and drug-using risk behaviour, HIV/STI prevalence and health-seeking behaviour. This study aims to increase knowledge and understanding of the specific working contexts and vulnerabilities of adolescent FSWs in China, and understanding the predictors for unsafe sexual behaviour which will contribute to inform future targeted interventions.

## METHODS

A cross-sectional survey of adolescent FSWs was conducted in collaboration with local academic



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institutes, the health department, community-based peer groups and Kunming Center for Disease Control (CDC). In addition, there are more than six peer groups/non-governmental organisations supporting FSWs since 2002. Twenty-two outreach workers or peer educators from these support groups were trained as interviewers for this study.

The study recruited women aged 15–19 years who are self-reported FSWs who sell sex for money or goods at sex work venues. The study targeted FSWs who use any sort of drugs such as alcohol and tobacco, and also those who have used heroin, cocaine, opium, marijuana, morphine, yaba/amphetamines, pethidine, ketamine and ecstasy for non-therapeutic purposes at least once weekly in the last month. Sampling was done in two stages, with initial geographical mapping of work venues (116 locations identified) and size estimation predicting 493 adolescent FSWs as a sampling frame. A subsequent stratified random sampling encountered difficulties in enrolling study participants because of a nationwide police crackdown on the sex industry. As random sampling was shown not to be feasible, snowball and convenience sampling was applied aiming to recruit about half the target population. Some extension methods were adopted to minimise bias inherent in chain-referral sampling, including introduction of a dual-incentive mechanism that provided participants and their peer recruiters with a bonus to increase enrolment<sup>17</sup>; verification by Kunming CDC of participants' eligibility during pre-test and post-test HIV counselling; and definition of the recruitment area for each peer group with a fixed recruitment number to avoid undersampling or oversampling, and repeated recruitment in each area.

A face-to-face semi-structured questionnaire developed in Chinese was adapted from FSW and drug user behavioural surveillance developed by the Chinese National CDC<sup>18</sup> and previous research from Kenya.<sup>19–20</sup> The questionnaire, which took about 50 min to complete, was tested among 24 women to determine whether the content and language were appropriate for the study population. Information was collected on socio-demographic characteristics, entry into sex work, sexual behaviours, prevention knowledge and practices, substance use, reported STI symptoms, family planning and reproductive history, and health service use. Thereafter, a free clinical gynaecological examination, STI screening and voluntary HIV counselling and testing (HCT) were followed by referral of participants to Kunming CDC. A unique code was assigned to each participant to match their questionnaire with clinical and laboratory results and to avoid using names in any of the datasets.

### Ethical considerations

The study protocol was approved by Yunnan institutional review board and the ethical committee of the Kunming Public Health Bureau. Women provided voluntary written informed consent separately for participation in the behavioural survey and HIV/STI testing. Willing participants were offered free HCT and STI testing services at Kunming CDC which were carried out following the national regulations regarding HIV prevention and management.<sup>21–22</sup> Confidentiality was maintained during the recruitment process, questionnaire administration, data storage, and linking of laboratory and clinical data from test results. Prior to STI testing, healthcare staff asked participants for the best way to give test results to a parent or responsible person, and obtained their written consent. A reimbursement fee of RMB 50 (about US\$8) was given to the participants to compensate for their time and transport investment. Furthermore, participants could receive free health services

through collaborating organisations, including outreach and peer education, standardised STI treatment, CD4 testing and antiretroviral treatment if indicated.

### Study measures

Chinese public health and social science research suggests that there are distinct typologies for FSWs according to workplace and sexual risk,<sup>10–16, 23–28</sup> with FSWs at 'low-end' establishments (eg, karaoke clubs, barbershops, dancing halls) having increased risks of HIV and STIs. Moreover, since 2005, China's HIV prevention strategy has aimed to strengthen intervention programmes to better address FSWs' internal diversity, and to promote behavioural change effectively.<sup>29</sup> In this study, which is based on previous research of sex work in Yunnan and China as a whole,<sup>10, 23–26</sup> we classified participants as 'higher risk' or 'lower risk' depending on their primary work setting. Participants at higher risk were those who walked the streets, worked in bars, small roadside guesthouses/hotels with managers or pimps, foot massage parlours, small saunas/bath rooms, barbershops, karaoke clubs, dancing halls and those who were self-employed (soliciting from the internet, a mobile phone or through a pimp). However, those at lower risk included those who worked at VIP clubs or big night clubs. Sexual partners were categorised as 'emotional partners', including non-paying sexual acts with boyfriends, fiancés and husbands in contrast with paying clients (regular or casual clients). To explore the strength of associations between unsafe sex and sex worker characteristics, three dependent variables were a priori selected, namely presence of any STI (participant had at least one infection of *Neisseria gonorrhoeae* (NG), *Chlamydia trachomatis* (CT), syphilis, *Condyloma acuminatum*, genital herpes simplex virus 2 (HSV-2) based on clinical diagnosis or laboratory screening depending on the STI); inconsistent or no condom use in the past month with any sexual partner (self-reported condom use in all sex acts (clients and emotional partners) over the past month); and no condom used during their last sex act with clients.

