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Drug Use Patterns and Associated Factors among Female Sex Workers in Iran

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Abstract

Objective: This study examines the prevalence of drug and poly-drug use and their associated factors among female sex workers (FSW) in Iran.

Methods: We analyzed data from a bio-behavioral surveillance survey of 1,347 FSW across 13 major cities in Iran in 2015. Two outcome measures were defined: i) past-month “any drug use”, a binary variable defined as none or any; and ii) a three-category past-month “poly-drug use” variable defined as none, only one drug, and more than one drug. Correlates of these two study outcomes were assessed using multivariable logistic regression and multinomial logistic regression, respectively. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were reported.

Results: We found that 24.9% (95% CI: 16.1, 36.4) and 13.5% (95% CI: 8.1, 21.5) of FSW reported past-month any drug use and poly-drug use, respectively. Longer sex work career (AOR 2.44 [95% CI: 1.28, 4.63]), unstable housing (AOR 2.56 [1.17, 5.64]), past-year experience of sexual violence (AOR 1.61 [1.15, 2.27]), and incarceration (AOR 2.02 [1.23, 3.32]) were positively associated with any drug use. Similarly, FSW who were unstably housed (AOR 3.4

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[1.06, 10.95]), reported past-year experience of sexual violence (AOR 2.06 [95% CI: 1.24, 3.41]) and incarceration (AOR 2.82 [1.60, 4.97]) were positively associated with past-month poly-drug use.

Conclusion: Drug use is frequent among Iranian FSW, particularly among those who experienced sexual violence, unstable housing or incarceration. Programs to reduce harms associated with drug and poly-drug use should target FSW as a priority population.

Keywords

Female sex workers; Drug use; Addictive behaviors; HIV; Surveillance; Iran

1. Introduction

A growing body of international evidence has documented a high prevalence of drug use among female sex workers (FSW) - women who engage in sex work and exchange sex for livelihood (Abdool Karim, et al., 2010; Lancaster, et al., 2016; Strathdee, et al., 2015). Drug use is considered to be a significant health challenge among FSW due to their dual sexual/drug risk for HIV and other sexually transmitted infections (STIs) (El-Bassel, Wechsberg, & Shaw, 2012). Indeed, previous studies have demonstrated FSW to be disproportionately affected by HIV infection (Baral, et al., 2012; Beyrer, et al., 2015; Couture, et al., 2011; Shannon, et al., 2011; Shannon, et al., 2015). For example, a systematic review in low- and middle-income countries reported an overall HIV prevalence of 11.8 % (95% CI: 11.6, 12.0), a level that was 13.5 times greater than in the general female population of reproductive age (Baral, et al., 2012). A recent update to this review study estimated the prevalence of HIV in FSW to vary by region from 0.3% in the Middle East and North Africa to 29.3% in Sub-Saharan Africa (Beyrer, et al., 2015). Moreover, in a 2011 global study, it was estimated that 15% (95% CI: 11.5, 18.6) of HIV infections in women were attributable to female sex work, as an occupational risk factor (Pruss-Ustun, et al., 2013). High-risk behaviors associated with sex work, such as multiple sexual partnerships, unprotected sex, and drug use, are the leading contributors to the elevated risk of HIV infection among FSW (Baral, et al., 2012; Beyrer, et al., 2015; Shannon & Csete, 2010). FSW reported using drugs as a coping mechanism to numb the challenges associated with the sex work conditions and to facilitate soliciting their sexual clients (Abdool Karim, et al., 2010; Strathdee, et al., 2015).

There are more than 220,000 FSW living in Iran (Sharifi, Karamouzian, et al., 2017), with an HIV prevalence of 4.5% (in 2010) (Sajadi, et al., 2013) to 2.1% (in 2015) (Mirzazadeh, et al., 2016), and only two-thirds have been tested for HIV and know their status (Shokoohi, et al., 2017). Although Iran has the highest number of heroin and opium user per capita worldwide (UNODC., 2011), our understanding of drug use patterns among FSW remains limited. Previous studies have estimated that 14.6% of FSW have ever injected drugs in their lifetime (Karamouzian, et al., 2017) and 15.0% have reported crystal methamphetamine use (Shokoohi, et al., 2018). Other studies of FSW are often limited by small sample size (100 or less) (Nasirian, et al., 2017) and recruitment sites limited to a single city (e.g., Tehran (Moayed-Nia, et al., 2016), Shiraz (Kazerooni, et al., 2014), Isfahan (Nasirian, et al., 2017)).

Therefore, the present study aims to report the prevalence of poly-drug use and any drug use among FSW in Iran using data collected in a multi-city national survey. Drawing on the social-ecological model (McLeroy, Bibeau, Steckler, & Glanz, 1988), we examine individual (e.g., socio-demographic variables), interpersonal (e.g., number of paying and non-paying partners), and structural/environmental (e.g., housing instability, incarceration history) factors associated with drug use among FSW in Iran. As a commonly used theoretical framework in assessing risk factors (Baral, Logie, Grosso, Wirtz, & Beyrer, 2013), the social-ecological model helps to understand the complex interplay between behavioral and socio-environmental factors in individual health, and explore factors underpinning health or health-related disparities (Baral, et al., 2013).

