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HIV/AIDS Risk Behaviors and Correlates of Injection Drug Use Among Drug Users in Pakistan

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ABSTRACT *We studied prevalence and correlates of injection drug use, awareness of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), and risky behaviors among drug users serviced by a nongovernmental organization catering to drug users in three Pakistani cities (Quetta, Peshawar, and Rawalpindi). Logistic regression analysis was used to identify correlates of injection drug use. Of 608 drug users, 99.8% were male; median age was 32 years, and 44% were married. Most (79.8%) were Pakistani; 15.3% were Afghani. The majority used heroin (98.7%), mostly by inhalation; 15.2% injected drugs. Only 41% had heard of HIV/AIDS, and 30% had been paid for donating blood. Injection drug use and needle sharing were highest in Quetta. Injecting drug users (IDUs) were nearly twice as likely to have donated blood and to have heard about HIV/AIDS compared to other drug users. Interventions to discourage transitions to injection, increase HIV testing, and safeguard the blood supply in Pakistan are urgently needed.*

KEYWORDS *Afghanistan, Blood donation, Heroin, HIV/AIDS, Injection drug use, Pakistan.*

INTRODUCTION

Although formal estimates are lacking, an estimated 0.5 million drug users are thought to live in Pakistan,[1] an unknown proportion of whom are injection drug users (IDUs) who are at risk of infection with bloodborne infections such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Heroin is easily available in Pakistan due to its proximity to Afghanistan, one of the world's leading producers of opium.

Until recently, most heroin users in Pakistan consumed the drug by inhaling fumes of heroin powder burned on foil (i.e., "chasing the dragon"). However, fluctuations in heroin availability, purity, and price have led many to switch to injection of liquid pharmaceuticals that are readily available at pharmacies without a prescription.[2,3] As a result, injection drug use may become increasingly common in Pakistan, increasing the probability of a widespread HIV/AIDS (acquired immuno-

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deficiency syndrome) epidemic associated with needle-sharing practices, as documented elsewhere in Asia.[4,5] There is a pressing need to identify factors associated with injection drug use in this setting.

The first reported case of AIDS in Pakistan was reported[6,7] in 1987. Since that time, the number of HIV cases has increased to approximately 100,000 among the country's population of 145 million.[8] This suggests that HIV prevalence in the general population has remained low, which is consistent with most reports of HIV testing among high-risk populations, such as IDUs, sex workers, truck drivers, and persons seeking treatment for sexually transmitted diseases (STDs).[9,10] While the lack of high-quality surveillance data has likely underestimated the scope of the HIV/AIDS epidemic in Pakistan, available data suggest that a major HIV epidemic has yet to occur. On the other hand, several reports indicate that HCV prevalence is as high as 89% among IDU populations and 7% among the general population.[2]

Data on HIV/AIDS awareness and associated high-risk behaviors in Pakistan are sparse. We studied HIV/AIDS awareness and risk behaviors among drug users in three Pakistani cities and determined correlates of injection drug use. Such data are needed to inform planning of programs and policies to safeguard against the spread of HIV/AIDS and other bloodborne pathogens.

METHODS

Study Sites

A cross-sectional study was conducted in three Pakistani cities (Quetta, Peshawar, and Rawalpindi) from July 2001 to August 2001 as part of a rapid situation assessment conducted by a local nongovernmental organization that provides outreach and detoxification services to drug users (Nai Zindagi, or New Life). Quetta and Peshawar are in proximity to Afghanistan, whereas Rawalpindi is a suburb of Islamabad, the nation's capital. The populations of these cities in year 2000 were 1.2 million, 2.2 million, and 0.6 million, respectively.

Data Collection

Prior to developing the questionnaire, focus group discussions and in-depth interviews were held with a selected sample of street drug users in each city, as described previously.[2] A questionnaire was also administered to community members about drug use on the streets. This information was used to develop a detailed questionnaire that was pretested and finalized. Data were collected from drug users who received services from Nai Zindagi in each of the three cities; trained interviewers administered the questionnaire to obtain the data.

There were no formal eligibility criteria other than the requirement that the respondent used street drugs. As there was no monetary incentive for completing the survey, it is unlikely that non–drug users were inadvertently included in the sample. Informed consent was obtained from all participants. On request, respondents were provided with referrals to medical care, detoxification, and drug rehabilitation.