### Laboratory investigations

Blood was collected and tested for HIV-1 antibodies (ELISA, Beijing BGI-GBI Biotech Co, China) and syphilis (rapid plasma reagin (RPR) test, Xinjiang Xindi Co, China). Positive HIV-1 ELISAs were confirmed by Western blot (Diagnostics HIV Blot 2.2, Genelabs, Redwood City, California, USA) and positive RPR tests for syphilis were confirmed by the *Treponema pallidum* particle assay test (Serodia TP-PA Fujirebio, Fuji, Japan). Endocervical swabs were collected and tested for NG and CT by PCR (AMPLICOR, Roche, Indianapolis, Indiana, USA). Investigations for HIV, syphilis, NG and CT were performed in the Reference Laboratory of the Kunming CDC. *C. acuminatum* and genital HSV-2 infections were clinically diagnosed based on the Chinese STDs Diagnosis Protocol.<sup>30</sup>

### Statistical analysis

Statistical tests were performed using Stata V.10.0. Variables from the data were initially presented using descriptive techniques.  $\chi^2$  tests, Wilcoxon rank sum test, Fisher's exact test and t test were used to detect associations among categorical variables, non-symmetrically and symmetrically distributed continuous variables, respectively. Logistic regression was used to investigate the extent of the association between the dependent variables and exploratory variables, including socio-demographic, sex work characteristics, behavioural characteristics and status of health service use. Multivariable logistic regression models were adjusted

for the exploratory variables found to be significantly associated ( $p < 0.1$ ) in the binary logistic regression analysis, and those hypothesised a priori to be associated using a stepwise forward-fitting approach beginning with the covariate with the lowest  $p$  value. Variables that did not markedly alter the model fit were removed from the model.

## RESULTS

### Socio-demographic and economic characteristics

Between July 2010 and February 2011, a total of 231 eligible and consenting women were recruited, with 201 (87%) completing their interview and accepting STI and HIV testing.

Women had a mean age of 18.2 years ( $SD = 1.0$ ) and were predominantly of Han ethnicity (75.1%; table 1). Approximately one-third of women were illiterate or only completed primary level schooling. The majority of respondents were single or never married (71.6%) and 10% reported currently living with their parents. Sex work was the main source of income for most women (91%). More than half of women (57%) reported their recent monthly income to be between US\$150 and 500. No significant differences in age, education level, marital status, residential status, ethnicity and living arrangements were identified between women who worked in higher-risk or lower-risk workplaces (table 1). Respondents working at higher-risk

**Table 1** Socio-demographic characteristics of adolescent female sex workers aged 15–19 years enrolled in a cross-sectional survey in Yunnan, China ( $n = 201$ )