2. Methods

2.1. Design, setting and participants

As a part of the second national bio-behavioral survey of FSW in Iran, 1,347 FSW from 13 large cities representing different geographical regions across Iran were recruited from January to August of 2015. More details about the study are described elsewhere (Shokoohi, et al., 2018; Shokoohi, et al., 2017). Briefly, participants were recruited from public street location through peer efforts as well as health facilities providing harm reduction services (e.g., free condoms, HIV testing and counseling, and substance use treatment) to vulnerable women including FSW (Fahimfar, Sedaghat, Hatami, Kamali, & Gooya, 2013). Eligible participants were female, aged 18 years old, reported having sexual penetrative intercourse in exchange for livelihood (i.e., money, goods, services, or drugs) with more than one clients in the previous 12 months, had Iranian citizenship, and lived or worked in the city where the survey was carried out.

2.2. Data collection

First, verbal informed consent was obtained for both the interview and HIV testing. One-to-one interviews were conducted in a private room by a trained female interviewer. A bio-behavioral surveillance survey (UNAIDS., 2007) containing demographics, history of sexual behaviors, HIV status, history of drug use and injection, and other relevant information was completed. The one-hour interview was followed by a rapid HIV test and counseling. HIV testing involved two steps: an HIV/syphilis dual rapid test, and if reactive, confirmation by a second test (i.e., Unigold HIV rapid test). Participants received monetary incentives for both the interview (70,000 Iranian Rials) and HIV test (30,000 Iranian Rials). The Research Ethics Board at the Kerman University of Medical Sciences reviewed and approved the study protocol and procedures (Ethics reference number: K/93/209).

2.3. Measures

2.3.1. Dependent variables: Any drug use and poly-drug use—The questionnaire collected information on the self-reported use of multiple drugs within the past month, including opium, heroin-crack, heroin, crack, norjizak/tamjizak (i.e., an illicit drug mostly used through injection and produced by a combination of different opioids, steroids, and benzodiazepines (Sadeghi, et al., 2015)), non-medicinal methadone, crystal methamphetamine (CM), hashish, marijuana, ecstasy, and cocaine. The frequency of use of

each of these drugs was as follows: a) never used, b) not used over the last six months, c) almost once a month, d) several times a month, e) two to three times a week, and f) four or more times a week. FSW who reported the drugs listed above over the past month (i.e., options 'c', 'd', 'e', and 'f') were categorized as past-month users.

Two main outcome variables were subsequently generated: i) a binary variable of any drug use in the past month, defined as reporting any of the above-mentioned drugs in the past month versus no drug use, and ii) a three-category variable of poly-drug use: reporting the use of more than one drug in the past month, use of only one drug in the past month, or no drug use. The term 'poly-drug use' refers to the use of more than one illicit drugs over a specified period either simultaneously or sequentially; however, it is not limited to only illicit drugs; that is, prescription drugs such as opioids can be also considered in this definition (Connor, Gullo, White, & Kelly, 2014).

2.3.2. Covariates—Consistent with our previous research (Shokoohi, et al., 2018; Shokoohi, et al., 2017), we explored factors associated with the study outcomes through the perspective of the social-ecological model. This paper relied on the core indicators that are collected in the bio-behavioral surveillance surveys to measure the effectiveness of the national HIV response among key affected populations, including FSW. We report four main groups of measured variables: sociodemographic, HIV-related individual, interpersonal, and structural/environmental covariates.

- I) Socio-demographics included: age (<25, 25–34, 35 years old), current marital or relationship status (single, married, widowed/divorced, temporary marriage), the highest level of education (primary school or less, middle or high school, diploma or more), and having income other than sex work (yes, no). Temporary marriage (or Sigheh) is a type of marriage contract in which unmarried women marry a man for a fixed (pre-specified) term. While legally and morally permissible, this practice has been stigmatized and remains a controversial topic, viewed as a cover for women involved in sex work (Karamouzian, et al., 2016).
- II) HIV-related individual covariates included duration of sex work involvement, selfperceived risk of HIV, HIV knowledge, and HIV sero-status. Duration of involvement in sex work was measured as the interview time minus the date of sex work debut (2 years, 3–5 years, 6–10 years, >10 years). Self-perceived risk for HIV was measured using a single item: “How much chance do you think there is that you are at risk for getting HIV?” (none vs. risk perception as low, moderate, high). Participant’s HIV knowledge was measured using five questions with yes, no, or don’t know response options (UNAIDS., 2007): 1) condoms can prevent HIV transmission, 2) restricting sexual relationships to only one faithful but uninfected partner can prevent HIV transmission, 3) mosquito bites can transmit HIV, 4) sharing meals with a person living with HIV can transmit HIV, and 5) a healthy-looking individual can have HIV. Participants who provided correct answers to these questions were defined as having sufficient knowledge. HIV sero-status (positive vs. negative) was determined through testing; however, we only report the prevalence of the study outcomes

among HIV-positive and HIV-negative FSW. This variable was not included in the regression models due to a very low number of FSW with HIV (N=28).