The questionnaire for the interview included information about demographic characteristics, drug use history, and HIV/AIDS awareness and knowledge of transmission routes. The following questions were asked to test HIV/AIDS-related knowledge: "Have you ever heard of HIV/AIDS?" "Can you list ways HIV or AIDS can be spread?" "Can you list ways to prevent HIV or AIDS?" "Do you think that sharing needles can spread infections?"

Statistical Methods

Chi-square tests were used to compare demographic and behavioral characteristics and HIV/AIDS knowledge among IDUs and non-IDUs. Univariate logistic regression models were used to identify correlates of ever having injected drugs, such as sociodemographic parameters, drug use variables, and HIV/AIDS awareness. Variables with $P < .1$ were manually entered in a stepwise fashion into a multivariate logistic regression model, beginning with the variable that was most significant. The likelihood ratio test was used to compare nested models with and without each subsequent covariate. In the final model, only variables with a level of significance of 5% or less were retained. All potential two-way interactions were assessed for their joint independent effects on the outcome of injection drug use. The Statistical Package for Social Sciences (SPSS, Version 10, SPSS, Inc., Chicago, IL) was used for all data analysis.

RESULTS

Sociodemographic Features

A total of 608 drug users were interviewed, of whom 302 subjects (49.7%) were from Quetta, 156 (25.7%) from Peshawar, and 150 (24.7%) from Rawalpindi. Almost all (99.8%) were males, with a median age of 32 years (interquartile range [IQR] 26–40). One respondent was a eunuch. The median age was slightly higher in Rawalpindi compared to Peshawar and Quetta (Table 1). Most (79.8%) were of Pakistani origin, 15.3% were Afghanis, and 4.9% were of other origin (e.g., Iranian, Uzbeks, Tajiks). The proportion of respondents who were married was significantly higher in Quetta than Peshawar and Rawalpindi ($P = .001$). Almost half (44.7%) had received no formal education; the proportion of uneducated respondents was highest in Peshawar ($P < .001$). Over half were currently homeless (53.4%), and 75% reported no form of income.

Drug Use/Sexual Behavior

The majority of subjects reported using heroin (98.7%), mostly by chasing the dragon; the remainder reported using injection pharmaceuticals. The median age of first using heroin was 20 years (IQR 17–25). A total of 92 persons (15.1%) had ever injected drugs: 18.7% in Quetta, 16.8% in Rawalpindi, and 7.1% in Peshawar ($P = .004$). Reasons for starting injection drug use included pressure from friends (38.6%), the desire to achieve "a quicker high" (31.6%), and curiosity (29.8%). Reports of current needle sharing were significantly higher in Quetta (75%) compared to Rawalpindi (45.5%) and Peshawar (22.2%) ($P = .02$). Half of IDUs reported cleaning needles before using a used needle/syringe, but the methods reported were largely insufficient to inactivate bloodborne pathogens (50% by plain water, 45.8% by boiling water, and 4.2% by other means).

HIV/AIDS Knowledge

Only 41% of respondents had heard of HIV/AIDS; of these, 70% knew at least one correct transmission route. HIV/AIDS awareness was highest in Rawalpindi (69%) compared to Peshawar (38%) and Quetta (28%) ($P < .001$) (Table 1). Only 2% had ever received an HIV antibody test. HIV/AIDS awareness was higher in injection versus noninjection drug users (52% vs. 39%, $P = .02$); however, the former were more likely to have ever donated blood (44% vs. 28%, $P = .004$) (Table 2).

TABLE 1. Sociodemographics, HIV/AIDS risk behaviors, and knowledge among drug users in Quetta, Peshawar, and Rawalpindi, Pakistan

