

# Sexualized Drug Use Among Female Sex Workers From Eight Cities in China: a Cross-sectional Study

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## Research Article

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## Abstract

**Background** There is rich literature on sexualized drug use (i.e. drug use before or during sex) for men who have sex with men but less data from female sex workers (FSW) particularly from low- and middle-income countries. We describe the sexual and reproductive health outcomes in FSW reporting sexualized drug use.

**Methods** We conducted a cross-sectional study in eight cities from seven provinces in China (2019). We recruited FSW through community organizations working with sex workers, and included those who were age 18 years or above; exchanged sex at least once for money or goods in the past three months. Multivariable logistic regression models were used.

**Results** In total, 1287 women participated: average age was 35.1 years (SD 10.3), 52.4% reported a monthly income over 5000 RMB (\$USD 707), and 17.4% completed high school or above. Among participants, 284 (22.1%, 95%CI:19.8-24.4) reported a history of sexualized drug use. Compared to FSW who never reported a history of sexualized drug use, FSW who reported a history of sexualized drug use had greater odds of: reporting inconsistent condom use for vaginal sex (AOR 2.67, 95%CI:1.93-3.69), inconsistent condom use for oral sex (AOR 2.33, 95%CI:1.25-4.37), ever had an unintended pregnancy (AOR 1.43, 95%CI:1.04-1.96), and ever diagnosed with STIs (AOR 5.39, 95%CI:3.92-7.40).

**Conclusion** We recommend routinely asking FSW about sexualized drug use as nearly one in five FSW reported a history of sexualized drug use and these women had an elevated risk profile compared with those who reported no sexualized drug use.

## Introduction

Female sex workers (FSW) are vulnerable to social and cultural marginalization, stigma and discrimination, socioeconomic disadvantage, and human right abuses.<sup>1</sup> This has been further exacerbated during the COVID-19 pandemic.<sup>2</sup> FSW are often at higher risk for acquiring HIV/sexually transmitted infections (STIs) compared to the rest of the population.<sup>3,4</sup> This elevated risk for acquiring HIV/STIs is exacerbated by the use of illicit drugs. However public health authorities often overlook this challenging aspect of disease prevention in FSW – illicit drug use. Drug dependence may lead to entry into sex work, used as a means to cope with challenges associated with sex work or as a means to purchase drugs.<sup>5-7</sup> Illicit drug use among FSW is associated with mental health issues (such as depression), increased frequency of condomless sex, acquisition of HIV/STIs, unintended pregnancy, violence and coercive sex.<sup>8-12</sup> Additionally, injecting drug use may increase the risk of acquiring HIV and other blood-borne infections (such as hepatitis C) among FSW.<sup>13,14</sup> Reducing the burden of HIV/STIs among FSW is a priority as they may facilitate the transmission of HIV/STIs to the general population.<sup>15</sup>

Despite known intersections between sex work, drug use and sexual risk, there is surprisingly little research about drug use before or during sex—referred to here as *sexualized* drug use—in FSW, particularly from low- and middle-income countries. Specifically, it is not clear whether FSW who report sexualized drug use may also be at elevated risk for acquiring HIV/STIs; this is in contrast to rich literature on sexualized drug use for men who have sex with men.<sup>16</sup> Regarding sexualized drug use among FSW, studies from the US-Mexican border report sexualized drug use among FSW ranged from 14 to 63%.<sup>17-19</sup> A study of 198 survival sex workers in Canada reported that 59% shared drugs with clients in the preceding six months, and that sexualized drug use was associated with inconsistent condom use, verbal harassment, physical and/or sexual assault.<sup>20</sup> A qualitative study of Kenyan FSW reported how drugs enabled these women to undertake sex work – ‘sex work was intolerable when sober’.<sup>5</sup> A study from China reported reasons for sexualized drug use related to client request or the opportunity to make more money.<sup>21</sup> Together these studies highlight the need to better understand how sexualized drug use impact the health of FSW, especially in contexts (like China) where punitive environments exist for both sex work and drug use, meaning that FSW who engage sexualized drug use might be at even greater disadvantage. Drug users and sex workers in China can be detained for up to 15 days. According to the Anti-Drug Law of the People’s Republic of China, and Law of the People’s Republic of China on Public Security Administration Penalties, drug users can be fined up to 2000 RMB (about 300 US dollars), of which addicts may be sent to a community for up to 3 years or drug rehabilitation center for up to 2 years, and sex workers can be fined up to 5000 RMB (about 750 US dollars) depending on the severity of the case.