- III) Interpersonal covariates, here related to sexual history, included history of forced sex or sexual violence, number of paying clients, number of non-paying partners, and group sex. History of forced sex/sexual violence was measured by asking “Has someone ever sexually forced/threatened you to have sex?” (never, experienced before last year, experienced in last year). The number of paying clients within the last month was measured as, “How many clients did you have sex [vaginal, anal, oral] with?” (none, only 1, 2–5, more than 5); clients were those who paid money or provided the participants with good, drugs, shelter, etc. in exchange for sex. We also measured the number of non-paying partners within the last month, “How many non-paying partners did you have sex [vaginal, anal, oral] with?” (none, only 1, more than 1); partners were those who had casual sexual not for the purpose of money, good, drugs, shelter, etc. History of concurrent multi-person sex (i.e., group sex) was measured as, “Have you ever experienced having group sex [i.e., having sex with more than one client at the same time]?” (never, experienced before last year, experienced in last year).
- IV) structural/environmental covariates measured in the current study included housing status, and history of incarceration. Current housing status was measured as, “Where do you currently live?” A binary variable was created: stable [e.g., living in their own house either alone or with a partner] vs. unstable [e.g., sleeping with other people, or in shelters and streets]. History of incarceration was measured as, “Have you ever been incarcerated?” A three-category variable was defined: never, experienced before last year, experienced during last year.

2.4. Statistical analysis

For each drug, we calculated the absolute and relative frequency of past-month use (either non-injection or injection) along with 95% confidence intervals (CI). Prevalences for outcome variables were compared across subgroups of independent covariates using Rao-Scott modified chi-square tests in order to adjust for the clustering effect of the study cities. We used multinomial logistic regression to assess the correlates of poly-drug use (a three-category variable: none, used only one drug, used more than one drug) and logistic regression to assess the correlates of any drug use (a binary variable: none, used at least one drug). The process for model building was the same for both study outcomes. We first fitted a multivariable regression model for the socio-demographic variables. Education and marital status with p-values <0.15 in this step were chosen to be further adjusted in assessing the effect of other covariates (p-values are not reported; Table 1). We then created three multivariable regression models for each cluster of individual (Model 1), interpersonal (Model 2), and structural (Model 3) covariates, adjusted for education and marital status. To develop the final prediction model, covariates with p-value < 0.15 in each cluster of these covariates were entered into another multivariable regression adjusting for both education and marital status (i.e., final model). This approach was used in order to produce separate models for each type of variable in the social-ecological model, to make effects visible in

Models 1 through 3, without controlling for other variable types that may mediate effects. Given the cross-sectional nature of the data, it was not possible to estimate mediating pathways. The adjusted odds ratios (AOR) and 95% CIs were reported. To deal with missing values, we also reported estimates from multiple imputations using a chained equation (MICE) algorithm under the assumption of a missing at random (MAR) mechanism with ten imputed datasets (Royston & White, 2011) (Data not shown). All analysis was performed using Stata version 15 (StataCorp, College Station, Texas, USA).

3. Results

3.1. Descriptive

Mean (SD) age of FSW was 35.6 (8.8) years while around 50% were older than 35 years. The mean (SD) age for sex work initiation was 26.5 (7.9) years; 25.8% were involved in sex work for 5 to 10 years and 32.8% for more than 10 years. Mean (SD) age of drug use initiation among 799 (59.8%) FSW with a lifetime history of drug use was 25.9 (7.8). Moreover, 28 (2.1%) FSW tested positive for HIV.

3.2. Drug use prevalence

The most common drugs used in the past month were: CM (16.2%), and heroin/crack (11.6%), non-medicinal methadone (7.0%), and opium (6.5%) (Fig. 1). The prevalences of past-month any drug use and poly-drug use were 24.9% and 13.5%, respectively (Table 1).

3.3. Poly-drug use by socio-demographics (Table 1)

A higher frequency of poly-drug use was reported among FSW who had lower level of education (15.8% for primary or less and 15.9% for middle/high school vs. 7.2% for diploma and higher), yielding an AOR = 2.99 (95% CI: 1.48, 6.02) for primary or less and 3.03 (95% CI: 1.78, 5.15) for middle/high school relative to more educated FSW (i.e., those with diploma or more). Also, FSW with temporary marriage status reported a higher proportion of poly-drug use (16.6%) than those who were married (8.3%). Poly-drug use did not differ across age categories, or between those who had or did not have income from sources other than sex work.

3.4. Poly-drug use and association with covariates (Table 2 and Table 3)

A higher poly-drug use was reported among FSW with longer sex work duration, with 17.2% and 15.0% for FSW respectively with >10 years and 6–10 years involvement in sex work vs. 7.3% for those with ≤2 years. Poly-drug use among 28 HIV-positive FSW was 35.7% compared to 13.1% among their HIV-negative counterparts. In addition, poly-drug use was prevalent among those who experienced sexual violence in the past year (23.1% vs. 10.5% for never), were unstably housed (36.0% vs. 11.0%), and experienced incarceration in the past year (31.1%) and before the past year (25.8%).

The final multivariable multinomial logistic regression model showed that unstable housing (AOR = 3.40 [95% CI: 1.06, 10.95]), history of incarceration either within the past year (AOR = 2.82 [95% CI: 1.60, 4.97]) or before the past year (AOR = 2.59 [95% CI: 1.43, 4.67]), and past-year experience of sexual violence (AOR = 2.06 [95% CI: 1.24, 3.41]) were

positively associated with past-month poly-drug use. Similar results were obtained from the final regression model with multiple imputations.

