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Injecting drug use & HIV prevalence among female sex workers: Evidence from the National Integrated Biological & Behavioural Surveillance, India

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***Background & objectives*: Female sex workers (FSWs) who inject drugs (FSW-IDs) have a higher risk of HIV infection and transmission. Understanding the socio-demographic characteristics and other risk behaviours among FSW-IDs will help in strengthening targeted interventions for HIV prevention and management. In the present study, the HIV prevalence, associated socio-demographic characteristics and risk behaviours among FSWs who injected drugs (FSW-IDs) and those who did not ID (FSW-NIDs) was determined in India.**

***Methods*: The national cross-sectional, community-based, integrated biological and behavioural surveillance was conducted in 2014-2015 at 73 randomly selected FSW domains across 28 States and Union Territories in India. The sample size was fixed at 400 for each domain, and a probability-based sampling method was followed. The data were analyzed by logistic regression methods.**

***Results*: Data from 27,007 FSWs were included in the analysis, of which 802 (3%) were FSW-IDs. HIV prevalence among FSW-IDs was significantly higher than that in FSW-NIDs (4.5 *vs*. 1.9%). Univariate analysis showed that factors significantly associated with higher HIV prevalence among FSW-IDs were older age, sex work as the only source of income, dissolved marriage, living with a sex worker, urban locality of sex work and consumption of alcohol or oral drugs. In multivariable analysis, factors such as older age of FSW-IDs (35 yr and above), having a dissolved marriage and sex work being the only source of income were observed to be independently and significantly associated with higher HIV prevalence.**

***Interpretation & conclusions*: Scaling up the HIV preventive interventions for FSW-IDs, such as facilitating awareness and improved access to needle and syringe exchange programme (NSEP) and opioid substitution therapy (OST), encouraging safe sex and injecting practices, educating on the harmful effects of alcohol and drugs and providing alternative vocation options to secure their financial needs are several strategies that may reduce HIV transmission among FSWs.**

Key words Female sex worker - HIV prevalence - India - injecting drug user - risk behaviours

HIV epidemic is highly heterogeneous across the States and districts of India and is more concentrated in the high-risk groups (HRGs) that include female sex workers (FSWs), men who have sex with men (MSM), injecting drug users (IDUs) and transgenders (TGs). The population living with HIV/AIDS in India was estimated to be 2.3 million in 2019, of which 44 per cent were females[1]. The highly vulnerable HRG population can potentially transmit the disease to the general population, as the heterosexual route is the major mode of HIV transmission in India[2]. While the adult HIV prevalence was estimated to be 0.22 per cent among HRGs in 2017, IDU had the highest HIV prevalence of 6.26 per cent, followed by TG (3.14%), MSM (2.69%) and FSW (1.56%). HIV epidemic in India is concentrated with substantially higher HIV prevalence in HRGs than in the general population (GP)[3]. Hence, limiting the disease spread among the HRGs and bridging populations was perceived to be the most effective method to prevent HIV transmission to the general population[2].

Initially, HIV preventive interventions were focused on FSWs and TGs and were later gradually extended to MSM and IDUs, as a surge in HIV prevalence in these populations was identified. However, the initial programmes focused on creating awareness on HIV and promoting condom usage. The introduction of 'Test and Treat' policy in 2017 significantly revamped the strategies for targeted interventions (TIs) among HRG[4,5]. Consequently, the estimated HIV incidence per every 1000 uninfected population declined from 0.64 in 1995 to 0.05 in 2019[1]. However, from 2010 to 2019, the decline in the incidence rate slowed down, as new infections declined only to about 37 per cent since 2010[1]. Hitherto, the incidence rate continues to be much higher among the HRGs as compared to the general population, and zero transmission is still unachievable. Hence, there is a need for disaggregated analysis to facilitate decentralized, group-specific interventions[1]. Demographic and socio-culturally relevant risk factors for HIV infection among the HRGs and the risk structure of transmission need to be explored with a view to design group-specific interventional strategies[6]. Globally, studies suggest that a considerable proportion of FSWs are IDUs or vice versa, thus increasing their risk of HIV acquisition through yet another route of transmission. These studies have reported the risk factors associated with HIV transmission among those females who are both sex workers as well as IDUs[7-11]. While it is evident that injecting drug usage is a risk factor for HIV infection, the IDU interventions in India focus primarily on male IDUs, and females are often ignored owing to their smaller numbers. Nonetheless, limited studies on female IDUs have been reported in the northeastern regions of India, and these cannot be considered representative of the entire nation[7,12,13].