Our study aims to contribute to the limited data of sexualized drug use among FSW in LMICs by describing the sociodemographic characteristics, sexual behaviors and HIV/STI testing behaviors among FSW reporting sexualized drug use. We hypothesized that disaggregating data by sexualized drug use provides valuable insights into their unique health challenges. Specifically, FSW who reported a history of sexualized drug use would have a different risk profile compared to FSW who reported no sexualized drug use.

## Methods

### Study sites and population

This cross-sectional study, led by a provincial STI Control Centre, was implemented in eight cities (Beijing, Tianjin, Shenzhen, Kunming, Jiaozhou, Yunfu, Xiangyang and Longnan) within seven provinces in China between August 17 and October 17, 2019. We collaborated with eight community-based organizations (CBOs) in these cities with experience of conducting female sex workers outreach programs (Appendix 1). Eligible participants were aged 18 years or above; exchanged sex (vaginal, oral, and/or anal) at least once for money or goods in the past three months; and willing to participate in the survey by providing verbal informed consent.

## Data collection

The Wenjuanxing platform (Changsha Haoxing Information Technology Co., Ltd., China) was used to create an online survey link which allowed participants to complete the survey by smartphone or computer tablets. The survey was created by the research group and revised by local CBO stakeholders, policy makers and international HIV/STI experts. Following a pilot study among 50 FSWs, the survey procedures were adjusted to simplify administration and improve survey comprehensibility. The primary outcome of this study was sexualized drug use among FSW. A previous study reported 34.7% of sexualized drug use among FSW in China.<sup>22</sup> We applied two-sided confidence intervals for one Proportion method to estimate a sample size of 753 for this study to produce a two-sided 95% confidence interval with a width equal to 0.05.

The outreach workers of the CBOs recruited FSW using convenience sampling from a variety of workplaces of FSWs: hair salons, saunas, bath centers, karaoke bars, dancing hall bars, sidewalk snack vendors, hotels, nightclubs, massage parlors, guesthouses and public outdoor places. Interested participants clicked on a survey link which assessed their eligibility and verified the uniqueness of the mobile phone number to avoid participants giving multiple entries. Each survey was self-administered by the eligible participant on their device at the recruitment site; they could ask the CBO worker for help if needed.

## Measures

We asked about sexualized drug use through the question: "Have you ever used the following substances before or during sex" (none, heroin, cocaine, crack, methamphetamine, speedball (heroin plus cocaine), other opioids, solvents/glue, hallucinogens, marijuana, other). The survey also asked about: 1) sociodemographic characteristics (age, marital status, monthly income, education level, source of sample, household registration, and migration status); 2) Sexual behaviors (employment status for commercial sex, duration of commercial sex, number of clients served in the past month, average amount received for vaginal sex with a client, consistency of condom use with vaginal sex in the past month, condom use at last vaginal sex, consistency of condom use with oral sex in the past month, consistency of condom use with anal sex in the past month, ever had unintended pregnancy, ever had abortion and current contraception method); and 3) HIV/STI testing behaviors (ever had an HIV test, result of last HIV test, ever had syphilis test, result of last syphilis test, ever diagnosed with STIs).