3.5. Any drug use and associations with covariates (Table 2 and Table 4)

FSW with more than 10 years (32.8%) and 6–10 years (26.0%) involvement in sex work reported a greater past-month drug use than those with less than 2 years (13.7%) sex work duration. Half of HIV-positive FSW reported past-month drug use vs. 24.4% in HIV-negative participants. Any drug use was higher in FSW who reported experiencing sexual violence in the past year (39.6% vs. 21.4% for never), reported being unstably housed (52.2% vs. 22.0% among FSW with stable housing), and experienced incarceration in the past year (43.3%) and before the previous year (44.4%) compared to in those who had never experienced incarceration (18.5%).

Our final multivariable logistic regression model showed that history of incarceration either before the past year (AOR = 2.74 [95% CI: 1.66, 4.52]) or within the past year (AOR = 2.02 [95% CI: 1.23, 3.32]), unstable housing (AOR = 2.56 [95% CI: 1.17, 5.64]), longer sex work duration (AOR = 2.44 [95% CI: 1.28, 4.63] for >10 years vs. 2 years), past-year experience of sexual violence (AOR = 1.61 [95% CI: 1.15, 2.27] vs. never), and having one non-paying sexual partner (AOR = 1.53 [95% CI: 1.00, 2.34]) were positively associated with past-month any drug use. All these positive associations remained significant in the imputed regression model except for having one non-paying sexual partner. In contrast, experiencing sexual violence before the past year was negatively associated with any drug use in the final regression model (AOR = 0.67 [95% CI: 0.46, 0.96] vs. never), while this association vanished in the final imputed regression model (AOR = 0.76 [95% CI: 0.52, 1.10]).

4. Discussion

Drawing on a large sample, these findings suggest that one-fourth of FSW in Iran self-reported drug use in past-month, of whom more than half used more than one drug. Crystal methamphetamine was the most common drug reported, followed by heroin-crack, opium and non-prescription methadone. With regard to socio-demographic variables, FSW with low education and unstable marital/relationship status (i.e., Sigheh) were more likely to report past-month any drug and poly-drug use. Moreover, any drug and poly-drug use among FSW were positively associated with interpersonal factors (sexual violence) and structural factors (unstable housing and history of incarceration). Although HIV status was not considered in the final regression models due to model instability with a very small number of HIV-positive cases, any drug and poly-drug use were higher in HIV-positive FSW compared with HIV-negative FSW. This association could be explained by the well-documented role of drug use/injection in driving the HIV epidemic in Iran (Nasirian, Doroudi, Gooya, Sedaghat, & Haghdoost, 2012; Rahimi-Movaghar, Amin-Esmaeili, Haghdoost, Sadeghirad, & Mohraz, 2012)

Drug use, particularly CM use, prevalences that we observed among FSW were significantly higher than those reported for other populations in Iran. For example, in a national household survey, the overall (male and female) prevalence of using illicit drugs five times or more in past 12 months was estimated as 3.49% for any drug and 0.47% for

amphetamine-type stimulants (Amin-Esmaeili, et al., 2016). Methamphetamine use prevalence was reported as 2% for lifetime and less than 0.40% for past-month use among youth (19–29y) (Sharifi, Shokoohi, et al., 2017) as well as 0.15 to 0.30% among university students (Abbasi-Ghahramanloo, Fotouhi, Zeraati, & Rahimi-Movaghar, 2015; Safri, et al., 2016), all of which are much lower than the prevalence we observed among FSW. A recent study revealed that FSW were more than two times more likely to report CM use concurrently with multiple opioids (Shokoohi, et al., 2018).

Our estimates for drug use are also comparable with estimates for FSW elsewhere. For example, drug use prevalence among FSW ranged from 2.6% to 7.4% in China (Tang, et al., 2015) (Li, Gong, Yue, & Jiang, 2017) to 25% lifetime use in India (Medhi, et al., 2012), and 34% in Myanmar. We also found that 4.3% injected heroin and 1.6% injected norjiak/tamjizak in the past month, considerably higher than any-drug injection prevalence reported for the general population in Iran (i.e., 0.09% to 0.28%) (Amin-Esmaeili, et al., 2016; Nikfarjam, et al., 2016). While we observed a high prevalence of past-month drug use in our study, high prevalence of lifetime drug use among Iranian FSW was also reported in local studies conducted in Shiraz (69.9% - (Kazerooni, et al., 2014) and Tehran (90.7% - (Moayedi-Nia, et al., 2016). Therefore, this subgroup of FSW needs to be carefully targeted for harm reduction programs given their dual risk of acquiring or transmitting HIV infection either from and to their partners or people in their drug using or injecting networks.

Using the socio-ecological model as the theoretical framework to explore factors associated with drug use among our study population, we found that socio-demographic factors including low education and temporary marriage/relationship status were associated with increased likelihood of drug use. Previous studies have also showed a strong link between education and substance use among women (Amin-Esmaeili, et al., 2016; Chaturvedi, Phukan, & Mahanta, 2003; Shokoohi, et al., 2018). The temporary marriage relationship is a unique type of variable in our context that was associated with drug use among FSW. Temporary marriage can be a proxy indicator for loose familial connection or support, low socioeconomic, and sex work of the study participants that associated with an increased risk of drug use. Previous studies in our context have demonstrated the role of lower socioeconomic status on women's engagement in sex work or drug use (Karamouzian, et al., 2016). We also documented that those with a longer sex work career were more likely to use drugs than those with shorter careers. These findings were consistent with previous studies indicating that FSW who remain in sex work longer are more likely to have been exposed to drug use and the associated harms (Couture, et al., 2012; Morris, et al., 2013). It is likely that some FSW started using drugs to cope with the challenges of being a sex worker. Indeed, studies of sex workers have found that drug use can also increase the involvement in or continuation of sex work (Cusick & Hickman, 2005; Gaines, et al., 2015), and FSW are likely to be trapped in a “work-score-use” cycle, indicating a cycle of selling sex, buying and using drugs (Jeal, Salisbury, & Turner, 2008). In addition to these socio-demographic and individual-level factors, we found a higher frequency of drug use among FSW with a higher number of partners and those with a history of forced sex, highlighting the key role of interpersonal adversities in drug use among our study population.