Hence, in this study, the data from the National Integrated Bio-Behavioural Surveillance (IBBS)[14] was analyzed to determine the HIV prevalence among FSW-IDs and FSW-NIDs in India. In addition, we have analyzed the association between various socio-demographic features and risk behaviour among FSW-IDs and FSW-NIDs were also analysed in the context of HIV prevalence.

Material & Methods

Surveillance design and methodology: The IBBS[14] conducted in 2014-2015 in India was the first nationwide, large-scale, community-based, bio-behavioural surveillance among HRGs and bridge populations. Apart from estimating the HIV prevalence, the focus was also on collecting behavioural data among HRGs and bridge populations, which could be of programmatic importance.

The IBBS study was approved by the Ethics Committee of the NACO before the survey was undertaken. The IBBS survey was done after obtaining written informed consent from all the respondents. The voluntary nature of their participation was stressed upon giving clear information regarding the risks and benefits of their participation.

The data collected during the IBBS of FSW as part of IBBS 2014-2015 were used for this study. Self-identified FSWs aged 15 yr or more, who were engaged in consensual sex in exchange for cash/payment-in-kind in the previous month, were included in the survey. The study was carried out from October 2014 to November 2015 in 73 FSW domains (clusters) in India, with each sampled domain requiring three months to complete the study. The sampling domains selected to generate the bio-behavioural estimates were contiguous administrative geographical units spread over one or two districts. The domains covered in the study were randomly selected, from a total of 515 FSW domains prioritized for the targeted interventional programmes for FSWs by the National AIDS Control Organization (NACO) based on the reported size of the FSWs in all the domains.

The probability-based sampling method with a cluster sampling approach was adopted. A conventional

cluster sampling approach was used for brothels or home-based FSWs, whereas a time location cluster sampling approach was used for mobile or dynamic street-based FSWs. The target sample size per domain was fixed at 400[14]. The targeted sample size could not be achieved in certain domains because of the non-availability of FSWs or a higher refusal rate than expected due to stigma or reluctance to identify themselves as FSWs. In all, 27,007 FSWs were enrolled from 73 sampling domains, covering 108 districts in 28 Indian States and Union Territories (UTs) of India.

The consented participants were interviewed with a questionnaire using a computer-assisted personal interview approach. The dry blood spot method was used to collect blood samples from the respondents, which were then tested for HIV in designated laboratories using the standard two-test protocol[14]. The first test was of high sensitivity using the MicroELISA HIV kit, and if the first test was positive, then the second test of high specificity was done using the SD Bioline HIV 1/2 3.0 kit. The detailed methodology, field monitoring and supportive supervision mechanism during data collection, ethical considerations including the informed consent process, weighing procedure and laboratory testing methods are available elsewhere[14].

Measures:

Exposure: Injecting drug use - female sex workers who inject and did not inject drugs (FSW-IDs and FSW-NIDs): To identify the FSW-IDs, those who had answered yes to the question 'Have you ever injected drugs for non-medical reasons in the last 12 months?' were grouped as FSW-IDs and the rest were grouped as FSW-NIDs.

Outcome: HIV prevalence: Based on the results of the HIV tests, the HIV prevalence of the FSW in both groups was calculated as the percentage of those who tested positive for HIV infection out of the total FSW-IDs and FSW-NIDs.

