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# Background demographics and risk behaviors of injecting drug users in Karachi, Pakistan

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## KEYWORDS

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## Summary

**Objective:** To find the prevalence of HIV infection and risk behaviors among injecting drug users (IDUs) in Karachi, Pakistan.

**Design:** A cross-sectional study of IDUs conducted in Karachi, Pakistan from February through June 1996.

**Results:** Of the 242 IDUs, 11 (4%) refused HIV testing. One (0.4%; 95% confidence interval (CI) = 0.37–0.48%) was HIV positive. All subjects were male. Over the past 6 months 47% had engaged in receptive needle sharing, 38% had perceived a change in their social network, 22% had had sexual intercourse, of whom only 7% always used condoms, and none had washed their needles with bleach. Younger age (28 vs. 31 years;  $p = 0.01$ ), younger age at first injection (25 vs. 28 years;  $p = 0.001$ ), fewer years of schooling (3 vs. 5 years;  $p = 0.001$ ), lower monthly income (\$70 vs. \$80;  $p = 0.03$ ), inhaling fumes of heroin from a foil in the year before injecting (OR = 4.8; CI = 2.2–10.3), injecting first time with heroin (OR = 3.6; CI = 1.2–12.6), having a temporary job (OR = 2.5; CI = 1.2–5.2), and a perceived change in one's social network (OR = 4.4; CI = 2.4–7.9) were all associated with receptive needle sharing. IDUs who knew about HIV spread through contaminated needles were less likely to share (OR = 0.4; CI 0.2–0.8). In the final logistic regression model receptive needle sharing was associated with inhaling of fumes of heroin on a foil in the year prior to injecting (adjusted OR = 5.6; CI = 2.6–12.0), a perceived change in one's social network (adjusted OR = 4.0; CI = 2.2–7.4), and inversely associated with age at first time of injection ( $\beta = -0.07$ ;  $p = 0.002$ ).

**Conclusion:** Background HIV prevalence was low among IDUs in Karachi despite high-risk behavior in 1996. In order to control HIV transmission among IDUs in Pakistan, continual HIV surveillance with well-coordinated and effective HIV risk reduction, and drug demand reduction programs need to be implemented among drug users.

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## Introduction

HIV can spread rapidly among intravenous drug users (IDUs). The multi-center drug injector study<sup>1</sup> elucidated these dynamics globally. HIV prevalence rose within a few months from 0 to greater than 40% in New York,<sup>2</sup> Bangkok,<sup>3</sup> Manipur, India,<sup>4</sup> and Edinburgh, Scotland.<sup>5</sup> IDUs that injected in 'shooting galleries', where a rented needle was re-used, primarily contributed to rapid HIV spread in New York. In Bangkok, individuals with an increasing number of sharing partners, injecting with used needles kept by dealers, and being incarcerated were more likely to seroconvert to HIV. However, IDUs in Glasgow (Scotland), Lund (Sweden), Sydney (Australia), Tacoma (Washington), Toronto (Ontario, Canada), and Hong Kong escaped such rises in HIV and maintained a low prevalence of less than 5% despite high-risk behavior being common. Des Jarlais et al. had identified three common factors in these cities:<sup>6</sup> (1) early intervention during low HIV prevalence, (2) provision of sterile injection equipment to IDUs, and (3) implementation of community outreach programs. Some studies have found low prevalence of HIV among IDUs who injected in closed HIV seronegative groups, and those who were in monogamous sexual relationships.<sup>7</sup>

Pakistan falls in the 'golden crescent' along with Afghanistan and Iran, notorious for drug production and trafficking. Tribal belts in North Pakistan that are outside government control have been known to harvest the poppy since ancient times. Traditionally cannabis and opium have been the most popular drugs. In the 1980s after the banning of opium production and the promulgation of strict laws regarding heroin and opium possession in Pakistan, poppy production declined. Opium production shifted to Afghanistan and further multiplied after the first Afghan war in 1990.<sup>8</sup> Due to the lucrative nature of the trade, it ran a parallel economy of exports to rich Western countries from 1994–1996 equivalent to 19.6% of Pakistan's gross domestic product.<sup>9</sup> Under international pressure the Taliban enforced a ban on poppy cultivation in 2000 leading to near eradication of poppy cultivation in 2001. Since 2002, in the post-Taliban Afghanistan, opium production has resumed and is spreading, with an estimated earning in 2003 of US\$2.3 billion supplying two-thirds of the world's opium.<sup>10</sup>