We also documented the role of socio-structural factors in increasing the likelihood of drug use and poly-drug use among our study population. Specifically, we found that FSW with unstable housing and a history of incarceration were more likely to report drug use. These findings were consistent with our previous report reflecting the significance of these key determinants in an increased likelihood of crystal methamphetamine use among FSW (Shokoohi, et al., 2018). Multiple socio-structural adversities, interpersonal and individual determinants of drug use identified in the present study have important implications for healthcare providers. In line with previous research (Jeal, et al., 2008), our findings also support the need for integrated multi-agency one-stop shop approaches towards care and harm reduction delivery for FSW who regularly use drugs. Both social and health care and supports are needed to address complex correlated issues of sex work and drug use. Scaling up interventions such as drug use screening as well as gender-sensitive, peer-run harm reduction and substance use treatment services are warranted to address both unsafe sex and unsafe drug use practices among FSW with a history of drug use (Karamouzian, Haghdoost, & Sharifi, 2014) (Alam-mehrjerdi, et al., 2016).

4.1. Limitations

Our study had three major limitations. We measured drug use and injection by self-report, and so our prevalence estimates are likely to have underestimated the true prevalence because of social desirability bias. We were only able to assess the association of factors with drug use, as the cross-sectional design did not allow to assess the causality. Our study population was recruited by mixed non-probability sampling methods from major urban settings in Iran, which limited the generalizability of our findings.

5. Conclusion

Our findings show that drug use is frequent among Iranian FSW, particularly in those who have experienced sexual violence, unstable housing and incarceration, and who have a longer history of sex work. To improve the impact of harm reduction programs in Iran, drug using FSW need to be effectively targeted. Future studies to assess the reasons behind using drugs, the role of sexual partners, and FSW's access to and use of harm reduction services will be helpful in planning harm reduction services that are accessible and tailored for women who are engaged in sex work in Iran.

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Highlights

- One quarter of FSW (24.9%) reported past-month any drug use.
- Poly-drug (i.e., the use of more than one drug) use was reported by 13.5% of FSW.
- Sexual violence increased the likelihood of any drug use and poly-drug use in FSW.
- Unstable housing and incarceration predicted any drug and poly-drug use in FSW.