Other covariates: Socio-demographic characteristics: Data on current age (in completed years), education status, marital status (*e.g*., single, unmarried, married, separated and divorced), co-partner (alone or living with family or spouse, sex worker, male partner, female friends and others), age of first sexual intercourse, duration of sex work and locality of sex work were considered.

Behavioural and psychosocial risks: These included type of sexual partners, frequency of condom usage and consumption of alcohol/oral drugs, alcohol consumption before or during sex, presence of sexually transmitted infection (STI) symptoms and having heard the term HIV. The respondents were asked about the type of their sexual partners (regular clients, occasional clients, regular non-paying partners and casual partners) and the consistency of condom usage with each of their partner types. Inconsistent condom usage was assessed by asking how often (every time, most of the time, sometimes and never) the respondent had used condoms during intercourse in the last month with each partner type. Those who answered most of the time or sometimes or never were coded as inconsistently using condoms. The respondents were asked whether they consumed alcohol and, if yes, whether they had consumed alcohol before or during sex. They were also asked whether they had consumed oral drugs in the last 12 months. The respondents were asked if they had any of the following symptoms suggestive of an STI: lower abdominal pain, foul-smelling vaginal discharge, burning pain during urination, genital ulcer/sore, swelling in the groin area and itching in the genital area. Those who had reported as having at least one of the symptoms were coded as having STI symptoms. Violence victimization was assessed by asking if the respondents had experienced physical and sexual violence at least once in the last 12 months. The respondents were also asked if they had ever heard the term 'HIV' to assess HIV awareness.

Data analysis: The unweighed proportions and HIV prevalence for the actual FSW sample size have been presented according to their status of injecting drug use. The socio-demographic and behavioural factors associated with the risk of HIV infection between the two groups of FSWs were analyzed by the Chi-square test and compared using risk ratios with 95% confidence intervals. Independent factors significantly associated with the HIV risk among the FSW-IDs were determined by logistic regression. All associated factors that were marginally significant at 5 per cent in the unadjusted logistic regression were selected for multivariable analysis. Factors with a $P<0.05$ were considered significant. IBM SPSS version 26.0 (IBM Corp., Armonk, NY, USA)[15] was used for all analyses.

Participants' time spent during the survey was compensated. Furthermore, all possible efforts were made to link the FSWs surveyed to Integrated Counselling and Testing Centres (ICTCs) to get their HIV status investigated, by providing them with

referral cards. Similarly, any non-registered FSWs were referred to the nearest NGO (non-government organization) and were encouraged to utilize HIV prevention and control services.

Results

Of the 27,007 FSWs who participated in IBBS 2014-2015, 802 (3%) were FSW-IDs, and the rest were FSW-NIDs. The age of the FSW-IDs ranged from 16 to 59 yr with a median age of 29 yr, and that of FSW-NIDs ranged from 15 to 70 yr with a median age of 30 yr. The proportion and HIV prevalence for each subgroup based on their socio-demographic and behavioural profiles are presented in Table I.

Although the distribution of FSW-IDs and FSW-NIDs was comparable for various socio-demographic characteristics, the proportion of FSW-IDs practising risk behaviours was higher than that of FSW-NIDs. HIV prevalence was significantly (P<0.001) higher among the FSW-IDs (4.5%) than that among the FSW-NIDs (1.9%), suggestive of a stronger association between injecting drug use behaviour and HIV infection in the case of FSWs. It was observed that HIV prevalence was significantly higher among the FSW-IDs aged ≥35 yr, FSW who had sex work alone as the primary source of income or who were working in bars, beauty or massage parlours, FSW in sex work for more than a year and FSW practising sex work in urban areas. HIV prevalence was also found to be significantly higher among FSW-IDs who reported inconsistent condom usage with their sexual partners. Similarly, HIV prevalence was significantly higher among FSW-IDs who experienced physical violence and who consumed alcohol and oral drugs in comparison with FSW-NIDs. The results indicated that injecting drug use was significantly associated with high HIV prevalence among the FSWs (Figure).