Variable	All women n/N (%)†	Characteristics by FSW workplace, n/N (%)†		p Value*
		Lower-risk workplace‡	Higher-risk workplace§	
Age, mean years (SD)	18.2 (1.0)	18.1 (1.0)	18.3 (1.0)	0.86**
Education level				0.29
Illiterate or primary school	59/201 (29.4)	26/105 (24.8)	33/96 (34.4)	
Middle school	78/201 (38.8)	42/105 (40.0)	36/96 (37.5)	
High school	64/201 (31.8)	37/105 (35.2)	27/96 (28.1)	
Current marital status				0.94
Never married or single	144/201 (71.6)	75/105 (71.4)	69/96 (71.9)	
Married or cohabiting¶	57/201 (28.4)	30/105 (28.6)	27/96 (28.1)	
Residential status				0.22
Yunnan	166/201 (82.6)	90/105 (85.7)	76/96 (79.2)	
Other province	35/201 (17.4)	15/105 (14.3)	20/96 (20.8)	
Ethnicity				0.71
Han	151/201 (75.1)	80/105 (76.2)	71/96 (74.0)	
Other ethnic group	50/201 (24.9)	25/105 (23.8)	25/96 (26.0)	
Currently living with				0.11
Parents	10/201 (5.0)	3/105 (2.9)	7/96 (7.3)	
Emotional partners	69/201 (34.3)	38/105 (36.2)	31/96 (32.3)	
Friends	67/201 (33.3)	34/105 (32.4)	33/96 (34.4)	
Alone	51/201 (25.4)	30/105 (28.5)	21/96 (21.8)	
Coercion-based site with handlers	4/201 (2.0)	0	4/96 (4.2)	
Source of income††				<0.001
Sex work is main source	182/200 (91.0)	102/104 (98.1)	80/96 (83.3)	
Other sources of income				
Parental/familial support	30/201 (14.9)	12/105 (11.4)	18/96 (18.8)	0.14
Emotional partner's support	29/201 (14.4)	16/105 (15.2)	13/96 (13.5)	0.73
Other sources of income	18/201 (9.0)	7/105 (6.7)	11/96 (11.5)	0.23
Monthly income in past 6 months (in US\$)				0.018
<150	18/201 (9.0)	4/105 (3.8)	14/96 (14.6)	
150–500	114/201 (57.0)	66/105 (62.9)	48/96 (50.0)	
>500	69/201 (34.0)	35/105 (33.3)	34/96 (35.4)	
Amount received from last client, median US\$ (IQR)	80 (48–160)	128 (80–160)	48 (32–136)	<0.001***
Age at first sexual intercourse, mean years (SD)	16.3 (1.2)	16.1 (1.1)	16.4 (1.3)	0.91**
Duration in sex work				0.001
≤6 months	107/201 (53.2)	43/105 (41.0)	64/96 (66.7)	
7–12 months	66/201 (33.8)	45/105 (42.9)	21/96 (21.9)	
>1 year	28/201 (13.9)	17/105 (16.1)	11/96 (11.4)	

\*p Value comparing women working at higher-risk versus lower-risk places using  $\chi^2$  test unless indicated.

†Unless otherwise indicated.

‡Workplaces at lower risk for adolescent FSWs. Division is based on previous research and interview of key informants within local context and includes VIP clubs, night clubs.

§Workplaces at higher risk for adolescent FSWs. Division is based on previous research and interview of key informants within local context and includes street walking, small roadside guesthouses with manager or pimp, foot massage parlours, saunas/bath rooms, barbershops, inns/hotels, karaoke clubs, dancing halls.

¶The minimum legal age for marriage is generally 20 for women 22 for men; in many rural areas, there is no restrictive social-cultural taboo for young people under the legal age of marriage to get engaged and cohabit without registration, so called 'de facto marriage'; in this case, some participants (1%) self-reported to be married.

\*\*Student's  $t$  test.

\*\*\*Wilcoxon rank sum test.

††Multiple-response question.

FSW, female sex worker.

venues were less likely to be full-time sex workers (83.3% vs 98.1%,  $p < 0.001$ ); they were more likely to have lower monthly income (<US\$150; 14.6% vs 3.8%,  $p = 0.018$ ); and earned less from their last clients (median US\$48 vs US\$128,  $p < 0.001$ ).

### Substance use

In the past 6 months, most women reported using tobacco (67.7%) and/or alcohol (74.1%), and 67.5% reported using substances everyday or almost everyday. Eight percent of respondents reported using illicit drugs. Respondents who were working at higher-risk venues were less likely to use tobacco (56.2% vs 78.1%,  $p = 0.001$ ) or alcohol (59.4% vs 87.6%;  $p < 0.001$ ) than those at lower-risk venues (table 2).

### Sexual behaviour

A total of 75.3% of women reported using a condom with their last male client. Consistent condom use during the last month

with clients was reported by 55%, whereas only 22.2% reported practising consistent condom use with their emotional partners. About half (50.3%) of respondents reported having sex while feeling drunk at least once in the past week, of whom 56.4% reported this act was unprotected. Respondents who were working at higher-risk venues were more likely to report having a shorter duration of sex work, for example, less than 6 months (66.7% vs 41%,  $p = 0.003$ ), and having more clients in the past week ( $p = 0.001$ ) compared with women working at lower-risk venues.