Demographic features	Quetta (n = 302)	Peshawar (n = 156)	Rawalpindi (n = 150)	Total (n = 608)	*P**
Age, years					
20 or younger	23 (7.7)	5 (3.2)	9 (6)	37 (6.1)	.016
21–30	139 (46.5)	72 (46.2)	50 (33.3)	261 (43.1)	
31 or older	137 (45.8)	79 (50.6)	91 (60.7)	307 (50.7)	
Median (IQR)	30 (25–38)	31.5 (26–40)	35 (28–40)	32 (26–40)	.030†
Country of origin					
Pakistan	227 (75.2)	121 (77.6)	137 (91.3)	485 (79.8)	.000
Afghanistan	59 (19.5)	34 (21.8)	—	93 (15.3)	
Other‡	16 (5.3)	1 (0.6)	13 (8.7)	30 (4.9)	
Married					
Yes	150 (50.2)	68 (43.6)	48 (32.2)	266 (44)	.001
No	149 (49.8)	88 (56.4)	101 (67.8)	338 (56)	
Education					
No education	119 (39.4)	87 (55.8)	66 (44)	272 (44.7)	<.001
5 or fewer years	106 (35.1)	28 (17.9)	29 (19.3)	163 (26.8)	
6–10 years	71 (23.5)	32 (20.5)	52 (34.7)	155 (25.5)	
11 or more years	6 (2)	9 (5.8)	3 (2)	18 (3)	
Median monthly income (rupees) (interquartile range)	3000 (2,100–4,000)	2000 (1,500–3,000)	1750 (1,425–3,000)	2750 (1,500–4,000)	.0001
No income	211 (69.9)	121 (77.6)	128 (85.3)	460 (75.7)	.001
≥1000	91 (30.1)	35 (22.4)	22 (14.7)	148 (24.3)	
Homeless					
Yes	99 (33)	107 (70.4)	115 (77.2)	321 (53.4)	.0001
No	201 (67)	45 (29.6)	34 (22.8)	280 (46.6)	
Injection drug use					
Yes	56 (18.7)	11 (7.1)	25 (16.8)	92 (15.2)	.0001
No	243 (81.3)	145 (92.9)	124 (83.2)	512 (84.8)	
Needle sharing					
Yes	18 (75)	2 (22.2)	5 (45.5)	25 (56.8)	.048
No	6 (25)	7 (77.8)	6 (54.5)	19 (43.2)	
Heard about HIV/AIDS					
Yes	85 (28.1)	59 (38.1)	103 (68.7)	247 (40.7)	.0001
No	217 (71.9)	96 (61.9)	47 (31.3)	360 (59.3)	
Know one or more way HIV/AIDS is transmitted					
Yes	81 (26.9)	46 (30.7)	54 (36)	420 (69.9)	.017
No	220 (73.1)	104 (69.3)	96 (64)	181 (30.1)	
Ever been tested for HIV					
Yes	3 (1)	5 (3.3)	3 (2)	11 (1.8)	.229
No	293 (99)	146 (96.7)	147 (98)	586 (98.2)	
Donated blood					
Yes	84 (27.8)	47 (30.5)	54 (36.2)	185 (30.6)	.188
No	218 (72.2)	107 (69.5)	95 (63.8)	420 (69.4)	

There were the following missing values: age (3); married (4); homeless (7); injection drug use (4); needle sharing (48); heard about AIDS (1); know how transmitted (7); ever been tested for AIDS (11); donated blood (3).

*Chi square test.

†Kruskal-Wallis test.

‡Iran, Uzbekistan, Tajikistan.

TABLE 2. Sociodemographics, HIV/AIDS risk behaviors, and knowledge among injecting drug users and noninjecting drug users