## Statistical analysis

Data were downloaded from Wenjuanxing platform and analyzed using IBM SPSS® version 24.0. Descriptive statistics were used to summarize the characteristics of study sample.  $\chi^2$  test or Fisher's exact test (for categorical variables), and t-test or Wilcoxon rank-sum test (for continuous variables) were used to identify statistically significant differences in sexual and reproductive health behaviors and outcomes among different groups of FSWs by background characteristics. Multivariable logistic regression models were used to explore the associations between sexualized drug use and sexual behavioral and HIV/STI testing behavioral factors. Based on our literature review, we adjusted for the potential confounders of injecting drug use in the preceding six months (a known risk factor for negative health outcomes for FSW), age, marital status, migration status, income and education in each of the models.

## Results

### Sociodemographic characteristics (Table 1)

Overall, their average age was 35.1 years (SD 10.3), a significant proportion were married (43.8%), about half reported a monthly income over 5000 RMB (\$USD 707, 52.4%) and a minority completed high school or above (17.4%, Table 1). FSWs were recruited from a variety of venues: foot washing rooms/hair salons (32.6%), saunas (21.1%), karaoke/dancing hall/bars (17.7%), street (12.9%) and other venues (15.7%). Most reported a rural household registration (78.7%, an official record of the person's residential origin), and only a minority were current local residents (27.0%).

There were significant differences for sociodemographic variables comparing those who reported a history of sexualized drug use, with those who reported no sexualized drug use. Compared to FSW who reported no sexualized drug use, those who reported a history of sexualized drug use were more likely to be younger, had less monthly income, had higher education level, worked in a sauna or karaoke bar, had a rural household registration and were local residents.

Among 1287 participants, 284 (22.1%, 95% CI:19.8–24.4) reported a history of sexualized drug use. Methamphetamine was most commonly used before or during sex (n = 110), followed by marijuana (n = 55), hallucinogens (n = 41), and cocaine (n = 15). Another 110 participants also reported other drugs use beyond our list.

Table 1  
Comparison of the sociodemographic characteristics of female sex workers in China, 2019 (N= 1287)

Characteristics	Sexualized drug use	No sexualized drug use	p value	Total n (%)
	n (%)	n (%)		
<b>Total</b>	284 (22.1)	1003 (77.9)		
<b>Age (years)</b>				
Mean ± SD	29.7 ± 7.9	36.7 ± 10.4	< 0.001	35.1 ± 10.3
<b>Marriage</b>			< 0.001	
Never married and not cohabiting	68 (23.9)	159 (15.9)		227 (17.6)
Never married but cohabiting	42 (14.8)	125 (12.5)		167 (13.0)
Married	142 (50.0)	422 (42.1)		564 (43.8)
Divorced or widowed	32 (11.3)	297 (29.6)		329 (25.6)
<b>Monthly income</b>			0.017	
less than 3000 RMB (\$USD 424)	64 (22.5)	150 (15.0)		214 (16.6)
3001–5000 RMB (\$USD 424–707)	77 (27.1)	321 (32.0)		398 (30.9)
5001-8000RMB (\$USD 707–1131)	73 (25.7)	254 (25.3)		327 (25.4)
Over 8000 RMB (over \$USD 1131)	70 (24.7)	278 (27.7)		348 (27.0)
<b>Education</b>			< 0.001	
Elementary school or below	69 (24.3)	412 (41.1)		481 (37.4)
Junior high school	131 (46.1)	451 (45.0)		582 (45.2)
High school or above	84 (29.6)	140 (14.0)		224 (17.4)
<b>Source of sample</b>			< 0.001	
Foot washing room/Hair salon	70 (24.7)	349 (34.8)		419 (32.6)
Sauna/Bath center	91 (32.0)	181 (18.1)		272 (21.1)
Karaoke/Dancing Hall /Bar	78 (27.5)	150 (15.0)		228 (17.7)
Street	16 (5.6)	150 (15.0)		166 (12.9)
Others*	29 (10.2)	173 (17.3)		202 (15.7)
<b>Household registration</b>			0.040	
Rural	238 (83.8)	775 (77.3)		1013 (78.7)
Urban	46 (16.2)	223 (22.2)		269 (20.9)
I am not sure	0 (0)	5 (0.5)		5 (0.4)
<b>Migration status</b>			< 0.001	
Local residents	176 (62.0)	172 (17.2)		348 (27.0)
Other city of this province	56 (19.7)	258 (25.7)		314 (24.4)
Other province	52 (18.3)	573 (57.1)		625 (48.6)
IDU = injecting drug use in the last 6 months; IQR = interquartile range; RMB = renminbi or Chinese yuan, 1 RMB = 0.14 US dollar; SD = standard deviation; USD = US dollar				
* Others: include sidewalk snack vendor/diner, hotel, nightclub, massage parlour, call girl, online advertising.				