The factors associated with a higher risk of HIV infection within the FSW-IDs analyzed using the logistic regression method using bivariate, and multivariable analyses are presented in Table II. Bivariate analysis showed that the independent variables significantly associated with a higher risk of HIV infection among the FSW-IDs were age, source of income, marital status, type of partners/members the FSW was living with, locality of sex work and consumption of alcohol and oral drugs. Multivariable analysis demonstrated that HIV prevalence was higher among FSW-IDs who were aged 35 and above [adjusted odds ratio (aOR): 6.22, confidence interval (CI): 2.06-18.78], those who relied upon sex work alone for a source of income (aOR: 2.71, CI: 0.92-7.94) and those who had dissolved marriage (aOR: 6.79, CI: 2.48 - 18.55) as compared to FSW-IDs who were younger than 24 yr, had sources of income other than sex work and who were married.

Discussion

FSWs have been reported to play a major role in HIV transmission to the general population through their clients (bridge population)[2]. The practice of female sex work is diverse and is traditionally followed among a few communities in various regions in India, such as north Karnataka and Rajasthan[16]. Various preventive interventions undertaken by the NACO and other organisations at the State and district levels have significantly contributed to the slowing down of HIV transmission. This is evident from the decline in adult HIV prevalence over the years in India[1]. The preventive measures among FSWs have predominantly focused on creating general awareness of HIV testing and management and encouraging condom usage. Studies show that FSWs, however, often indulge in injecting drug use due to the socio-environmental factors associated with their living or work conditions and peer practices, which increases the risk of HIV acquisition among the FSWs[7]. Various studies on FSWs conducted globally have indicated injecting drug use to be a significant risk factor for HIV infection[7-11]. While the IDU interventions in India predominantly focus on male IDUs, the FSW interventions have not adequately covered preventive measures for injecting practice-associated HIV acquisition risk. Identifying and addressing such lacunae in the current FSW interventions is essential for halting HIV transmission among FSWs.

The present study highlights the need for integrated interventions addressing risky behaviours associated with sexual as well as injecting drug use-related HIV transmission among FSWs. The prevalence of HIV among female IDUs and the factors associated with high HIV prevalence in FSWs were analyzed with dual risk behaviours in this study. The results suggest that prevention strategies for FSWs must include scrutiny to assess injecting drug practice and implementation of specially designed intervention programmes for older and unmarried FSWs who continue to practice sex work for day-to-day existence.

Theories such as life course and syndemic theory have been used to explain the higher risk of infection among HRG[17,18]. Life course theory suggests that

Table I. Comparison of HIV prevalence by socio-demographic and sexual behaviours among injecting and non-injecting female sex workers in India