The 1993 national survey in Pakistan estimated that there were 2.7 million drug users using narcotic and psychotropic substances out of a population of 125 million.<sup>11</sup> Injections and pharmaceutical drugs are easily available without prescription in Pakistan. The 1993 survey estimated 1.52 million heroin addicts, though the 2000 national survey estimated 0.5 million heroin addicts in Pakistan.<sup>12</sup> In the 1993 national survey, injecting drug abuse was first reported in 1.8% of addicts in Karachi, the largest city in Pakistan, with an international air and seaport. Prior to our study in 1994, Baqi et al.<sup>13</sup> found an alarming 25% injecting drugs and 52% engaging in receptive needle sharing in a mixed population of drug addicts in Karachi. Fortunately none were HIV positive. A study in 1999 from Lahore of 200 injecting drug users found that none of them were HIV positive but 89% were hepatitis C virus (HCV) positive.<sup>14</sup> Subsequent studies have shown an increase in injecting among drug users in Pakistan though HIV testing was not part of these studies. The 2000 national survey<sup>12</sup> involving four major cities found that 15% of

heroin users mainly injected while 31% had injected on at least one occasion, among a mixed population of drug addicts with a variation found in the different cities (Karachi 55%, Lahore 30%, Quetta 14%, and Peshawar 12%). A study conducted in 2001 at detoxification centers in three cities identified that overall, 15.2% of drug users had injected drugs on at least one occasion (Quetta 18.7%; Rawalpindi 16.8%, and Peshawar 7.1%).<sup>15</sup> In another study of the same period a higher prevalence of injecting drug use was seen among Afghans than Pakistanis in Quetta (18.8% vs. 12.3%).<sup>16</sup> In 2002 in Karachi the majority of drug users (>80%) had made a transition toward injecting.<sup>17</sup>

Pakistan recently had an outbreak of HIV among IDUs in the Sindh province. First, in the small town of Larkana in June of 2003, 9.3% of IDUs (17 of 183) were tested positive for HIV.<sup>18</sup> In follow-up studies carried out in 2003 in harm reduction drop-in centers in Karachi, one IDU from the Larkana outbreak was found to be HIV positive (0.6% of 160 tested).<sup>17</sup> Further sero-surveillance from January to July of 2004 in Karachi identified 160 HIV positive IDUs.<sup>19</sup> Surveillance data from the Sindh AIDS control program has shown that up until December of 2004 HIV prevalence among IDUs was 8.9% in Karachi (332 HIV positive among 3736 tested) and 5.3% in Larkana (49 HIV positive out of 926 tested). We present in this paper the baseline correlates of receptive needle sharing among IDUs in Karachi in 1996, particularly those who congregated in streets, and also assess whether HIV had entered this group at that time.

## Methods

From 1989 to 1992 the World Health Organization (WHO) conducted a comparative study<sup>1</sup> of drug injecting behaviors in 13 cities (Athens, Bangkok, Berlin, Glasgow, London, Madrid, Naples, New York, Rome, Rio de Janeiro, Santos, Sydney and Toronto) and recruited 6390 IDUs mostly from out of drug treatment settings. Karachi was included in phase II of these studies since cities from less-developed countries were not represented in phase I. Karachi is the largest city in Pakistan. A major economic center with 9.9 million<sup>20</sup> residents, it is divided into four districts: North, South, West, and East.

From February through June 1996, we administered questionnaires to IDUs congregating in the streets as well as in rehabilitation centers in Karachi, and obtained sera for HIV testing. For comparative purposes, we used the WHO questionnaire from the New York site, which was translated into Urdu and modified according to local settings. We estimated that we needed a sample size of 500 IDUs based on an estimated HIV prevalence of <1% and upper estimate of the 95% confidence interval of 0.74. First we interviewed key informants in each district in Karachi prior to recruiting street IDUs to obtain a crude estimate of IDU numbers. At the time of the study there were 26 rehabilitation centers in Karachi.<sup>21</sup> IDUs were selected from the streets if they had injected at least within the last 2 months, and from the rehabilitation centers if they had injected at least once within the last 2 months before starting treatment. 'Receptive needle sharing' behavior was defined as injecting with a used needle from someone else within the last 6 months. A 'perceived change in one's social network' was defined as the

subject's perception that he had either joined a new group, or a new IDU was introduced to the group, or someone in the group had left, injected somewhere else, and then returned to the group within the last 6 months.

We initially chose two major privately funded rehabilitation centers that provided free care (Edhi Village and Azam Village). After an extensive search of these IDUs we did not meet our sample size requirement and so included other rehabilitation centers: Al-Midway Rehabilitation Center, Asghar Hospital, and the Karachi Addiction Clinic and Sadaqat Clinic. We also visited Karachi Central Prison to look for IDUs. IDUs were paid an honorarium for participating in the study.