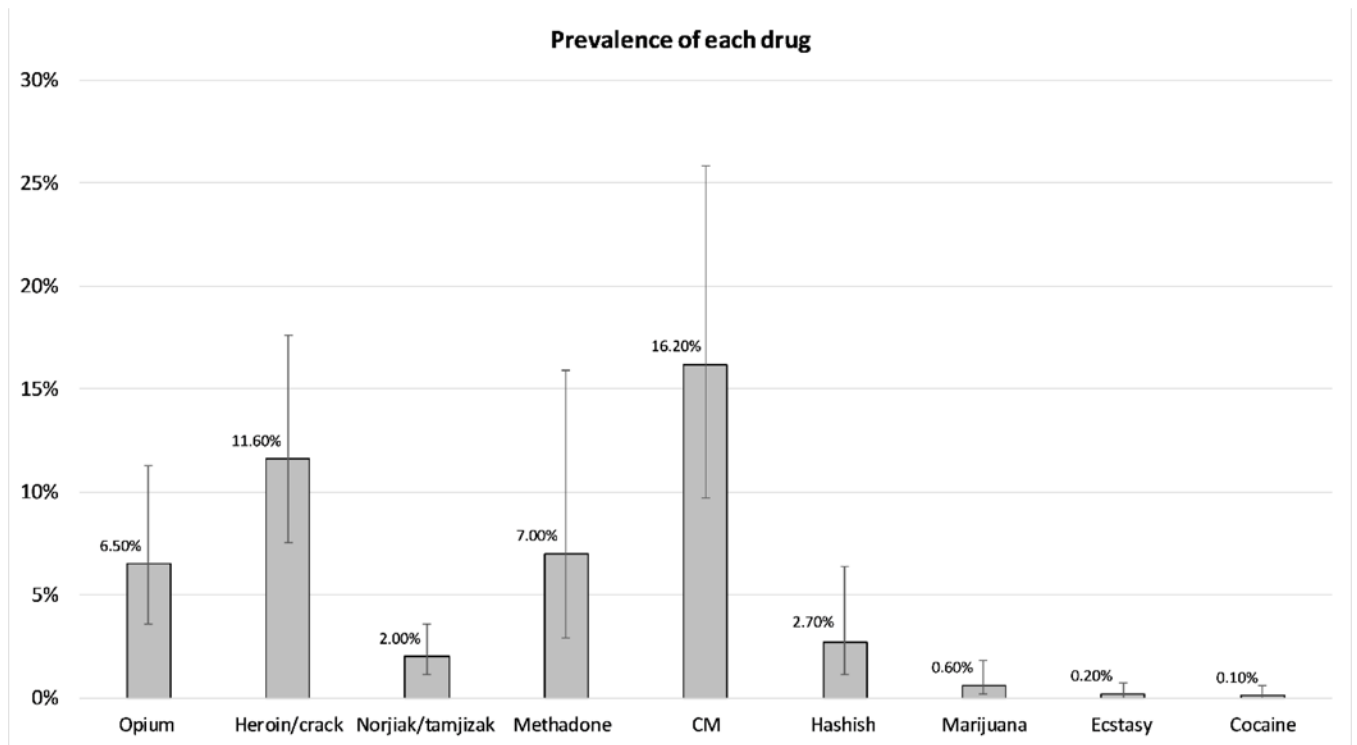


Fig 1. Drug use (injection or non-injection) frequencies in the past month self-reported by female sex workers, Iran, 2015. [Error bars represent 95% confidence intervals. CM: crystal methamphetamine]

Prevalence and socio-demographic associations of past-month one drug, poly-drug and any drug use among female sex workers, Iran 2015

Table 1

Socio-demographic variables	Poly-drug use ^d			Any drug use		
	One drug used ^d	Two or more drugs used		One drug used ^d	Two or more drugs used	
	N	% (95% CI)	AOR (95% CI) ^b	% (95% CI)	AOR (95% CI) ^b	AOR (95% CI) ^c
Overall	1346	11.4 (7.9, 16.3)	---	13.5 (8.1, 21.5)	---	24.9 (16.1, 36.4)
Age groups						
<25 years old	137	9.5 (4.5, 18.9)	Ref	10.9 (5.9, 19.4)	Ref	20.4 (10.9, 35.1)
25–34 years old	526	9.7 (6.4, 14.5)	1.19 (0.49, 2.86)	13.5 (7.6, 22.7)	1.31 (0.79, 2.17)	23.2 (14.6, 34.9)
35+	672	13.4 (8.6, 20.2)	1.67 (0.65, 4.32)	14.1 (8.2, 23.2)	1.24 (0.61, 2.55)	27.5 (17.5, 40.5)
Current marital status^e						
Single	84	11.9 (6.5, 20.7)	2.10 (0.85, 5.13)	8.3 (3.5, 18.5)	1.19 (0.54, 2.61)	20.2 (10.9, 34.4)
Married	440	9.1 (5.5, 14.8)	Ref	10.9 (5.9, 19.2)	Ref	20.0 (11.6, 32.2)
Widow/divorced	220	13.2 (8.2, 20.5)	1.54 (0.77, 3.10)	12.7 (6.2, 24.4)	1.23 (0.51, 2.95)	25.9 (14.6, 41.7)
Temporary ^d	590	12.7 (8.3, 19.0)	1.63 (1.01, 2.64) [*]	16.6 (9.8, 26.7)	1.88 (1.12, 3.14) [*]	29.3 (18.3, 43.4) [*]
Education^e						
Primary school or less	507	12.2 (7.8, 18.7)	1.87 (0.83, 4.22)	15.8 (9.3, 25.4) [*]	2.99 (1.48, 6.02) ^{**}	28.0 (17.4, 41.9) [*]
Middle/high school	471	13.6 (8.9, 20.3)	2.23 (1.19, 4.18) [*]	15.9 (9.2, 26.1)	3.03 (1.78, 5.15) ^{**}	29.5 (18.4, 43.7) ^{**}
Diploma or more	359	7.8 (4.3, 13.6)	Ref	7.2 (3.9, 13.0)	Ref	15.0 (8.8, 24.6)
Having income other than						

Socio-demographic variables	Poly-drug use ^a				Any drug use	
	One drug used ^d		Two or more drugs used		AOR (95% CI) ^c	AOR (95% CI) ^c
	% (95% CI)	AOR (95% CI) ^b	% (95% CI)	AOR (95% CI) ^b		
sex work	N					
Yes	543	12.3 (7.2, 20.2)	Ref	14.0 (6.9, 26.3)	Ref	26.3 (14.1, 43.8)
No	788	11.0 (7.4, 16.2)	0.82 (0.40, 1.65)	13.1 (7.8, 21.0)	0.84 (0.38, 1.82)	24.1 (15.6, 35.3)

^aReference category: No drug use

^bAdjusted odds ratio (AOR) with 95% confidence intervals from multivariable multinomial logistic regression model

^cAdjusted odds ratio (AOR) with 95% confidence intervals from multivariable logistic regression model

^dTemporary marriage is locally named Sigheh

* P-value < 0.05

** P-value < 0.01

^eBoth education and marital status with p-value < 0.05 were chosen to be adjusted for in other regression models (model 1–3 and final model)

Table 2

Prevalence of one drug, poly-drug and any drug use by the individual, interpersonal, and structural covariates, female sex workers, Iran, 2015