## Sex work parameters (Table 2)

The majority of FSWs worked for a manager (54.4%), and half were involved in commercial sex for more than a year (50.5%). A minority of women consistently used condoms with clients in the past month for vaginal sex (42.1%), oral sex (16.0%), and anal sex (41.6%). Most reported an unintended pregnancy (61.7%) or had at least one abortion (61.4%), and only one out of four women were using a long-acting reversible contraceptive (24.1%).

Compared to FSW who reported no sexualized drug use, FSW who reported a history of sexualized drug use were more likely to work for a manager, received more money for sex work, had inconsistent condom use with sex (vaginal, oral and anal), were more likely to have unintended pregnancy and abortion, and less likely to use long-acting reversible contraception.

Table 2  
Comparison of the sexual behavioural characteristics of female sex workers in China, 2019 (N= 1287)

Characteristics	Sexualized drug use	No sexualized drug use	p value <sup>#</sup>	Total n (%)
	n (%)	n (%)		
<b>Total</b>	284 (22.1)	1003 (77.9)		
<b>Employment status</b>			< 0.001	
Self-employed / freelance FSW	64 (22.5)	508 (50.7)		572 (44.4)
Work for a manager	218 (76.8)	482 (48.1)		700 (54.4)
Other	2 (0.7)	13 (1.3)		15 (1.2)
<b>Duration of commercial sex</b>			< 0.001	
More than one year	65 (22.9)	585 (58.3)		650 (50.5)
Less than one year	219 (77.1)	418 (41.7)		637 (49.5)
<b>Clients served in the past month</b>			0.340	
≤ 22 (cut off is the median)	137 (48.2)	516 (51.5)		653 (50.7)
> 22	147 (51.8)	487 (48.6)		634 (49.3)
<b>Average amount received per vaginal sex act (USD)</b>			< 0.001	
≤ 21 (cut off is median)	117 (41.2)	539 (53.7)		656 (51.0)
> 21	167 (58.8)	464 (46.3)		631 (49.0)
<b>Consistency of condom use with vaginal sex in the past month*</b>			< 0.001	
Not always used	214 (75.4)	531 (52.9)		745 (57.9)
Always used	70 (24.6)	472 (47.1)		542 (42.1)
<b>Consistency of condom use with oral sex in the past month*</b>			0.002	
Not always used	163 (91.6)	467 (81.6)		630 (84.0)
Always used	15 (8.4)	105 (18.4)		120 (16.0)
<b>Consistency of condom use with anal sex in the past month*</b>			0.035	
Not always used	10 (83.3)	90 (98.9)		142 (58.4)
Always used	2 (16.7)	1 (1.1)		101 (41.6)
<b>Ever had unintended pregnancy</b>			< 0.001	
None	95 (33.5)	398 (39.7)		493 (38.3)
1 time	68 (23.9)	285 (28.4)		353 (27.4)
2–3 times	89 (31.3)	274 (27.3)		363 (28.2)

IUD = intrauterine device; RMB = renminbi or Chinese yuan, 1 RMB = 0.14 US dollar; SD = standard deviation; USD = US dollar

\* Denominators are those who reported vaginal sex, oral sex, and anal sex in the last one month