	Injection drug use			
Demographic Features	Yes (N = 92)	No (N = 516)	Total (N = 608)	*P**
Age, years				
20 or younger	4 (4.4)	33 (47.3)	37 (6.2)	.564
21–30	43 (47.3)	215 (42.2)	258 (42.9)	
31 or older	44 (48.4)	262 (51.4)	306 (50.9)	
Median (1QR)	30 (25–40)	32 (26–40)	32 (26–40)	.80†
Country of origin				
Pakistan	71 (77.2)	410 (80.1)	481 (79.6)	.580
Afghanistan	17 (18.5)	76 (14.8)	93 (15.4)	
Others‡	4 (4.3)	26 (5.1)	30 (5)	
Married				
Yes	39 (42.2)	226 (44.5)	265 (44.2)	.733
No	53 (57.6)	282 (55.5)	335 (55.8)	
Education				
No education	41 (44.6)	229 (44.7)	270 (44.7)	.908
5 or fewer years	27 (29.3)	136 (26.6)	163 (27)	
6–10 years	22 (23.9)	131 (25.6)	153 (25.3)	
11 or more years	2 (2.2)	16 (3.1)	18 (3)	
Median income (Rupees) (interquartile range)	3,000 (1,600–4,500)	2,500 (1,500–3,625)	2,750 (1,500–4,000)	.431†
No income	71 (77.2)	386 (75.4)	457 (75.7)	.792
1,000 or more	21 (22.8)	126 (24.6)	147 (24.3)	
Homeless				
Yes	50 (54.3)	269 (53.3)	319 (53.4)	.910
No	42 (45.7)	236 (46.7)	278 (46.6)	
Heard about AIDS				
Yes	48 (52.2)	198 (38.7)	246 (40.8)	.021
No	44 (47.8)	313 (61.3)	357 (59.2)	
Know one or more way HIV/AIDS is transmitted				
Yes	37 (40.2)	143 (28.3)	180 (30.2)	.017
No	55 (59.8)	362 (71.1)	417 (69.8)	
Donated blood				
Yes	40 (43.5)	143 (28.1)	183 (30.4)	.004
No	52 (56.5)	366 (71.9)	418 (69.6)	
Ever been tested for AIDS				
Yes	2 (2.2)	9 (1.8)	11 (1.9)	.677
No	88 (97.8)	494 (98.2)	582 (98.1)	

There were the following missing values: age (7); country of origin (4); married (8); education (4); income (4); homeless (11); heard about AIDS (5); know how transmitted (11); donated blood (7); ever been tested for AIDS (15).

*Chi square test.

†Mann-Whitney U test.

‡Iran, Uzbekistan, Tajikistan

Correlates of Injection Drug Use

Univariate logistic regression analysis revealed that living in Quetta or Rawalpindi, ever having heard about HIV/AIDS, knowing how HIV/AIDS was transmitted, and ever having donated blood were associated with ever having injected drugs. Ever using condoms and ever having paid anyone to have sex were marginally associated with injection drug use (Table 3).

TABLE 3. Logistic regression analysis of risk factors associated with injection drug use

Variable	Crude odds ratio	95% Confidence interval	Adjusted odds ratio	95% Confidence interval
Age, years				
20 or younger	1.00			
21–30	1.65	(0.55, 4.91)		
31 or older	1.39	(0.47, 4.10)		
Country of origin				
Pakistan	1.00			
Afghanistan	1.29	(0.72, 2.31)		
Other*	0.89	(0.30, 2.62)		
City				
Peshawar	1.00		1.00	
Rawalpindi	2.66	(1.26, 5.62)	2.15	(0.99, 4.62)
Quetta	3.04	(1.54, 5.98)	3.29	(1.65, 6.54)
Education				
No education	1.00	(0.65, 1.88)		
5 or fewer years	1.11	(0.94, 1.64)		
6–10 years	0.94	(0.15, 3.16)		
11 or more years	0.70			
Religion	0.79	(0.23, 2.70)		
Professional skills	1.17	(0.73, 1.87)		
Employed	1.13	(0.67, 1.90)		
Income level	0.91	(0.54, 1.53)		
Homeless	1.04	(0.67, 1.63)		
Lived for more than 1 year in the city	1.29	(0.79, 2.10)		
Married	1.10	(0.69, 1.71)		
Ever been in drug treatment	0.82	(0.52, 1.28)		
Ever been incarcerated	1.26	(0.47, 1.33)		
Addict in family	0.79	(0.48, 1.30)		
Ever used condoms	2.04	(0.93, 4.50)		
Ever paid for sex	0.68	(0.43, 1.06)		
Heard about AIDS	1.73	(1.10, 2.70)	1.79	(1.10, 2.92)
Know how AIDS is transmitted	1.70	(1.10, 2.70)		
Donated blood	1.97	(1.25, 3.10)	1.89	(1.18, 3.02)
Ever been tested for AIDS	0.80	(0.17, 3.80)		

*Iran, Uzbekistan, Tajikistan.

In multiple logistic regression analysis (Table 3), respondents from Quetta were more than three times as likely to have ever injected drugs, and respondents from Rawalpindi were twice as likely to have ever injected drugs compared to respondents from Peshawar. Having donated blood and having heard about HIV/AIDS were also associated with nearly two-fold increased odds of ever having injected drugs.