### HIV and sexually transmitted infections

Nearly three-quarters of young women (74.0%) reported having STI symptoms in the past year, including vaginal itching or irritation, burning urination, lower abdominal pain, unusual leucorrhoea, or rashes, lumps or blisters around the genitals or anus (table 2). One-third (30.4%) of women had one or more

**Table 2** Sexual behaviour, drug use and HIV/STIs among adolescent female sex workers

Variable	Characteristics by FSW workplace, n/N (%)†			p Value*
	All women, n/N (%)†	Lower-risk workplace	Higher-risk workplace	
<b>Sexual behaviour</b>				
Number of emotional partners (past 3 months)				0.24
Only 1	24/192 (12.5)	17/102 (16.7)	7/90 (7.8)	
2–4	75/192 (39.1)	35/102 (34.3)	40/90 (44.5)	
5–10	67/192 (34.9)	35/102 (34.3)	32/90 (35.5)	
>10	26/192 (13.5)	15/102 (14.7)	11/90 (12.2)	
Number of clients (past week), median (IQR)	2 (1–3)	1 (1–2)	2 (1–4.5)	0.001**
Condom used during last paid sex act	146/194 (75.3)	76/105 (72.4)	70/89 (78.7)	0.31
<b>Consistent condom use (last month)</b>				
With paying client	105/191 (55.0)	57/99 (57.6)	48/92 (52.2)	0.13
With emotional partner	42/189 (22.2)	27/103 (26.2)	15/83 (18.1)	0.41
At least one sex act while feeling drunk (past week)	78/155 (50.3)	48/90 (53.3)	30/65 (46.2)	0.38
At least one sex act without a condom while feeling drunk (past week)	48/78 (56.4)	27/48 (56.3)	17/30 (56.7)	0.16
<b>Substance using behaviour</b>				
<b>Any substance used (past 6 months)‡</b>				
Illicit drugs§	16/201 (8.0)	8/105 (7.6)	8/96 (8.3)	0.85
Tobacco	136/201 (67.7)	82/105 (78.1)	54/96 (56.2)	0.001
Alcohol	149/201 (74.1)	92/105 (87.6)	57/96 (59.4)	<0.001
<b>Frequency of substance use (past 6 months)</b>				
Everyday or almost everyday	112/166 (67.5)	69/95 (72.6)	43/71 (60.6)	0.03
1 or 2 days weekly	7/166 (4.2)	1/95 (1.1)	6/71 (8.0)	
Occasionally	47/166 (28.3)	25/95 (26.3)	22/71 (31.0)	
<b>Emotional partners involved in substance use</b>				
Never used	52/139 (37.4)	35/85 (41.2)	19/54 (31.5)	0.44
Previously used	31/139 (22.3)	19/85 (22.4)	12/54 (22.2)	
Currently using	56/139 (40.3)	31/85 (36.4)	25/54 (46.3)	
<b>HIV and STIs</b>				
HIV positive	2/201 (1.0)	0	2/96 (2.1)	0.22***
Self-reported symptoms of STI (past year)	148/200 (74.0)	73/104 (70.2)	75/96 (78.1)	0.20
Any STI (based on clinical or laboratory screening)	61/201 (30.4)	24/105 (22.9)	37/96 (38.5)	0.016
<b>STI prevalence based on clinical diagnosis or laboratory screening</b>				
<i>Neisseria gonorrhoeae</i>	25/191 (13.1)	4/100 (4.0)	21/91 (23.1)	<0.001***
<i>Chlamydia trachomatis</i>	28/191 (14.7)	17/100 (17.0)	11/91 (12.1)	0.33
Syphilis	3/201 (1.5)	1/105 (0.9)	2/96 (2.1)	0.47***
<i>Condyloma acuminatum</i>	13/189 (6.9)	4/100 (4.0)	9/89 (10.1)	0.09***
Genital HSV-2	1/189 (0.5)	1/100 (1.0)	0	0.52***

\*p Value comparing women working at higher-risk versus lower-risk workplaces using  $\chi^2$  test unless indicated.

†Unless otherwise indicated.

‡Multiple-response question.

§Illicit drugs used include heroin, marijuana, morphine, amphetamines, ketamine, ecstasy.

\*\*Wilcoxon rank sum test.

\*\*\*Fisher's exact test.

FSW, female sex worker; STI, sexually transmitted infection.

