

# Determinants of HIV positivity among injecting drug users in Delhi and Punjab

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## Abstract

**Context:** In India, the HIV positivity among injecting drug users (IDUs) stands at a staggering 7.71%. Among the states, HIV positivity among IDUs is highest in Punjab and Delhi, 21.2% and 18.3%, respectively. Interestingly, these two states are near to the “Golden Crescent.” **Aims:** The aim of this study was to examine the similarities and differences between the IDUs in Punjab and Delhi, in the context of vulnerability to HIV. **Settings and Design:** This study uses data from the HIV Sentinel Surveillance-2010–2011 (HSS). The HSS is a cross-sectional data collection process for HIV surveillance in India. HSS, apart from collecting the blood samples from the respondents, also collects basic sociodemographic as well as some information on the drug use patterns of the IDUs. **Data and Methods:** The raw data from HSS 2010–2011 were used for this study. Bivariate and multivariate analyses performed to obtain the results. **Results:** Descriptive analyses revealed that the IDUs of Punjab and Delhi are very different from each other. In Delhi, 62.4% of IDUs inject drugs for more than 5 years; whereas in Punjab, it was only 32.4%. Majority of the Delhi IDUs (86.5%) inject more than three times a week whereas the corresponding percentage in Punjab was only 29.5%. The profiles of the HIV positives also differ between these two states. **Conclusions:** It would be prudent to adopt state-specific strategies to prevent the spread of HIV among the IDUs.

**Key words:** Delhi, HIV positivity, HIV Sentinel Surveillance, India, injecting drug user, Punjab

## INTRODUCTION

Globally, around 35 million peoples are living with HIV. Almost half of them do not know their HIV status. India contributes to 6% of global HIV burden. The number of new infections in 2001 was 3.4 million across the globe, which declined by 38% to 2.1 million in 2013. After Sub-Saharan Africa, Asia, and the Pacific region houses, the largest number of HIV-infected population, 4.8 million (2013); 43% of them lives in India.<sup>[1]</sup>

In India, number of new infection is declined from 2.74 lakhs in 2000 to 86 thousand in 2015. However, India still houses a total of 21.17 lakh people living with HIV (PLHIV) which is the third largest PLHIV population in the world. The overall reduction in HIV/AIDS load in India is due to declining to stable trends of HIV infections in few high prevalent states of India. However, increasing trends in HIV infection were found in low prevalence states such as Delhi and Punjab,

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one of the main reasons being use of injecting drugs.<sup>[2,3]</sup>

Injecting drug use is contributing 10% of HIV transmission globally and 30% outside Sub-Saharan Africa.<sup>[4]</sup> In Asia, the majority of HIV infections in female occur as the consequences of long-term sexual partner of injecting drug users (IDUs) or other high-risk behavior individuals.<sup>[1]</sup>

There are globally 16 million people injecting drugs, and among them, around 3 million are living with HIV/AIDS.<sup>[5]</sup> In India, estimated numbers of male IDUs were 96,463–189,729 and female IDUs were 10,055–33,392. In India, 0.05% of male aged 15–49 years are injecting drugs for nonmedical purpose.<sup>[6]</sup> In India, previously IDUs were the major driver of HIV in North-Eastern states, but now it is found in other part of India, such as Delhi, Punjab, and Maharashtra. Transmission of HIV from IDUs has dual burden and more rapid since the infection spread from IDU to their sex partners.<sup>[7,8]</sup> It is documented that 60% of IDUs were infected with HIV within their first 2 years of injecting.<sup>[9]</sup> In India, main mode of HIV transmission is sexual route, but currently intravenous drug use is emerging as an important mode of HIV transmission in several parts of the country.<sup>[10]</sup>

In India, the HIV positivity among the IDUs stands at a staggering 7.71%, which is the second highest among the high-risk groups (HRGs). Among the states, the positivity among the IDU group is highest in Punjab and Delhi, 21.2% and 18.3%, respectively.<sup>[11]</sup> Interestingly these two states, not adjacent, are close to the “Golden Crescent.” The HIV positivity among IDUs in both the states was much higher than in the other groups considered under the HSS.<sup>[11]</sup>