DISCUSSION

In our study of drug users in three cities in Pakistan, we found a low level of HIV/AIDS awareness coupled with risky behaviors. Although the proportion of drug users who had ever injected drugs was relatively modest, needle sharing appeared common, and injection drug use was closely associated with paid blood donation. These findings have important implications with respect to prevention of injection drug use and the spread of HIV and other bloodborne infections in Pakistan.

Earlier studies suggest that most Pakistanis remain unaware of HIV/AIDS, especially those who are uneducated and living in rural areas.[11,12] We found that only 41% of drug users had heard about HIV/AIDS, and few were aware of HIV risks through needle sharing. In our study, IDUs were twice as likely to have heard about HIV/AIDS compared to non-IDUs, but this may reflect their greater likelihood of interacting with nongovernmental organization workers who informed them of HIV/AIDS and transmission risks.

Overall, however, HIV/AIDS awareness was low. At the time of this study, not all NGO workers had received formal HIV/AIDS education, and such information was not regularly provided to each client. Since this study was completed, our study team has facilitated education sessions for staff members on HIV/AIDS and viral hepatitis; many of these staff members have since become certified HIV/AIDS counselors. We are therefore confident that dissemination of this important information will improve among drug users within the reach of this organization.

We found that 15% of our study sample had ever injected drugs; among these individuals, more than half reported sharing needles. Not surprisingly, injection drug use and needle sharing were significantly more common in Quetta, which is close to Afghanistan. We have previously shown that, compared to Pakistani drug users in Quetta, Afghani drug users were more likely to have ever injected drugs and to have reported higher levels of needle sharing.[13]

While the proportion of drug users who reported injecting drugs was relatively low during the study period, the war in Afghanistan that immediately followed interrupted the heroin supply from Afghanistan to Pakistan; this in turn could precipitate transitions to injection drug use.[2,3,14] Decreasing heroin purity or increasing price may also lead to increased injection drug use since this route of administration is more efficient than inhalation or smoking. Although half of the IDUs we studied reported cleaning needles before using a used syringe, the methods used were insufficient to disinfect syringes.

Our data on self-reported needle sharing should be interpreted cautiously, however, due to a large amount of missing data for this question. Earlier reports by our group and others[2–3,13] in Lahore and Quetta indicate that up to three quarters of IDUs report recent needle sharing, and few disinfect their syringes before reuse. We must also caution about the generalizability of our data since there was no formal sampling strategy. Since there was no monetary reimbursement for completing the survey, it is unlikely that the sample included non–drug users.

If HIV seriously penetrates the IDU population in Pakistan, our findings suggest that a generalized epidemic could subsequently occur since HCV prevalence is already very high in this population.[2] Moreover, IDUs in our sample were nearly twice as likely to report donating blood than other drug users. In Pakistan, blood donation by IDUs is common since many private blood clinics provide monetary reimbursement. In a study of 37 blood banks in Pakistan by Luby et al.,[15] half utilized paid donors. Only 8% of blood banks asked potential donors about injection drug use, none screened potential donors about other high-risk behaviors, and serologic testing for dangerous bloodborne pathogens like HBV, HCV, and HIV was not regularly conducted.[15] Blood handling and storage fell far below recommendations by the World Health Organization,[15] and most blood recipients in Pakistan are unaware of the risks of transfusion.[16]

The close association we observed between blood donation and injection drug use in Pakistan underscores the need for improvements in blood screening to ensure safety of the blood supply. Pakistan would do well to learn from the lesson in China, where HIV spread rapidly through contaminated blood subsequent to paid blood donation that was common among IDUs.[17]

In our study sample, street drug use was exclusively a male phenomenon, although one respondent was a eunuch. It is possible that female IDUs were more hidden and less likely to seek services from the nongovernmental organization we studied. The risk of heterosexual transmission of HIV and HBV to women is not negligible since nearly half of the drug users we studied were married and lived with their families. In a recent study, 45% of wives of drug users in Manipur were HIV seropositive.[18]

Our findings indicate a high prevalence of needle sharing, a close association between injection drug use and paid blood donation, and lack of HIV/AIDS awareness, all of which could contribute to an HIV epidemic among IDUs in Pakistan. Lessons should be learned from other Asian countries like India, Thailand, China, and Myanmar, where massive HIV epidemics occurred among IDUs within short periods of time. Interventions are needed to discourage transitions to injection among heroin users since the prevalence of drug injection has thus far remained low in these Pakistani cities. Needle-exchange programs should also be introduced and expanded. Until recently in Pakistan, needle exchange has been limited to Lahore. Since this study was completed, a small needle-exchange program has been initiated in Quetta by some of the authors, but additional resources are needed to ensure that this program can be expanded and sustained.