Variables	FSW-ID (n=802)			FSW-NID (n=26,205)			Risk raito[#]
	n	%	HIV	n	%	HIV	
Age group (yr)							
≤24	196	24.4	3.1	5077	19.4	1.4	2.22 (0.98-5.05)
25-34	407	50.7	2.9	13,203	50.4	1.9	1.59 (0.90-2.81)
≥35	199	24.8	9.0	7925	30.2	2.4	3.77 (2.38-5.99)***
Education							
Literate (can read and write)	559	70.1	4.1	17,357	66.3	1.5	2.67 (1.76-4.06)***
Illiterate	239	29.9	5.4	8820	33.7	2.7	2.02 (1.17-3.47)*
Source of income							
Sex work alone	377	47.0	6.1	10,726	41	1.8	3.48 (2.29-5.30)***
Bar girl, beauty/massage parlour	155	19.3	5.2	5207	19.9	2.1	2.47 (1.23-4.97)*
Other than sex work[@]	269	33.5	1.9	10,252	39.2	2.0	0.92 (0.38-2.21)
Marital status							
Married	411	51.3	1.5	16,698	63.8	1.5	1.00 (0.45-2.22)
Unmarried	223	27.8	4.0	4439	16.9	2.0	1.97 (1.05-3.74)*
Separated/widowed/divorced	167	20.8	12.6	5054	19.3	3.4	3.73 (2.41-5.75)***
Currently living							
Alone	120	15	3.3	3626	13.8	2.8	1.19 (0.45-3.18)
With family/spouse	571	71.4	4.0	20,198	77.1	1.6	2.51 (1.68-3.76)***
With sex worker	54	6.8	13.0	602	2.3	3.5	3.34 (1.66-6.71)***
With another male partner	19	2.4	0.0	720	2.7	3.2	-
With other female friends	34	4.3	5.9	584	2.2	2.7	2.08 (0.54-8.03)
With others	2	0.3	0.0	462	1.8	5.6	-
Age of first sexual intercourse							
≤17 yr	321	40	5.3	11,109	47.5	1.8	2.88 (1.78-4.67)***
≥18 yr	481	60	4.0	12,298	52.5	2.1	1.88 (1.19-2.96)*
Duration of sex work							
0-1 yr	54	6.7	3.7	1667	6.4	1.7	2.17 (0.55-8.49)
>1-10 yr	469	58.6	4.5	16,038	61.3	1.8	2.40 (1.57-3.67)***
>10 yr	278	34.7	4.7	8477	32.4	2.1	2.16 (1.26-3.71)**
Locality of place of sex work							
Rural	102	12.7	0.0	5297	20	1.9	-
Urban	414	51.6	8.0	11,778	45.2	2	3.80 (2.72-5.30)***
Both	286	35.7	1.0	9105	34.8	1.8	0.58 (0.19-1.80)
Experienced physical violence[¥]	342	42.6	4.7	6158	23.5	1.9	2.44 (1.47-4.07)***
Experienced sexual violence[∞]	424	52.9	2.6	4423	17.0	1.9	1.33 (0.72-2.48)
Had occasional clients	691	86.3	4.8	19,684	75.2	2	2.32 (1.66-3.25)***
Inconsistent condom use[^]	300	43.4	4.3	5975	30.4	2.3	1.84 (1.08-3.13)*
Had regular clients	716	89.3	4.7	21,249	81.1	1.9	2.48 (1.78-3.46)***
Inconsistent condom use	340	47.5	4.1	7563	35.6	2	2.01 (1.20-3.35)*

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Variables	FSW-ID (n=802)			FSW-NID (n=26,205)			Risk raito[#]
	n	%	HIV	n	%	HIV	
Had regular non-paying partner	556	69.4	3.4	15,979	61	1.7	1.99 (1.28-3.11)**
Inconsistent condom use^	358	64.4	3.6	10,906	68.3	1.8	2.03 (1.18-3.46)*
Had casual partner	392	48.9	1.8	5060	19.3	2	0.91 (0.44-1.89)
Inconsistent condom use^	215	54.8	2.3	2596	51.3	2.5	0.92 (0.39-2.17)
Consumed alcohol[$]	543	67.7	5.9	8158	31.1	2.6	2.24 (1.56-3.21)***
Consumed alcohol before sex	419	77.3	5.7	5420	66.4	2.6	2.12 (1.44-3.10)***
Consumed oral drugs (*ganja*/heroine)[$]	386	48.1	7.0	949	3.6	1.8	3.90 (2.15-7.08)***
STI symptoms (at least one)	558	69.6	4.5	13,099	50	1.9	2.24 (1.53-3.30)***
Heard HIV/AIDS	726	90.5	4.5	22,848	93.3	1.9	2.31 (1.65-3.23)***
HIV prevalence	36	4.5	4.5	505	1.9	1.9	2.29 (1.66-3.18)***