Punjab is one of the fast developing economies with the base of agriculture and allied sectors.<sup>[12]</sup> Geographically, Punjab is bounded on the west by Pakistan, north by Jammu and Kashmir, northeast by Himachal Pradesh, and on the south by Haryana and Rajasthan. The state has 553 km of international borders with Pakistan, comprising the districts of Gurdaspur, Amritsar, Tarn Taran, and Ferozepur. The border area of Punjab is highly affected with illegal migration, drug trafficking, illegal trade, etc. Most of the border villages of Gurdaspur, Amritsar, and Tarn Taran have migrated labor from Bihar and Uttar Pradesh for agricultural and other activities.<sup>[13,14]</sup> These migrations are seasonal to rural area whereas semipermanent and permanent to urban area.<sup>[14,15]</sup> Ludhiana is the first metropolitan and now largest city of Punjab and most in migrated

city of India after Surat.<sup>[16,17]</sup> Urban populations of Punjab increased to 37.48% in last decade and one in three are residing in urban area.<sup>[18]</sup>

Delhi is one of the key destination migrants place in India, mostly they are coming from the states such as Uttar Pradesh, Bihar, Rajasthan, and Uttaranchal. In terms of homeless migrants in Delhi, most of them are from Uttar Pradesh, Bihar, West Bengal, Rajasthan, and Madhya Pradesh. Mostly they are construction workers, rickshaw pullers, domestic helper, rag pickers, and other daily wage workers.<sup>[15,17]</sup> According to census 2001, Delhi is the city of in-migration mostly because of employment and urbanization.<sup>[19]</sup>

## DATA AND METHODS

The data used for this paper are from HIV Sentinel Surveillance (HSS) (2010–2011), a cross-sectional survey to assess the HIV positivity among the selected sentinel groups across the country. For the IDUs, a sample of 250 to be collected from each of the IDU sentinel sites during the period from January 2011 to March 2011.

### Ethical clearance

The Ethical Committee of National AIDS Control Organization has approved all the procedures of the HSS survey. Informed consent/assent was taken from the participants before recruitment.

### Inclusion criteria from injecting drug users

Men or women of the age group 15–49 years, who use addictive substances or drugs for recreational or nonmedical reasons, through injections, at least once in the last 3 months. Every person attending the clinic, visiting the Drop-in Center for the first time during the survey period and meeting the inclusion criteria was sampled until the required sample size was achieved.<sup>[20]</sup>

### Sampling

Consecutive sampling method was adopted in HSS at HRG sentinel sites. At each site, 5–10 IDUs were recruited per day after taking informed consent/assent, so that adequate time can be given to each individual and quality can be ensured at every step of recruiting the respondent for HSS.

In Delhi, data were collected from two IDU sites; North Delhi and South West Delhi, whereas in Punjab from six sites; Amritsar, Ludhiana, Moga, Mohali, Rupnagar, and Tarn Taran. Basic sociodemographic details, such as age, sex, marital status, educational status, and the basic information about the drug use

patterns, were collected from the IDUs selected for the survey. The blood is drawn for the HIV testing.<sup>[20]</sup>

### Testing strategy

Two test protocols were adopted in HSS. Blood spot collected through dried blood spot (DBS) method and the DBS specimens are sent to testing laboratories where serum is eluted from the DBS and used for testing. The eluted DBS sample first tested for HIV antibodies with one ELISA with high sensitivity. The samples found reactive on the first assay were retested with a second assay of high specificity and samples that are reactive in both the tests are interpreted as “antibody positive.”<sup>[20]</sup>

### Data analysis

Analysis was done, after cleaning, with the help of SPSS version 20 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY:IBM Corp) and Excel.

## RESULTS

### Sociodemographic characteristics

From the two sites in Delhi, a total of 498 samples were collected; North Delhi (249) and South West Delhi (249). From the six sites in Punjab, 1483 samples were collected; Amritsar (248), Ludhiana (244), Moga (247), Mohali (247), Rupnagar (250), and Tarn Taran (247).