We tested blood samples for HIV-1 and HIV-2 by dipstick test (PATH, Dipstick-HIV 1+2). We confirmed positive samples with the same test, and re-confirmed it with ELISA (Enzygnost<sup>®</sup> Anti-HIV-1/-HIV-2; Dade Behring, Liederbach, Germany) as recommended by WHO.<sup>22</sup> We did anonymous linked testing of the sera, provided pre-test HIV counseling, and post-test counseling to those seeking results. The project was reviewed and approved by the Human Subject Committee of The Aga Khan University.

We double entered the data in Epi Info version 6,<sup>23</sup> which we used for analysis. We analyzed difference in continuous variables with the *t*-test and categorical variables with the Chi-square test, selecting 0.05 as the level of significance. Receptive needle sharing was the main outcome of interest examined in the statistical analysis. Logistic regression was used to eliminate confounding associated with receptive needle sharing using SPSS statistical software. All the significant variables associated with receptive needle sharing were entered in the model simultaneously and the least significant variables were removed with backward elimination until variables with a *p* value <0.05 were left. The 95% confidence interval (CI) of the proportion of HIV among IDUs was calculated based on Poisson distribution.<sup>24</sup> We also assessed for interaction between the variable of perceived change in one's social network and proportion living in the North District of Karachi as receptive needle sharing and perceived change in one's social network were highest in this district.

## Results

After an extensive search of major injecting drug-user habitats in Karachi over a period of 4 months, we found only 261 IDUs. Of these 19 (7%) refused or did not complete the interview. Among the remaining 242 IDUs, 191 (79%) were from the street, 40 (16%) were from rehabilitation centers, 10 (4%) were from jail and one (0.4%) was from a private location. All were male and their mean age was 26 years. One hundred and thirty-one (54%) were homeless and lived on the streets. One hundred and twenty-one (50%) were from the North District, 48 (20%) from East, 43 (18%) from West, and 24 (10%) from the South District. For 191 (79%) their source of income was temporary work, followed by self-employment in 24 (10%). One hundred and sixty-five (68%) were single, 72 (30%) were married, and five (2%) were divorced or separated. One hundred and thirty-five (56%) had been incarcerated since injecting. Of the 242 IDUs interviewed 11 (4%) refused HIV testing. Of the remaining 231, only one (0.43%; 95% CI: 0.37–0.48%) was HIV positive and was of HIV-1 serotype.

Heroin was the main injecting drug that was used by 232 (96%) of the IDUs. In the preceding 6 months the major trends among IDUs were: 169 (70%) had made a transition from non-injecting methods to injecting, 53 (22%) had used injecting as well as using non-injecting methods equally from the beginning of use, 13 (5%) were injecting exclusively, and five (2%) were making a transition towards sniffing heroin. Of those who had made a transition towards injecting drugs, 145 (86%) did so because they preferred the high rush from injection, 35 (21%) found drug quality or price to be better, 28 (17%) were under pressure to do so from friends, 25 (15%) found it more convenient, 13 (8%) found syringes easily available, and 13 (8%) found it easier to modulate the dose when injecting. Of the five who had made a transition towards sniffing heroin all cited that they preferred the high from sniffing heroin; two said that they usually did it this way, one said that they were satisfied with the high from sniffing, and one said that drug quality or price was favorable. One hundred and seventy-nine (74%) injected in each of the previous 6 months and of these 155 (87%) injected daily. Unused needles were obtained by 223 (92%) from a drug store or pharmacy.

In the past six months 114 (47%) had injected with a shared needle. Of these, 98 (86%) obtained the shared needle from drug injecting friends who sat together, rarely from somewhere in the street in nine (8%), from a relative in seven (6%), and from a dealer in two (2%). The main reasons for receptive needle sharing were: difficulty in obtaining syringes in 48 (42%), not having their own needles in 48 (42%), peer pressure in 13 (11%), the enjoyment of sharing in 13 (11%), and "had always shared" was the reason in 13 (11%).

One hundred of the 242 IDUs (41%) had self-reported a perceived change in the social network with whom they injected over the past six months. Receptive needle sharing was present in 52% of IDUs who injected in the North District of Karachi, 37.5% in the East District, 40% in the South District and 51% in the West District, whereas perceived change in one's social network was present in 42% of IDUs in the North District, 42% in the East District, 28% in the South District, and 35% in the West District of Karachi. In bivariate analysis younger age (*p* = 0.01), age at the first time of injected drugs (*p* = 0.001), fewer years of schooling (*p* = 0.001), lower monthly income (*p* = 0.03), perceived change in social network (OR = 4.4; CI = 2.4–7.9), inhaling fumes from heroin from a foil in the year before injecting (OR = 4.8;

**Table 1** Continuous variable risk factors associated with receptive needle sharing<sup>a</sup> among IDUs in Karachi recruited from February through June 1996

Risk factors	Sharer	Non-sharer	<i>p</i> -Value
Mean age (years)	28	31	0.01
Mean age at first injection (years)	25	28	0.001
Mean years of schooling	3	5	0.001
Mean monthly income (in US\$)	70	86	0.03
Mean times injected in a day in the past 6 months	5	6	0.6

<sup>a</sup> Receptive needle sharing defined as injecting with a used needle from someone else in the past 6 months.