Totals may not match due to non-response/don't know; [#]Reference category non-injecting FSW's; [@]Labours, business, service (Pvt./ Govt.), hotel staff, *etc*.; [$]Consumed in the last 12 months; [¥]Physical violence: physically beaten by someone (hurt, hit, slapped, pushed, kicked, punched, burned and but not using weapon) at least once in the last 12 months; [∝]Sexual violence: Forced by someone in the last 12 months to have sexual intercourse; ^Not use of a condom at each sex act; *P* *<0.05; **<0.005; ***<0.001. STI, sexually transmitted infection; FSWs, female sex workers; FSW-ID, FSWs who inject drug; FSW-NID, FSWs who did not inject drug

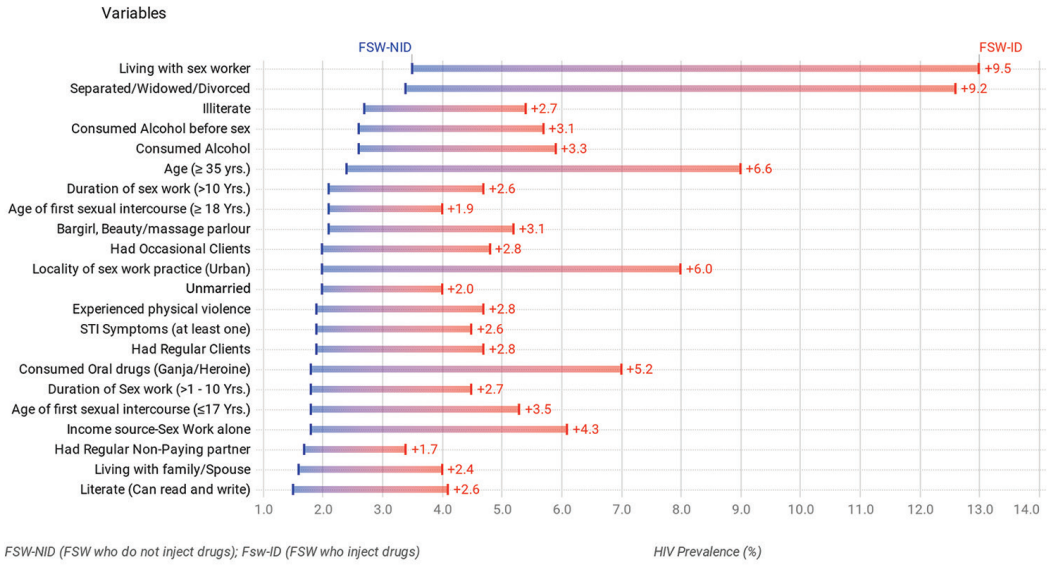

Figure. HIV prevalence (%) and its difference among female sex workers who inject drug and female sex workers who do not inject drug: IBBS2014-2015.

circumstances such as age at first commercial sex activity, duration of sexual activity, current age, education and violence victimization have an impact on condom usage and associated infection risks[17]. In our study, specific life course conditions such as age at first sex and duration of sex work were associated with higher HIV prevalence among FSW-IDs. A study conducted among FSWs in Kolkata, India, proposed an integrated theoretical model of life course vulnerabilities, economic insecurity, risk perceptions and empowerment attitudes that influence consistent condom usage among FSWs in India. It has been reported that Information Education Communication (IEC) activities for HIV prevention and increased condom usage were observed to be beneficial only among FSWs who were financially secure[14]; however, the majority of the vulnerable FSWs are financially dependent on sex work alone.

Older age is often associated with higher HIV infection risk among FSWs because of the higher chances of exposure risk as a result of the longer

Table II. Factors associated with HIV infection among female sex workers who inject drug by logistic regression analysis: Integrated Biological and Behavioural Surveillance, 2014-2015