Covariates	Categories	N	Poly-drug use		Any drug use
			One drug % (95% CI)	Poly-drug % (95% CI)	% (95% CI)
<i>HIV-related individual covariates</i>					
Sex work duration	2 years	233	6.4 (3.8, 10.8)	7.3 (2.7, 18.5)	13.7 (6.4,26.9)
	3–5 years	303	11.2 (6.9, 17.8)	12.5 (7.0, 21.5)	23.8 (14.2,37.0)
	6–10 years	334	11.1 (6.1, 19.4)	15.0 (8.8, 24.3)	26.0 (15.6,40.1)
	> 10 years	424	15.6 (11.9, 20.2)	17.2 (10.5, 26.9) **	32.8 (23.4,43.8) **
HIV knowledge	Sufficient	448	9.4 (6.0, 14.3)	10.7 (5.3, 20.4)	20.1 (11.6,32.5)
	Insufficient	845	12.3 (8.4, 17.7)	14.4 (8.9, 22.6)	26.7 (17.6,38.5)
Risk perception^a	Not at all	212	4.7 (2.4, 9.2)	13.2 (5.2, 29.8)	17.9 (8.0,35.6)
	Some extent	12.4	11.7 (8.1, 16.6)	12.4 (7.2, 20.4)	24.1 (15.4,35.5)
HIV sero-status	Negative	1310	11.4 (7.8, 16.4)	13.1 (7.8, 21.0)	24.4 (15.7,35.9)
	Positive	28	14.3 (8.3, 23.4)	35.7 (26.1, 46.7) **	50.0 (36.1,63.9) **
<i>Interpersonal covariates</i>					
Had forced sex	Never	800	10.9 (6.7, 17.3)	10.5 (5.7, 18.6)	21.4 (12.7,33.7)
	Before past year	307	9.1 (6.4, 12.9)	14.7 (8.0, 25.4)	23.8 (15.7,34.3)
	Past year	225	16.4 (10.5, 24.9)	23.1 (14.8, 34.2) **	39.6 (26.0,54.9) **
No. paying clients^b	None	294	9.9 (4.7, 19.5)	15.0 (6.5, 30.9)	24.8 (11.1,46.5)
	Only 1	185	10.3 (4.7, 20.9)	9.2 (3.2, 23.5)	19.5 (9.0,37.2)
	2–5	436	12.8 (7.4, 21.3)	15.1 (9.2, 23.8)	28.0 (17.5,41.5)
	> 5	392	12.0 (7.5, 18.5)	13.5 (6.8, 25.1)	25.5 (14.3,41.3)
No. Non-paying partners^b	None	631	11.9 (6.6, 16.7)	11.9 (6.5, 20.9)	22.5 (13.7,34.6)
	Only 1	536	11.0 (6.5, 17.9)	14.4 (7.9, 24.8)	25.4 (14.9,39.8)
	> 1	158	17.7 (10.8, 27.7)	17.1 (10.3, 27.0)	34.8 (22.8,49.1)
Concurrent multi-person sex	Never	1165	11.5 (7.6, 16.9)	12.4 (7.3, 20.1)	23.9 (15.2,35.4)
	Before past year	69	13.0 (5.7, 27.2)	20.3 (8.9, 40.0)	33.3 (18.2,52.9)
	Past year	97	9.3 (5.8, 14.5)	22.7 (10.1, 43.3)	32.0 (17.8,50.5)
<i>Environmental and structural factors</i>					
Housing status	Stable	1200	11.0 (7.3, 16.3)	11.0 (6.1, 19.1)	22.0 (13.4,34.0)
	Unstable	136	16.2 (10.0, 25.2)	36.0 (23.7, 50.5) **	52.2 (38.5,65.6) **
Incarceration	Never	984	9.8 (5.8, 15.8)	8.7 (4.6, 16.0)	18.5 (10.6,30.4)

Covariates	Categories	N	Poly-drug use		Any drug use
			One drug % (95% CI)	Poly-drug % (95% CI)	% (95% CI)
	Before past year	252	18.7 (13.6, 25.0)	25.8 (14.7, 41.2)	44.4 (29.7,60.2)
	Past year	90	12.2 (6.8, 20.9)	31.1 (18.3, 47.6) **	43.3 (29.1,58.8) **

^aFSW's perception of their risk for acquiring HIV infection. Some extent indicates any level of risk perception (low, moderate, high)

^cDuration: Last month

* P-value < 0.05

** P-value < 0.01

Table 3

Multivariable multinomial logistic regression analyses to identify correlates of past-month *poly-drug use* among female sex workers, Iran, 2015 (N = 1070 in final model)