STI during study screening based on clinical or laboratory evaluation. STI prevalence was particularly high among women working at higher-risk venues (38.5%) compared with lower-risk venues (22.9%;  $p=0.016$ ). The prevalence of syphilis, NG, CT, *C acuminatum* and genital HSV-2 infection detected during laboratory screening was 1.5%, 13.1%, 14.7%, 6.9% and 0.5%, respectively. Participants who were working at higher-risk venues were significantly more likely to have NG (23.1% vs 4.0%,  $p<0.001$ ), and more likely to have *C acuminatum* infection (10.1% vs 4.0%,  $p=0.09$ ; table 2). Of 201 participants, two women (1%) tested HIV positive and both were working at higher-risk venues.

### Health-seeking behaviour and service use

The majority of women reported a need for additional health knowledge (77.1%), free condom distribution (50.8%) and low-cost STI diagnosis and treatment services (53.7%; table 3). Of women who reported STI symptoms in the past year ( $n=148$ ), about half reported having taken self-treatment for STI symptoms (52.4%), and only 25.5% reported seeking care at public health facilities, similarly between those working at higher-risk and lower-risk venues. Compared with the lower-risk group, those working at higher-risk workplaces were significantly less likely to have received peer education and outreach services (62.5% vs 87.5%,  $p<0.001$ ), and free condoms (59.3% vs 93.3%,  $p<0.001$ ); and were more likely to have received HIV testing (43.8% vs 17.1%,  $p<0.001$ ). At the same time, they were less likely aware of test results (35.7% vs 72.2%,  $p=0.009$ ).

### Factors associated with unprotected sex and STIs

Among adolescent FSWs, the main predictor independently associated with having any STI was access to free condoms in the past year (table 4). Adolescent FSWs who did not receive services of condom provision were 2.5 times more likely to

have at least one STI (95% CI 1.1 to 5.7;  $p=0.028$ ) than those with service exposure. There seemed to be a trend for women working at higher-risk venues to be at increased risk for having any STI (38.5% and 22.9%, respectively), although this was no longer statistically significant after adjustment of other factors.

Adolescent FSWs who reported illicit drug use (adjusted OR 8.54, 95% CI 1.04 to 70.41;  $p=0.048$ ) and received primary education or less (adjusted OR 3.07, 95% CI 1.09 to 8.62;  $p=0.033$ ) were more likely to report unprotected sex in the past month with any partner compared with women with higher education. In addition, shorter duration in sex work was independently associated with unprotected sex, with less risky behaviour over time.

Four factors were significantly associated with no condom used during last paid sex act, including earlier age at sex debut, currently married or cohabiting, living with current partner for less than 6 months, and not having received HIV testing in the last year.

### DISCUSSION

To our knowledge, these results are the first to document sexual risk behaviour, clinical and laboratory based HIV/STI screening rates, and health-seeking behaviour of this vulnerable and marginalised group of adolescent FSWs in China. Compared with previous FSW studies (mainly focusing on adult FSWs) in China,<sup>10 23–26</sup> our study did not show many significant differences in demographic, social and sexual behavioural characteristics between women working at the higher-risk and lower-risk venues based on the traditionally divided risk groups in China. Although respondents working at higher-risk workplaces were earning less despite having more clients in the past week, both groups were found to report high numbers of sexual partners and low condom use. Half the young women reported five or more emotional partners in the past 3 months, with whom the rate of consistent condom use

**Table 3** Health-seeking behaviour and access to health services among Chinese female sex workers

Variable	All women, n/N (%)†	Characteristics by FSW workplace, n/N (%)†		
		Lower-risk workplace	Higher-risk workplace	p Value*
Need for health services				
Free condom distribution	102/201 (50.8)	55/105 (52.3)	47/96 (47.8)	0.63
Service to increase health knowledge	155/201 (77.1)	75/105 (71.4)	80/96 (83.3)	0.045
Low-cost STI diagnosis and treatment	108/201 (53.7)	51/105 (48.6)	57/96 (59.4)	0.13
Low-cost reproductive health service	83/201 (41.3)	46/105 (43.8)	37/96 (38.5)	0.45
Free clean needle and syringe distribution	23/201 (11.4)	19/105 (18.1)	4/96 (4.1)	0.002**
Detoxification treatment	7/201 (3.5)	4/105 (3.8)	3/96 (3.1)	0.55**
Health-seeking behaviour				
Sought care for STI symptoms (past year)‡				
At private clinic or hospital	55/146 (37.7)	22/70 (31.4)	33/76 (43.4)	0.14
At public clinic or hospital	37/145 (25.5)	16/70 (22.9)	21/75 (28.0)	0.48
Self-treatment for STI	76/145 (52.4)	41/70 (58.8)	35/75 (46.7)	0.15
Health services use				
Received peer education/outreach (past year)‡	151/200 (75.5)	91/104 (87.5)	60/96 (62.5)	<0.001
Received free condoms (past year)‡	155/201 (77.1)	98/105 (93.3)	57/96 (59.4)	<0.001
Received methadone/clean needles‡	13/199 (6.5)	9/105 (8.6)	4/94 (4.3)	0.17**
Received HIV testing (past year)	60/201 (29.9)	18/105 (17.1)	42/96 (43.8)	<0.001
Aware of HIV testing results	28/60 (46.7)	13/18 (72.2)	15/42 (35.7)	0.009