All the respondents from Punjab were males, whereas in Delhi, there were nine female respondents out of the 498 IDUs selected for HSS. Mean age of IDUs in Delhi was 31.7 years (standard deviation [SD]: 8.4) and in Punjab was 28.9 years (SD: 6.2). Major share of the IDUs were from the age group 20–39 years (Delhi = 75.3% and Punjab = 89.6%). The percentage of IDUs in the age group 40–49 years in Delhi was 23.1%; in the case of Punjab, this percentage was only 8.1% [Table 1, Figures 1 and 2].

In both the states, more than 50% of the IDUs were unmarried; Delhi (62.7%) and Punjab (52.3%). The literacy status of both Delhi and Punjab is more than national average; however, among the IDU respondents, 73.3% of the Delhi IDUs and 45.7% of the Punjab IDUs were either illiterate or educated up to class 5.

In Punjab, around half of the IDUs (52.6%) were from urban area, whereas in Delhi, almost all of them were from urban area (99.8%). The major occupational group of IDUs in Delhi is “large businesses/self-employed” (36.7%) and that of Punjab is “nonagricultural laborers” (33.5%) [Table 2].

**Table 1: Profile of Intravenous Drug Users, Delhi and Punjab**

Characteristic	Delhi (%) n=498	Punjab (%) n=1483	Total (%) n=1981
Age group			
15-19	8 (1.6)	34 (2.3)	42 (2.1)
20-29	212 (42.6)	860 (58.0)	1072 (54.1)
30-39	163 (32.7)	469 (31.6)	632 (31.9)
40-49	115 (23.1)	120 (8.1)	235 (11.9)
Gender			
Male	489 (98.2)	1483 (100)	1972 (99.5)
Female	9 (1.8)		9 (0.5)
Marital Status			
Never married	312 (62.7)	776 (52.3)	1088 (54.9)
Married	149 (29.9)	626 (42.2)	775 (39.1)
Divorced/separated	37 (7.4)	81 (5.5)	118 (6.0)
Educational Status			
Illiterate	201 (40.4)	326 (22)	527 (26.6)
Literate and <=5	164 (32.9)	352 (23.7)	516 (26)
6-10	115 (23.1)	581 (39.2)	696 (35.1)
11 to Graduation	17 (3.4)	218 (14.7)	235 (11.9)
Post Graduate	1 (0.2)	6 (0.4)	7 (0.4)
Residence			
Urban	497 (99.8)	780 (52.6)	1277 (64.5)
Rural	1 (0.2)	703 (47.4)	704 (35.5)
Occupation			
Agricultural Labourer	1 (0.2)	33 (2.2)	34 (1.7)
Local transport worker	31 (6.2)	113 (7.6)	144 (7.3)
Hotel Staff	5 (1)	1 (0.1)	6 (0.3)
Agricultural cultivator/landholder	3 (0.6)	59 (4.0)	62 (3.1)
Unemployed	84 (16.9)	367 (24.7)	451 (22.8)
Non-Agricultural Labourer	64 (12.9)	497 (33.5)	561 (28.3)
Domestic Servant	2 (0.4)	7 (0.5)	9 (0.5)
Skilled/Semiskilled worker	42 (8.4)	45 (3.0)	87 (4.4)
Petty business/small shop	13 (2.6)	169 (11.4)	182 (9.2)
Large Business/Self employed	183 (36.7)	8 (0.5)	191 (9.6)
Service (Govt./Pvt.)	70 (14.1)	134 (9.0)	204 (10.3)
Student	-	7 (0.5)	7 (0.4)
Truck Driver/helper	-	43 (2.9)	43 (2.2)