Variables	Models 1 to 3 ^a		Final Model ^{a,e}	
	One drug ^b AOR (95% CI) ^c	Poly-drug ^b AOR (95% CI) ^c	One drug ^b AOR (95% CI) ^c	Poly-drug ^b AOR (95% CI) ^c
<i>Model 1: Individual covariates</i>				
Sex work duration				
3–5 years vs. 2 years	1.55 (0.89, 2.71)	2.09 (1.02, 4.29) *	1.56 (0.81, 3.00)	1.96 (0.81, 4.74)
6–10 years vs. 2 years	1.82 (0.89, 3.73)	1.90 (0.80, 4.50)	1.85 (0.81, 4.22)	1.38 (0.52, 3.64)
> 10 years vs. 2 years	3.44 (1.96, 6.03) **	2.55 (0.97, 6.69)	3.10 (1.84, 5.23) **	1.84 (0.67, 5.07)
Insufficient HIV^e knowledge				
	1.31 (0.79, 2.17)	1.27 (0.65, 2.47)	---	---
Had (some extent) risk perception (vs. not at all)				
	2.37 (1.10, 5.07) *	0.96 (0.43, 2.11)	2.25 (1.09, 4.66) *	0.79 (0.42, 1.5)
<i>Model 2: Interpersonal covariates</i>				
Had forced sex				
Before past year vs. Never	0.72 (0.37, 1.40)	1.28 (0.78, 2.09)	0.59 (0.30, 1.16)	0.90 (0.52, 1.57)
Past year vs. Never	1.80 (1.04, 3.14) *	2.57 (1.5, 4.41) *	1.75 (0.87, 3.51)	2.06 (1.24, 3.41) **
Last-month number of Paying clients				
Only 1 vs. None	0.86 (0.24, 3.03)	0.54 (0.22, 1.35)	---	---
2–5 vs. None	1.19 (0.43, 3.32)	0.88 (0.29, 2.66)	---	---
> 5 vs. None	0.90 (0.30, 2.73)	0.58 (0.16, 2.12)	---	---
Last month number of Non-paying partners				
Only 1 vs. None	1.27 (0.81, 2.00)	1.45 (0.85, 2.47)	---	---
> 1 vs. None	1.94 (0.79, 4.78)	1.68 (0.71, 3.97)	---	---
Concurrent multi-person sex				
Before past year vs. None	1.41 (0.53, 3.77)	1.56 (0.54, 4.49)	---	---

Variables	Models 1 to 3 ^a		Final Model ^{a,e}	
	One drug ^b AOR	Poly-drug ^b AOR	One drug ^b AOR	Poly-drug ^b AOR
	(95% CI) ^c	(95% CI) ^c	(95% CI) ^c	(95% CI) ^c
Past year vs. None	0.55 (0.25, 1.20)	1.72 (0.68, 4.37)	---	---
<i>Model 3: Environmental and structural factors</i>				
Unstable housing	1.88 (0.88, 4.04)	3.75 (1.52, 9.28)**	1.65 (0.72, 3.78)	3.4 (1.06, 10.95)*
Incarceration				
Before past year vs. None	2.39 (1.40, 4.09)**	3.29 (1.80, 6.02)**	2.53 (1.36, 4.70)*	2.59 (1.43, 4.67)**
Past year vs. None	1.43 (0.75, 2.72)	3.54 (1.81, 6.90)**	1.10 (0.57, 2.12)	2.82 (1.60, 4.97)**

^aEducational attainment and marital status adjusted for in all regression models

^bReference category: No drug use

^cAdjusted odds ratio (AOR) with 95% confidence intervals from multivariable logistic regression models;

^eonly covariates with P-value < 0.10 from Model 1–3 were included in the final regression model.

* P-value < 0.05

** P-value < 0.01

Table 4

Multivariable logistic regression analyses to identify correlates of *any drug use* in female sex workers, Iran, 2015

Variables	Models 1 to 3 ^a	Final Model ^{a,c} (N=1265)
<i>Model 1: Individual covariates</i>		
	AOR (95% CI) ^b	AOR (95% CI) ^b
Sex work duration		
3–5 years vs. 2 years	1.85 (1.08, 3.17) [*]	1.87 (1.00, 3.52)[†]
6–10 years vs. 2 years	1.86 (0.94, 3.71)	1.96 (0.95, 4.02)
> 10 years vs. 2 years	2.93 (1.56, 5.50) ^{**}	2.44 (1.28, 4.63)^{**}
Insufficient HIV knowledge^e		
	1.29 (0.77, 2.16)	---
Had (some extent) Risk perception		
	1.35 (0.67, 2.71)	---
(vs. Not at all)		
<i>Model 2: Interpersonal covariates</i>		
Had forced sex		
Before past year vs. Never	0.99 (0.63, 1.56)	0.67 (0.46, 0.96)[*]
Past year vs. Never	2.18 (1.45, 3.28) ^{**}	1.61 (1.15, 2.27)^{**}
Last-month number of paying clients		
Only 1 vs. None	0.67 (0.25, 1.78)	---
2-5 vs. None	1.01 (0.36, 2.81)	---
>5 vs. None	0.70 (0.21, 2.31)	---
Last-month number of non-paying partners		
Only 1 vs. None	1.37 (1.00, 1.90) [†]	1.53 (1.00, 2.34)[*]
>1 vs. None	1.80 (0.87, 3.72)	1.88 (0.90, 3.93)
Concurrent multi-person sex		
Before past year vs. Never	1.49 (0.63, 3.54)	---
Past year vs. Never	1.13 (0.52, 2.47)	---
<i>Model 3: Environmental and structural factors</i>		
Unstable housing		
	2.82 (1.31, 6.10) [*]	2.56 (1.17, 5.64)[*]
Incarceration		
Before past year vs. Never	2.82 (1.73, 4.58) ^{**}	2.74 (1.66, 4.52)^{**}

Variables	Models 1 to 3 ^a	Final Model ^{a,c} (N=1265)
Past year vs. Never	2.44 (1.42, 4.2) **	2.02 (1.23, 3.32) **

^aEducational attainment and marital status adjusted for in all regression models

^bAdjusted odds ratio (AOR) with 95% confidence intervals from multivariable logistic regression models

^conly covariates with P-value < 0.10 from Model 1–3 were included in the final regression model

[†]P-value = 0.05

* P-value < 0.05

** P-value < 0.01