\*p Value comparing women working at higher-risk versus lower-risk places using  $\chi^2$  test unless indicated.

\*\*Fisher's exact test.

†Unless otherwise indicated.

‡Multiple-response question.

FSW, female sex worker; STI, sexually transmitted infection.

**Table 4** Predictors of sexual risk behaviour defined as presence of any sexually transmitted infection at screening, inconsistent condom use in the past month and no condom used during last sex act among 201 adolescent female sex workers

Variable	Risk factor	% (n/N)	Crude OR (95% CI)	p Value	Adjusted OR (95% CI)	p Value
Any STI	Age					
	19 years	28.0 (27/97)	1.0	0.56		
	15–18 years	33.0 (34/104)	1.26 (0.69 to 2.31)			
	Workplace characteristics					
	Lower risk	22.9 (24/105)	1.0	0.016		
	Higher risk	38.5 (37/96)	2.12 (1.13 to 3.95)			
	Sex work as main source of income					
	No	56.0 (10/18)	1.0	0.016		
	Yes	28.0 (51/182)	0.31 (0.11 to 0.85)			
	Amount received from last client					
	US\$4–75	37.0 (34/92)	1.0	0.051		
	US\$76–150	20.8 (10/48)	0.45 (0.20 to 1.03)			
	>US\$150	19.4 (6/31)	0.41 (0.15 to 1.12)	0.07		
Received free condoms (past year)						
Yes	25.2 (39/155)	1.0	0.003	1.0	0.028	
No	47.8 (22/46)	2.72 (1.35 to 5.47)		2.51 (1.11 to 5.70)		
Inconsistent or no condom use in past month with any sexual partners	Age					
	19 years	75.3 (73/97)	1.0	0.66		
	15–18 years	77.9 (81/104)	1.16 (0.60 to 2.26)			
	Education level					
	High school	71.9 (46/64)	1.0		1.0	
	Middle school	73.0 (57/78)	1.00 (0.47 to 2.13)	0.99	0.90 (0.41 to 1.99)	0.79
	Illiterate or primary school	86.4 (51/59)	2.69 (1.00 to 7.23)	0.04	3.07 (1.09 to 8.62)	0.033
	Choose sex work for earning money					
	No	82.0 (73/89)	1.0	0.05		
	Yes	72.3 (81/112)	0.50 (0.25 to 1.07)			
	Duration in sex work					
	>1 year	64.3 (18/28)	1.0		1.0	
	7–12 months	80.3 (53/66)	2.27 (0.83 to 6.17)	0.10	2.91 (0.098 to 8.60)	0.044
<6 months	79.0 (83/107)	2.10 (0.84 to 5.25)	0.10	2.90 (1.02 to 8.19)	0.054	
Illicit drug use (past 6 months)						
No	75.7 (140/185)	1.0		1.0		
Yes	87.5 (14/16)	4.40 (0.55 to 35.02)	0.12	8.54 (1.04 to 70.41)	0.048	
Received HIV testing (past year)						
Yes	71.7 (43/60)	1.0		1.0		
No	78.7 (111/141)	1.57 (0.78 to 3.16)	0.38	2.35 (1.08 to 5.13)	0.032	
No condom used during last sex act with client	Age					
	19 years	19.6 (19/97)	1.0		1.0	
	15–18 years	27.9 (29/104)	1.61 (0.83 to 3.15)	0.15	1.81 (0.88 to 3.72)	
	Age at sex debut					
	>16 years	27.7 (23/83)	1.0		1.0	
	≤16 years	21.4 (25/117)	1.78 (0.92 to 3.46)	0.08	2.0 (0.99 to 4.06)	
	Current marital status					
	Never married, separated or single	27.8 (40/144)	1.0		1.0	
	Married or cohabiting	14.0 (8/57)	0.42 (0.18 to 0.98)	0.038	0.37 (0.15 to 0.92)	0.033
	Duration of living with current partner					
	≤6 months	31.5 (28/89)	1.0		1.0	
	>6 months	18.0 (20/111)	0.50 (0.26 to 0.99)	0.041	0.40 (0.19 to 0.82)	0.014
	Received HIV testing (past year)					
Yes	10.0 (6/60)	1.0		1.0		
No	29.8 (42/141)	3.87 (1.50 to 9.96)	0.002	2.88 (1.11 to 7.50)	0.030	