Characteristics	Sexualized drug use	No sexualized drug use	p value <sup>#</sup>	Total n (%)
	n (%)	n (%)		
4–5 times	25 (8.8)	39 (3.9)		64 (5.0)
Over 5 times	7 (2.5)	7 (0.7)		14 (1.1)
<b>Ever had abortion</b>			< 0.001	
None	102 (35.9)	395 (39.4)		497 (38.6)
1 time	71 (25.0)	311 (31.0)		382 (29.7)
2–3 times	79 (27.8)	265 (26.4)		344 (26.7)
4–5 times	28 (9.9)	25 (2.5)		53 (4.1)
Over 5 times	4 (1.4)	7 (0.7)		11 (0.9)
<b>Current contraception method</b>				
Male condom	175 (61.6)	745 (74.3)	< 0.001	920 (74.9)
Female condom	70 (24.7)	158 (15.8)	< 0.001	228 (18.6)
Oral contraceptive	109 (38.4)	245 (24.4)	< 0.001	354 (28.8)
IUD/Injectables/patches	40 (14.1)	256 (25.5)	< 0.001	296 (24.1)
Spermicide	1 (0.4)	51 (5.1)	< 0.001	52 (4.2)
Traditional methods (e.g. safety period calculation, herbal tea)	6 (2.1)	31 (3.1)	0.001	37 (3.0)
IUD = intrauterine device; RMB = renminbi or Chinese yuan, 1 RMB = 0.14 US dollar; SD = standard deviation; USD = US dollar				
* Denominators are those who reported vaginal sex, oral sex, and anal sex in the last one month				

## HIV/STI testing behaviours (Table 3)

The majority of FSW reported ever testing for HIV (83.3%) and 1.1% reported living with HIV. A lower majority reported ever testing for syphilis (72.1%) and 12.7% reported a positive syphilis result with their last test. The majority of FSW (69.4%) reported ever being diagnosed with an STI (including herpes, chlamydia, gonorrhoea, warts and hepatitis). Compared to FSW who reported no sexualized drug use, FSW who reported a history of sexualized drug use were less likely to be ever tested for HIV or syphilis, but more likely to be diagnosed with an STI in the past.

Table 3  
Comparison of the HIV/STI testing behaviours of female sex workers in China, 2019 (N= 1287)

Characteristics	Sexualized drug use n (%)	No sexualized drug use n (%)	p value	Total n (%)
<b>Total</b>	284 (22.1)	1003 (77.9)		
<b>Ever had an HIV test</b>			0.015	
Yes	223 (78.5)	849 (84.7)		1072 (83.3)
No	61 (21.5)	154 (15.4)		215 (16.7)
<b>Result of last HIV test<sup>&amp;</sup></b>			0.024	
Positive	0 (0.0)	12 (1.2)		12 (1.1)
Negative	220 (77.5)	829 (82.7)		1049 (97.9)
Indeterminate	2 (0.7)	3 (0.3)		5 (0.5)
I don't know	1 (0.4)	5 (0.5)		6 (0.6)
<b>Ever had syphilis test</b>			0.039	
Yes	191 (67.3)	737 (73.5)		928 (72.1)
No	93 (32.7)	266 (26.5)		359 (27.9)
<b>Result of last syphilis test</b>			0.250	
Positive	22 (7.8)	96 (9.6)		118 (12.7)
Negative	163 (57.4)	624 (62.2)		787 (84.8)
Indeterminate	2 (0.7)	7 (0.7)		9 (1.0)
I don't know	4 (1.4)	10 (1.0)		14 (1.5)
<b>Ever diagnosed with STIs*</b>			< 0.001	
Yes	178 (62.7)	216 (21.5)		893 (69.4)
No	106 (37.3)	787 (78.5)		394 (30.6)
<sup>&amp;</sup> denominator here is different due to missing data, * includes herpes, chlamydia, gonorrhoea, warts, hepatitis				
IDU = injecting drug use; STI = sexually transmitted infection				

Table 4 summarizes the regression analyses of FSW. Compared to FSW who never reported any sexualized drug use, FSW who reported a history of sexualized drug use had greater odds of working for a manager, working for a shorter duration, inconsistently used condoms for vaginal and oral sex, ever had unintended pregnancy, and ever diagnosed with STIs in the past.