Variables	HIV prevalence (%)	OR (95% CI)	aOR (95% CI)
Age group (yr)			
≤24	3.1	1	1
25-34	2.9	0.96 (0.36-2.60)	1.15 (0.40-3.32)
≥35	9.0	3.15 (1.22-8.11)*	6.22 (2.06-18.78)***
Education			
Literate	4.1	1	
Illiterate	5.4	1.34 (0.67-2.69)	
Source of income			
Sex work alone	6.1	3.43 (1.29-9.14)*	2.71 (0.92-7.94)*
Bar girl, beauty/massage parlour	5.2	2.87 (0.92-8.94)	2.33 (0.68-7.99)
Other than sex work	1.9	1	1
Marital status			
Married	1.5	1	1
Unmarried	4.0	2.84 (1.00-8.08)*	2.37 (0.69-8.13)
Separated/widowed/divorced	12.6	9.71 (3.84-25.53)***	6.79 (2.48-18.55)***
Currently living			
Alone	3.3	1	
With family/spouse	4.0	1.22 (0.41-3.59)	
With sex worker	13	4.32 (1.21-15.45)*	
With another male partner	0.0	-	
With other female friends	5.9	1.81 (0.32-10.35)	
With others	0.0	-	
Age of first sexual intercourse (yr)			
≤17	5.3	1.36 (0.70-2.66)	
≥18	4.0	1	
Duration of sex work (yr)			
0-1	3.7	1	
>1-10	4.5	1.22 (0.27-5.35)	
>10	4.7	1.28 (0.28-5.82)	
Locality of place of sex work			
Rural	0	-	
Urban	8.0	8.17 (2.48-26.91)**	
Both	1.0	1	
Experienced physical violence			
Yes	4.7	1.08 (0.55-2.12)	
No	4.3	1	
Experienced sexual violence			
Yes	2.6	0.38 (0.18-0.78)*	0.77 (0.33-1.82)
No	6.6	1	
Had occasional clients			

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Variables	HIV prevalence (%)	OR (95% CI)	aOR (95% CI)
Yes	4.8	1.79 (0.54-5.94)	
No	2.7	1	
Had regular clients			
Yes	4.7	2.09 (0.49-8.87)	
No	2.3	1	
Had regular non-paying partner			
Yes	3.4	0.48 (0.24-0.93)*	0.75 (0.33-1.69)
No	6.9	1	1
Had casual partner			
Yes	1.8	0.24 (0.10-0.55)**	0.28 (0.10-0.75)*
No	7.1	1	1
Consumed alcohol (in the last 12 months)			
Yes	5.9	3.99 (1.40-11.41)*	2.66 (0.83-8.58)
No	1.5	1	1
Consumed alcohol before sex			
Yes	5.7	0.87 (0.38-1.99)	
No	6.5	1	
Consumed oral drug (ganja/heroine)			
Yes	7	3.40 (1.58-7.33)**	2.25 (0.93-5.44)
No	2.2	1	1
STI symptoms (at least one)			
Yes	4.5	0.99 (0.48-2.05)	
No	4.5	1	
Heard HIV/AIDS			
Yes	4.5	1	
No	3.9	0.86 (0.26-2.88)	

*P<0.05; **P<0.005; ***P<0.001. OR, odds ratio; CI, confidence interval; aOR, adjusted OR; STI, sexually transmitted infection

duration of their commercial sexual activity in most cases[19]. However, in the present study, it was observed that HIV prevalence was three times higher among older FSW-IDs than among older FSW-NIDs. The financial instability due to older age with potentially lesser clients[20], reliance on sex work alone for their source of income or being divorced or being alone or widowed[21] thus may impede their ability to negotiate condom usage with their clients. Such associated risks along with injection practices make older FSW-IDs more vulnerable to the risk of HIV acquisition.