**Table 2: Characteristics of respondent based on history of drug use, Delhi and Punjab**

Characteristic	Delhi (%) n=498	Punjab (%) n=1483	Total (%) n=1981
Duration of use			
<6months	14 (2.8)	1 (0.1)	15 (0.8)
6 months	29 (5.8)	68 (4.6)	97 (4.9)
1-3 years	86 (17.3)	457 (30.8)	543 (27.4)
3-5 years	58 (11.6)	477 (32.2)	535 (27)
>5 years	311 (62.4)	480 (32.4)	791 (39.9)
Frequency of use			
Once a week or less	5 (1)	201 (13.6)	206 (10.4)
Twice a week	23 (4.6)	340 (22.9)	363 (18.3)
Thrice a week	39 (7.8)	505 (34.1)	544 (27.5)
More than thrice a week	431 (86.5)	437 (29.5)	868 (43.8)

In Delhi, the percent of IDUs injecting drugs for more than 5 years is 62.4%, whereas in Punjab, it is only 32.4%. Majority of the Delhi IDUs (86.5%) inject more than three times a week; however, in Punjab, only 29.5% of the IDUs inject more than thrice a week.

### Prevalence and determinants of HIV

The overall HIV positivity in Delhi and Punjab was 18.3% and 21.2%, respectively. The HIV positivity in North Delhi is 34.9%, whereas in South West Delhi, it is only 1.6%. In Punjab, the positivity ranges from 2.8% in Mohali to 45.6% in Amritsar [Table 3].

In Delhi, the positivity is highest among the IDU of the age group 30–39 years (20.9%) and in Punjab, it is in the age group 20–29 years (22.7%). In both the states, the difference in positivity between age groups is not statistically significant. In both the states, although the percentages of positivity are different, the difference in positivity between different marital statuses is significant. In both the states, the percentage of positivity is highest among the illiterate IDUs, 22.4% in Delhi and 24.8% Punjab, and there is no statistical difference in positivity between different educational groups. In both the states, there is a statistical difference in positivity among the different occupational groups; in Delhi, the highest positivity is among the groups “large business/self-employed” (31.1%) (in Delhi, there were two “domestic servants” and one among them is positive, which makes the positivity for this occupational group as 50%) and in Punjab, it is among the skilled/semiskilled workers (31.1%) [Table 4].

In Delhi, the highest HIV positivity is found among the IDUs whose duration of injecting drug is from 6 months to 1 year (34.5%). In Punjab, the highest positivity is found among the IDUs who are injecting drugs for more than 5 years (33.5%). In both the states, the positivity among the IDUs whose frequency of drug use once a week or less has the maximum positivity; 24.9% in Punjab and 50% in Delhi (the number of IDUs whose frequency of use is “once a week or less” in Delhi are only four and of them, two were found positive). Considering the other frequencies of drug use in Delhi, the highest percentage is for the IDUs of frequency thrice a week (28.2%) and in Punjab is for IDUs of the frequency more than thrice a week (23.3%) [Table 5].

A binary logistic regression model was applied to know the significant predictors of HIV positivity. The sociodemographic characters such as age, marital status, place of residence (only for Punjab) educational status, and the drug behavioral

**Table 3: District wise distribution of HIV positivity**

Districts	No. tested	Found positive	Percent positive
Delhi			
North Delhi	249	87	34.9%
South West Delhi	249	4	1.6%
Punjab			
Amritsar	248	113	45.6%
Ludhiana	244	37	15.2%
Moga	247	18	7.3%
Mohali	247	7	2.8%
Rupnagar	250	87	34.8%
Tarn Taran	247	52	21.1%