Table 4  
Factors related to sexualized drug use among female sex workers in China, 2019 (N= 1287).

Variables	Sexualized drug use Crude OR <sup>§</sup>	p value	Sexualized drug use Adjusted OR <sup>#</sup>	p value
	(95% CI)		(95% CI)	
<b>Source of Sample</b>				
Foot washing room/Hair salon	Ref			
Sauna/Bath center	<b>2.51 (1.75–3.59)</b>	<b>&lt; 0.001</b>	1.15 (0.75–1.77)	0.521
Karaoke/Dancing Hall /Bar	<b>2.59 (1.78–3.77)</b>	<b>&lt; 0.001</b>	1.33 (0.86–2.06)	0.193
Street	<b>0.53 (0.30–0.95)</b>	<b>0.032</b>	<b>0.43 (0.22–0.82)</b>	<b>0.010</b>
others	0.84 (0.52–1.34)	0.454	<b>0.57 (0.34–0.96)</b>	<b>0.035</b>
<b>Household registration</b>				
Rural	Ref		Ref	
Urban	<b>0.67 (0.47–0.95)</b>	<b>0.025</b>	<b>0.64 (0.43–0.96)</b>	<b>0.031</b>
<b>Employment status for commercial sex work</b>				
Self-employed	Ref		Ref	
For a manager	<b>3.59 (2.65–4.87)</b>	<b>&lt; 0.001</b>	<b>2.10 (1.47–2.99)</b>	<b>&lt; 0.001</b>
<b>Duration of sex work in current location</b>				
More than a year	Ref		Ref	
Less than a year	<b>4.72 (3.48–6.39)</b>	<b>&lt; 0.001</b>	<b>2.68 (1.90–3.79)</b>	<b>&lt; 0.001</b>
<b>Average price for vaginal sex (USD)</b>				
≤ 21	Ref		Ref	
> 21	<b>1.66 (1.27–2.17)</b>	<b>&lt; 0.001</b>	1.13 (0.81–1.58)	0.478
<b>Consistency of condom use with vaginal sex in the past month</b>				
Always used	Ref		Ref	
Not always used	<b>2.72 (2.02–3.66)</b>	<b>&lt; 0.001</b>	<b>2.67 (1.93–3.69)</b>	<b>&lt; 0.001</b>
<b>Consistency of condom use with oral sex in the past month</b>				
Always used	Ref		Ref	
Not always used	<b>2.44 (1.38–4.32)</b>	<b>0.002</b>	<b>2.33 (1.25–4.37)</b>	<b>0.001</b>
<b>Ever had unintended pregnancy</b>				
No	Ref		Ref	
Yes	1.31 (0.99–1.73)	0.057	<b>1.43 (1.04–1.96)</b>	<b>0.029</b>

\* p value < 0.05, \*\* p value < 0.01, \*\*\* p value < 0.001

HIVST = HIV self-testing; OR = odds ratio; Ref = Reference level; SD = standard deviation; USD = United States Dollar; 95% CI = 95% confidence interval

# adjusted for injecting drug use, age, marital status, migration status, income and education

Variables	Sexualized drug use Crude OR <sup>§</sup>	p value	Sexualized drug use Adjusted OR <sup>#</sup>	p value
	(95% CI)		(95% CI)	
<b>Current long-acting reversible contraception</b>				
No	Ref		Ref	
Yes	<b>0.48 (0.33–0.69)</b>	<b>&lt; 0.001</b>	0.83 (0.54–1.29)	0.411
<b>Ever had a HIV test</b>				
No	Ref		Ref	
Yes	<b>0.66 (0.48–0.92)</b>	<b>0.015</b>	0.89 (0.61–1.30)	0.556
<b>Ever had a syphilis test</b>				
No	Ref		Ref	
Yes	<b>0.74 (0.56–0.99)</b>	<b>0.039</b>	0.82 (0.59–1.15)	0.253
<b>Ever diagnosed with STIs</b>				
No	Ref			
Yes	<b>6.12 (4.61–8.13)</b>	<b>&lt; 0.001</b>	<b>5.39 (3.92–7.40)</b>	<b>&lt; 0.001</b>
* p value < 0.05, ** p value < 0.01, *** p value < 0.001				
HIVST = HIV self-testing; OR = odds ratio; Ref = Reference level; SD = standard deviation; USD = United States Dollar; 95% CI = 95% confidence interval				
# adjusted for injecting drug use, age, marital status, migration status, income and education				