To improve the safety of the blood supply, paid blood donation should be prohibited, and screening for bloodborne infections should be regularly implemented. HIV/AIDS awareness programs should be introduced through electronic media, outreach workers, religious leaders, health workers, friends, and family members. Financial and economic empowerment of drug users will improve their chances of returning to the society as respected individuals through provision of vocational skills training and job opportunities. Efforts such as these are needed in order for Pakistan to avert a major HIV/AIDS epidemic.

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REFERENCES

1. United Nations Office for Drug Control and Crime Prevention. *Global Illicit Drug Trends: 2002*. New York: United Nations; 2002.
2. Zafar T, Hasan S. A sociodemographic and behavioral profile of heroin users and the risk environment in Quetta, Pakistan. *Int J Drug Policy*. 2002;13:121–125.
3. Strathdee SA, Zafar T, Brahmbhatt H, et al. Higher level of needle sharing among injection drug users in Lahore, Pakistan, in the aftermath of the US-Afghan war. Paper presented at: Fourteenth International Conference on AIDS; July 7–12, 2002; Barcelona, Spain. Abstract MoPpC2018.
4. Poshyachinda V. Drug injecting and HIV infection among the population of drug abusers in Asia. *Bull Narc*. 1993;45:77–90.
5. Weniger BG, Brown T. The march of AIDS through Asia. *N Engl J Med*. 1996;335: 343–345.
6. Khanani RM, Hafeez A, Rab SM, et al. Human immunodeficiency virus-associated disorders in Pakistan. *AIDS Res Hum Retroviruses*. 1988;4:149–154.
7. Mujeeb SA, Hashmi MRA. A study of HIV-antibody sera of blood donors and people at risk. *J Pak Med Assoc*. 1998;38:221–222.
8. Khan OA, Hyder AA. Responses to an emerging threat: HIV/AIDS policy in Pakistan. *Health Policy Plann*. 2001;16:214–218.
9. Hyder AA, Khan OA. HIV/AIDS in Pakistan: the context and magnitude of an emerging threat. *J Epidemiol Community Health*. 1998;52:579–585.
10. Kazi BM, Ghaffar A, Salman M. Health care systems in transition III. Pakistan, Part II. Pakistan's response to HIV-AIDS. *J Public Health Med*. 2000;22:43–47.
11. Ali, S, Khanani R, Tariq WU. Understanding the context of HIV/AIDS infection in Pakistan. *Venerology*. 1995;8:160–163.
12. Lynn W. Pakistan launches media blitz on AIDS. *Global AIDS News*. 1994;2:1–2.
13. Zafar T, Brahmbhatt H, Imam G, ul Hassan S, Strathdee SA. HIV knowledge and risk behaviors among Pakistani and Afghani drug users in Quetta, Pakistan. *J Acquir Immune Defic Syndr*. 2003;32:394–398.
14. Hankins CA, Friedman SR, Zafar T, Strathdee SA. Transmission and prevention of HIV and STD in war settings: implications for current and future armed conflicts. *AIDS*. 2002;16:2245–2252.
15. Luby SP, Khanani R, Zia M. et al. Evaluation of blood bank practices in Karachi, Pakistan, and the government's response. *Health Policy Plann*. 2000;15:217–222.
16. Luby SP, Niaz Q, Siddiqui S, et al. Patients' perceptions of blood transfusion risks in Karachi, Pakistan. *Int J Infect Dis*. 2001;5:24–26.
17. Lau JT, Thomas J, Lin CK. HIV-related behaviours among voluntary blood donors in Hong Kong. *AIDS Care*. 2002;14:481–492.
18. Panda S, Chatterjee A, Battacharya SK, et al. Transmission of HIV from injecting drug users to their wives in India. *Int J STD AIDS*. 2000;11:468–473.