**Table 4: HIV positivity according to background characteristics**

Characteristic	Delhi	P	Punjab	P
Age group (Yrs)				
15-19	12.5%	0.693	11.8%	0.268
20-29	17.9%		22.7%	
30-39	20.9%		19.4%	
40-49	15.7%		20.0%	
Gender				
Male	18.2%	0.759	21.2%	
Female	22.2%			
Marital Status				
Never married	23.5%	0.000	21.5%	0.000
Married	6.0%		18.5%	
Divorced/separated	24.3%		38.3%	
Educational Status				
Illiterate	22.4%	0.222	24.8%	0.377
Literate and <=5	14.6%		21%	
6-10	18.3%		19.1%	
11 to Graduation	5.9%		21.6%	
Post Graduate	0%		16.7%	
Residence				
Urban	18.1%	0.638	26.3%	0.000
Rural	0%		15.5%	
Occupation				
Agricultural Labourer	0%	0.000	6.1%	0.002
Local transport worker	16.1%		28.3%	
Hotel Staff	20%		0%	
Agricultural cultivator/landholder	0%		15.3%	
Unemployed	6%		19.1%	
Non-Agricultural Labourer	3.1%		26%	
Domestic Servant	50%		14.3%	
Skilled/Semiskilled worker	19%		31.1%	
Petty business/small shop	7.7%		20.1%	
Large Business/Self employed	31.1%		12.5%	
Service (Govt./Pvt.)	15.7%		12.7%	
Student	-		0%	
Truck Driver/helper	-		11.6%	
Total	18.3%		21.2%	

status such as duration of use (only for Delhi) and frequency of use were used as the predictor variables.



Only the marital status was found to be a significant predictor for HIV in Delhi. On the other hand, in Punjab, marital status and place of residence were found to be significant as predictors for HIV positivity [Table 6].

**Table 5: HIV positivity according to reason to come to the health centre and drug use, Delhi and Punjab**

Characteristic	Delhi	P	Punjab	P
Duration of use				
<6 months	7.1%	0.000	0%	0.000
6 months	34.5%		8.8%	
1-3 years	27.9%		12%	
3-5 years	31%		19.3%	
>5 years	12.2%		33.5%	
Frequency of use				
Once a week or less	50%	0.116	24.9%	0.177
Twice a week	13%		19.4%	
Thrice a week	28.2%		19%	
More than thrice a week	17.4%		23.3%	
Total	18.3%		21.2%	

**Table 6: Determinants of HIV positivity by binary logistic regression**

Variables	Delhi Odds Ratio (95% CI)	Punjab Odds Ratio (95% CI)
Age group		
15-19	1.0 (Ref.)	1.0 (Ref.)
20-29	2.7 (0.3-24)	2.5 (0.8-7.2)
30-39	6.8 (0.7-62.8)	2.0 (0.7-6.0)
40-49	4.8 (0.5-45.9)	1.7 (0.5-5.6)
Marital Status		
Married	1.0 (Ref.)	1.0 (Ref.)
Divorced/separated	4.1 (1.4-11.8)*	2.4 (1.4-3.9)*
Never married	4.7 (2.2-10.3)*	1.1 (0.8-1.4)
Educational Status		
Illiterate	1.0 (Ref.)	1.0 (Ref.)
Literate and <=5	0.6 (0.4-1.2)	0.9 (0.6-1.3)
6-10	0.9 (0.5-1.6)	0.8 (0.6-1.1)
11 to Graduation	0.3 (0-2.5)	0.9 (0.6-1.4)
Post Graduate	0.0	0.6 (0.1-5.0)
Duration of Use		
<6 months	1.0 (Ref.)	1.0 (Ref.)
6 months	3.9 (0.4-37.8)	
1-3 years	3.3 (0.4-29.0)	
3-5 years	4.0 (0.4-36.0)	
>5 years	1.2 (0.1-10.2)	
Frequency of Use		
Once a week or less	1.0 (Ref.)	1.0 (Ref.)
Twice a week	0.2 (.0-2.9)	0.9 (0.6-1.4)
Thrice a week	0.6 (0.1-6.2)	1.0 (0.6-1.5)
More than thrice a week	0.4 (.0-3.3)	1.2 (0.8-1.8)
Residence		
Urban	1.0 (Ref.)	1.0 (Ref.)
Rural		0.5 (0.4-0.7)*

\*P value <0.05

In Delhi, being divorced/separated and never being married increase the risk of being positive by more than four times compared to a married person among IDUs. In Punjab, being divorced/separated increases the chance of being positive by more than two times as compared to a married IDU. Being from rural area reduced the risk of being positive by half for the IDUs of Punjab.