## Discussion

This study of 1287 FSW from eight Chinese cities reveals that a history of sexualized drug use identified FSW who had greater associations with negative sexual and reproductive health outcomes, even after accounting for injecting drug use (a known risk factor for negative health outcomes in FSW). Whilst much has been published about the associations between injecting drug use and negative sexual and reproductive health outcomes,<sup>21,23–33</sup> our study contribute to the limited literature on sexualized drug use among FSW, and provides evidence to support routinely asking about sexualized drug use, which may also help to more efficiently allocating resources to subpopulations of FSW with the greatest health needs.

The self-report of sexualized drug use among FSW compounded their risks for sexual health outcomes, compared to their non-drug using peers. It is already established that injecting drug use among FSW is associated with increased risks of STIs,<sup>21,23–27</sup> HIV,<sup>21,26,28</sup> higher unintended pregnancy rates,<sup>21</sup> reproductive morbidity,<sup>29</sup> less consistent condom use,<sup>21,30,31</sup> violence,<sup>29,32,33</sup> and mental health problems.<sup>33</sup> We add to this literature by demonstrating a history of sexualized drug use is also associated with negative sexual and reproductive health outcomes. Our disaggregated data of FSW reporting sexualized drug use uncovered significant differences in sociodemographic

characteristics, sexual behaviors and HIV/STI testing behaviors compared with their non-drug using peers. This emphasizes the need to measure sexualized drug use among FSW as an additional risk factor for negative health outcomes, and thus direct additional resources to them such as empowerment-based harm reduction programs,<sup>34</sup> or strength-based interventions.<sup>35</sup>

Sexualized drug use was commonly associated with shorter durations of sex work. This may suggest some situational issues about entering the trade that may increase risk. Whilst we were unable to ask about the complex reasons for sexualized drug use, which could pull or push FSW into using drugs, our findings are consistent with international literature. A study from Chinese FSW found that client request and monetary incentives were reasons for drug use with clients.<sup>21</sup> This is similar to experiences of FSW from other countries where FSW earned money to sustain their drug habit<sup>36</sup> or directly exchange of sex for crack (cocaine).<sup>37</sup> In addition, ongoing drug-injecting among FSW was associated with having drug-using love-mates and drug-using clients among FSW in Vietnam.<sup>14</sup>

The main strength of our study is acquiring data from a large number of FSW working in diverse locations, with varying duration of time working in the sex industry. Our data, disaggregated by sexualized drug use, is a unique contribution to the current literature on FSW and highlights the unique challenges faced by a distinct group of sexualized drug-using FSW. Our findings should be read in light of several limitations. This was not a random sample although we attempted to recruit a representative sample of FSW working in diverse settings. There is a risk of social desirability bias as we relied on self-report of drug use, consistent with other studies regarding drug-use. We tried to mitigate this bias by the anonymous nature of the survey. We did not include questions regarding the use of alcohol before or during sex, which may also increase the risk of HIV/STIs in FSW.<sup>38</sup> Given the brief nature of the survey, we did not ask about how drug-use affected the lives of the women, and we could not distinguish between non-problematic and problematic drug use. More research is needed to explore the drug related harms of sexualized drug use for FSW. Finally, we did not include males or transgender sex workers who may have even higher risk for HIV/STIs. This will be the subject of future research.