Any STI, reported at least one STI based on clinical diagnosis or laboratory screening from *Neisseria gonorrhoeae/Chlamydia trachomatis/syphilis/Condyloma acuminatum/genital herpes simplex virus 2* infections.  
STI, sexually transmitted infection.

was very low (22.2%). Even among sex acts with clients, consistent condom use over the last month was relatively low (55.0%) compared with reports from other studies.<sup>12 23 31 32</sup> The homogeneity of adolescent FSWs regarding risk-taking behaviour suggests that intervention activities need to focus on adolescent FSWs working at any workplace. Furthermore, governments and policymakers need to consider the influence of legal crackdowns of FSWs, which leads to marginalisation and migration and impedes health workers from providing continuous intervention services.

This study noted that adolescent FSWs who recently started sex work more often reported unprotected sex, which concurs with our finding that they received less frequent free condom

service (68.2% vs 89.3%,  $p=0.006$ ) and less frequent outreach or peer education services (67.3% vs 82.1%,  $p=0.014$ ) compared with women who had worked longer in the sex trade (more than 1 year). Additionally, level of education was significantly associated with inconsistent condom use, highlighting the need for integration of sex education into existing primary and secondary schooling. For illiterate adolescent FSWs, existing 'youth centres' or 'drop-in centres' could be reoriented or reprioritised to serve this specific population with appropriate information.

Previous studies, largely among adult FSWs, show similar HIV and syphilis prevalence rates to our study.<sup>26 28 33–35</sup> Nearly a third of participants had at least one STI, and particularly adolescents working at higher-risk venues were at increased

risk, potentially due to the lower reported access to STI prevention and treatment services. Moreover, women who reported having accessed HCT services were less likely to report unprotected sex. This highlights the need for universal access to youth-friendly counselling, testing and treatment services. Overall, this information justifies intensified targeted programmes to increase HIV and STI prevention, treatment and care activities, particularly at higher-risk venues and among newcomers.

Eight percent of respondents reported using illicit drugs and related increasing sexual risk behaviour, consistent with other studies of FSWs.<sup>23</sup> Various studies have shown associations between alcohol use and sexual risk behaviour, and HIV and STIs among sex workers.<sup>19–36</sup> This poses a significant risk, with nearly three-quarters of these adolescents using alcohol.

There are several potential limitations to this study. During the survey period, illegal drug use and sex work were facing police crackdown nationwide, which made random sampling strategies impossible. Additionally, resulting difficulties in disclosure of illegal drug use may have resulted in an underestimation of the prevalence of drug use.

In summary, current health services, social development and livelihood interventions, and youth programmes are failing to substantially reach these most vulnerable girls in society. Innovative and sustainable approaches to extend existing services are needed to improve the health and wellbeing of these young women. Existing sex worker drop-in centres need reorientation to improve services relevant and accessible to young people. Future studies should assess the effectiveness and impact of such interventions and could include recruitment and training of adolescent sex worker peer educators to generate new innovative and targeted strategies, and to improve confidential, non-judgmental counselling and testing for HIV and affordable STI treatment.

### Key messages

- ▶ Adolescent female sex workers (FSWs) in China aged 15–19 years report frequent unprotected sex and were diagnosed with high rates of sexually transmitted infections (STIs), confirming their vulnerability.
- ▶ Unprotected sex was more often reported by adolescent FSWs who only recently entered into sex work, requiring particular attention.
- ▶ Adolescent FSWs who accessed STI prevention services, including peer education based health promotion and condom access, reported improved sexual behaviour.
- ▶ Scaling up of sexual and reproductive health interventions targeting adolescent FSWs at all work venues, including those perceived as low risk, is needed.

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