The syndemic theory suggests that certain psychosocial behaviours and conditions such as depression, drug use and violence victimization are mutually reinforced, leading to a synergistic amplification effect on concentrated HIV prevalence among HRGs. A recent study of the syndemic model on MSM suggests that substance use and violence victimization interacted synergistically and had significantly higher odds of HIV transmission risk behaviour (inconsistent condom usage)[17]. In the present study, although FSW-IDs and FSW-NIDs did not differ by most of the demographic characteristics (age, education, source of income, marital status or locality), there was a significant difference in their sexual and social behaviours (Table I). For instance, the proportion of those who had casual clients was much higher among FSW-IDs than FSW-NIDs. The proportion exhibiting inconsistent condom usage among their clients was considerably higher among FSW-IDs. In addition, the proportion of those consuming alcohol, oral drugs or having at least one STI symptom was higher among the FSW-IDs (Table I). Apart from drug abuse, violence victimization and lack of social support have been reported to be associated with inconsistent condom usage, leading to higher HIV prevalence[22,23].

The proportion of FSW-IDs who experienced either physical or sexual violence was much higher even in our study (Table I).

Notably, social behaviour can also be influenced by other factors such as environmental conditions. For instance, the HIV prevalence was significantly higher among FSW-IDs who were co-living with sex workers or spouse or family and those practicing sex work in urban areas than FSW-NIDs under similar living conditions (Table I). Co-living with other sex workers may increase the odds of unsafe injection practices through peer pressure. Similarly, spousal pressure or depression due to domestic violence can influence drug usage, which, inturn, may increase the infection risk as conceptualized by the chain of risk model[10,17,24].

The needle syringe exchange programme (NSEP) is an IDU intervention that offers sterile injecting kits in exchange for used needles and syringes. However, IDUs sought non-NSEP sources to buy injection kits due to deficit supply at NSEP centres or environmental and social factors that hamper the utilization of NSEP. These centres are functional only in domains with high IDU population and FSW-IDs from other areas may not be aware of NSEP or might not have access to them[25,26]. Owing to inaccessibility to sterile injections or financial constraints, FSWs often share needles or reuse the old needles/syringes. Some female IDUs have also been reported to be looking for used injections in hospital bins[13]. IDUs in the northeast reveal their HIV status and follow strategies such as serosorting and being the last receiver to prevent transmission risks to other FSWs who are HIV negative. A HIV-positive FSW is usually the last one to use the shared needle. Although effective to a certain extent, this puts HIV-infected FSW at risk of acquiring other infections such as HBV, HCV and other HIV infection due to other subtypes[21]. Studies reveal the origin of flash blood concept among FSWs in Tanzania, wherein a portion of the blood from an IDU who had just injected the drug is drawn and shared by the rest instead of the drug[27]. This is done to compensate for the unaffordability of the drugs; however, no studies are available to know the prevalence of such practices in India.

The results indicate a higher prevalence of HIV among FSW-IDs who were older, divorced, separated or widowed or were dependent on sex work for their source of income. Measures to incorporate integrated interventions with a special focus on facilitating awareness and improved access to NSEP and opioid substitution therapy (OST), encouraging safe sex and injecting practices, educating on the adverse effects of alcohol and drugs and securing the financial needs of the FSWs, are recommended for immediate consideration. Interventions for FSWs should attempt their rehabilitation by providing alternative means of survival, ensuring improved linkage to HIV prevention programmes and better adherence to anti-retroviral therapy to reduce the possibility of HIV transmission.

The National IBBS conducted in 2014-2015 is the latest, large-scale, bio-behavioural data on key populations, and its analysis can induce direct strategic planning for appropriate interventions for FSWs. It would, however, be critically important to generate the same periodically. Our study is, however, not without certain limitations. For lack of specific data and tools in the data management programme on the migration of FSWs and their potential duplication across the domains could not be studied. Data on ART knowledge, ART uptake and behavioural aspects/HIV status of the clients of FSWs were not analyzed as this information was not collected during the survey. Furthermore, no attempt was made to analyse the data to explore geo-cultural variations in HIV prevalence in the key sub-population of FSWs in this study.

Overall, awareness of injection risks and IEC activities on the adverse effects of injecting drugs and other sedative substances such as alcohol and oral drugs might result in behavioural changes among FSWs. Periodic HIV testing coupled with interventions for safe injection strategies are needed to achieve the sustainable development goal (SDG) 'To End HIV by 2030'.

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