## Conclusion

Our study highlights the sexual health needs FSW with a history of sexualized drug use. Similar to guidelines regarding sexualized drug use among MSM,<sup>39</sup> we recommend that routinely asking FSW about sexualized drug use is valuable to distinguish individuals who may be at higher risk of negative health outcomes. This will provide the opportunity to offer additional support to FSW who display problematic sexualized drug use.

## Declarations

### Ethics

This study was approved by the Dermatology Hospital of Southern Medical University (2019017). Verbal informed consent was obtained from all the participants who agreed to participate in this study.

### Consent for Publication

Not applicable.

### Availability of data and materials

All data generated or analysed during this study are included in this published article. Additional information may be requested from the corresponding author.

### Competing interests

All authors declare no competing interests.

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### Authors' contributions

CW designed the project. CW, MX, YW, WT, HZ, and BY conducted the study. JJO, JDT, MS, HF provided technical and modelling advice throughout the project and critically revised the manuscript. All authors participated in the interpretation of results and critically revised the

manuscript. All authors reviewed the manuscript and approved the final version.

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## Appendix

### Appendix 1

Name of institution	Number of FSW served in 2018	Official cooperation with Government/ CDC/Hospital	Primary services provided to FSW	City	Region of China	Population of the city	GPD per capita (USD)	Type of city	Ethnic breakdown
Beijing Firefly Women Group	700	Yes	1. HIV/STD test and treatment promotion, 2. High risk sex behavior intervention	Beijing	Northern	21.54 million	24 k	1st tier	Han (95.69%), Manchu, Hui, Mongolian, Korean etc. 56 ethnics
Tianjin Sunflower Migrant Women Service Center	3000	Yes	1. Training skills on reproductive health and HIV/STD prevention 2. Provide HIV/STD testing 3. Provide HIV/syphilis self-test kit.	Tianjin	Northern	15.62 million	17 k	1st tier	Han (97%), Hui (2%), Manchu (0.6%), Mongolian, Korean etc. 52 ethnics
Xiangyang Ziwei Garden Health Consulting Studio	1200	Yes	1. Training skills on reproductive health and HIV/STD prevention 2. Provide HIV/STD testing 3. Provide HIV/syphilis self-test kit. 4. Community empowerment	Xiangyang	Central South	6.05 million	11 k	3rd tier	Han (99.6%), Hui (0.4%)
Shenzhen Hongci Women Care Service Center	5000	Yes	1. Training skills on reproductive health and HIV/STD prevention 2. Provide HIV/STD testing 3. STD linkage to care	Shenzhen	Southern	13.44 million	29.5 k	1st tier	Han, Zhuang, Tujia, Miao, Dong etc. 56 ethnics (7.8%)
Yunfu Zhongyue AIDS Care Rescue Center	600	Yes	1. High risk sex behavior intervention 2. Provide psychological support, 3. HIV/syphilis/NG consulting and test	Yunfu	Southern	2.55 million	4.7 k	4th tier	99.6% Han, with 0.4% minority ethnics
Kunming Parallel Sexual Health Support and Development Center	1200	Yes	1. High risk sex behavior intervention 2. Provide HIV/STD testing	Kunming	Southwest	6.95 million	10.6 k	2nd tier	Han (86.16%), minority ethnics (13.84%)

Name of institution	Number of FSW served in 2018	Official cooperation with Government/ CDC/Hospital	Primary services provided to FSW	City	Region of China	Population of the city	GPD per capita (USD)	Type of city	Ethnic breakdown
Longnan Longjiang Support Group	1940	Yes	1. Provide platform for FSW to get HIV/syphilis/HCV test	Longnan	Northwest	2.64 million	2.2 k	5th tier	Han (97.69%), minority ethnics (2.31%)
Jiaozhou Love Health Service Center	2000	Yes	1. High risk sex behavior intervention 2. Gynecological examination, 3. Provide HIV/STD testing 4. Training skills on reproductive health and HIV/STD prevention	Jiaozhou	Eastern	0.91 million	18 k	4th tier	Han (99.3%), minority ethnics (0.7%)