## DISCUSSION

In the recent past, the injecting drug use and the positivity among the IDUs are on a rise in newer pockets in India.<sup>[7,8,21]</sup> In a recent report released by the National AIDS Control Organization (NACO), one could observe an unprecedented high rates of HIV positivity among IDUs in the states of Bihar, Uttar Pradesh, and Uttarakhand; 27.2% (combined).<sup>[22]</sup>

Many studies indicated that the new IDU users and the young IDUs are more vulnerable to the transmission of HIV.<sup>[23-28]</sup> The percentage of IDUs <20 years of age is very limited in these two states; the positivity of this age group is slightly lesser than the other age groups; however, this difference was not statistically significant. The positivity among the IDUs who started injecting drugs <1 year before survey is higher for the state of Delhi, in comparison with IDUs of Punjab. In Punjab, the maximum positivity is among the IDUs who have been injecting the drugs for more than 5 years. It is documented that the IDUs are increasing in Punjab.<sup>[29,30]</sup> The highest level of equipment sharing and other high-risk behaviors were present among IDUs of Delhi and other metropolitan cities as compared to the other areas of the country.<sup>[6]</sup>

Studies from Africa on general population show that being married increases the vulnerability to HIV infection and the vulnerability is more for married persons in comparison to unmarried, separated/divorced people.<sup>[31-35]</sup> A study of the IDUs in Russia showed that being married increases the risk to be positive.<sup>[36]</sup> Another study shows that the singles and divorced people are more likely to involve in more risky sexual and injecting behaviors as compared the married people.<sup>[37]</sup> Exploring the data further, it is seen that there is not much difference in the age structure, frequency of the drug use, and the duration of the drug use patters among the different marital status. In both the states, being divorced/separated increases the risk of being HIV-positive as compared to being married. In Delhi, the risk rises by about 4 times with the dissolution of marriage and in Punjab by about 2.4 times. In Delhi, being single increases

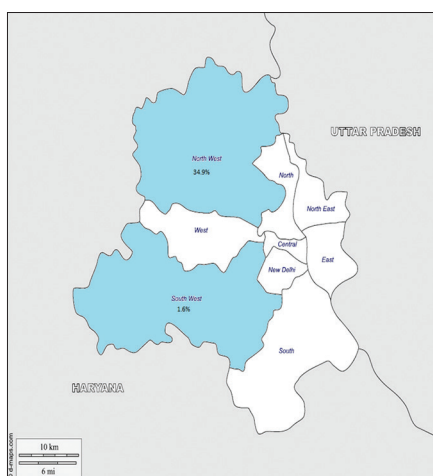


Figure 1: District-wise distribution of HIV positivity, Delhi

the risk of being HIV positive by about 4.7 times as compared to the married IDUs, whereas in Punjab, the risk increases only slightly but it is not statistically significant.

In Punjab, IDUs in rural areas have a lesser risk of HIV transmission as compared to their counterparts in urban areas. In general in India, the HIV is more prevalent in the urban areas as compared to the rural areas.<sup>[38]</sup> Studies from Manipur show that among IDUs positivity is slightly more among the IDUs of the rural areas as compared to the urban areas.<sup>[39]</sup>

## CONCLUSION

Although being states that are very close to each other, the profile of the IDUs in the states of Delhi and Punjab is very different. The profile of the HIV positives also differs across these two states. In this regard, it would be prudent to adopt state-specific strategies to prevent the spread of HIV among the IDUs. Even though there are differences in the background characteristic of the IDUs, the logistic regression reveals that marriage in both the states influences the risk of being HIV positive. Studies from other countries also corroborate this finding. Strategies focusing single/separated/divorced IDUs should be devised to mitigate their elevated risk.

The recently concluded the National Integrated Biological and Behavioral Surveillance<sup>[22]</sup> survey may throw more light into the differences and similarities of behavioral, both with regard to the drug and sex, patterns of the IDUs in these two states. This detailed information would help the researchers to identify the area to focus on the interventions for IDUs in these two states.



Figure 2: District-wise distribution of HIV positivity, Punjab

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## Conflicts of interest

There are no conflicts of interest.

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