**Table 2** Categorical variable risk factors associated with receptive needle sharing<sup>a</sup> among IDUs in Karachi recruited from February through June 1996

Risk factors	Sharer (n = 114)	Non-sharer (n = 128)	Odds ratio (CI)	p-Value
Having a temporary job	88% (100)	74% (95)	2.5 (1.2–5.2)	0.01
Inhaling fumes of heroin on a foil in the year before injecting	89% (102)	64% (82)	4.8 (2.2–10.3)	<0.001
When first time injected, used heroin	95% (109)	86% (110)	3.6 (1.2–12.6)	0.02
Perceived change in one's social network in the past 6 months	56% (29)	23% (64)	4.4 (2.4–7.9)	<0.001
When first time injected had heard about AIDS	24% (27)	33% (42)	0.6 (0.3–1.1)	0.15
When first time injected knew that AIDS could spread by injection <sup>b</sup>	61% (16/26)	69% (36/41)	0.2 (0.05–0.9)	0.01

<sup>a</sup> Receptive needle sharing defined as injecting with a used needle from someone else in the past 6 months.

<sup>b</sup> Total denominator = 69 (27 + 42); two excluded from analysis as they did not know/could not remember.

CI = 2.2–10.3), those who when injected for the first time used heroin (OR = 3.6; CI = 1.2–12.6), and those having a temporary job (OR = 2.5; CI = 1.2–5.2) were associated with receptive needle sharing (Tables 1 and 2). There was no difference in the number of times IDUs injected between sharers and non-sharers ( $p = 0.6$ ) (Table 1). Knowing that HIV and AIDS could be spread by sharing contaminated needles when they injected for first time was associated with less receptive needle sharing (OR = 0.2; CI = 0.05–0.9) (Table 2).

In the final logistic regression model receptive needle sharing was associated with a perceived change in one's social network (adjusted OR (AOR) = 4.0; CI = 2.2–7.4), inhaling of fumes on a foil prior to injection (AOR = 5.6; CI = 2.6–12), and inversely associated with age at the first time of injection ( $p = 0.002$ ) (Table 3). There was no interaction between those living in the North District of Karachi and those who had perceived a change in their social network. The model was statistically significant ( $p < 0.001$ ).

Before injecting 188 (78%) cleaned the needle with water only; 14 (6%) reported using heated or boiled water. None washed the needle with bleach. One hundred and eighty-four (76%) disposed of the needle in the garbage after using it, while 19% gave it to someone else.

Two hundred and thirty-five (97%) had started injecting in 1996, at ages ranging between 11 and 72 years (median 25

years). When they had injected for the first time, 172 (71%) had never heard about HIV or AIDS and 218 (90%) used heroin at that time. The rest used morphine, buprenorphine, pethidine, diazepam or pentazocine. In the year before they began injecting, 198 (82%) were using cannabis, 184 (76%) were inhaling fumes of heroin burnt on foil, 167 (69%) were smoking heroin, 101 (42%) were sniffing heroin, and 75 (31%) were drinking alcohol.

One hundred and thirty (54%) were not aware of HIV. Of the remaining 112 (46%) who knew about HIV, 42 (38%) self-reported that they did not change their risk behavior, while 70 (63%) reported taking steps to avoid catching HIV. Most of the IDUs who did not change their risk behavior (83% of the 42) said they had not taken steps because they were not aware of specific measures to reduce the risk. Of the 70 who took some measures, 32 (46%) had reduced receptive needle sharing, 25 (36%) had increased cleaning of their needles, 20 (29%) had reduced needle use, 13 (19%) had stopped having sex, and four (6%) had started increasing their use of condoms.

One hundred and eighty-eight (78%) had not had sexual intercourse during the past six months. Of the remaining 54 who had had sex during the past six months, 36 (67%) never used a condom, seven (13%) did so occasionally, one (2%) did so half the time, six (11%) did so most of the time, and four (7%) always used one. Eighteen (7%) reported male to male sex within the last five years.

Since injecting regularly, 20 (8%) had donated their blood for money, 11 had donated blood only when in dire need of money, seven had donated in exchange for drugs, and two were professional blood donors who sold blood as a regular source of income. Only five (2%) IDUs reported that they had traveled abroad since the start of their injecting drug use. Two reported that they had traveled to Iran, one to India and the other two did not mention where they had been. Of these, three injected alone and two injected in a group but did not respond to the question about whether they had shared needles.

## Discussion

HIV infection remained uncommon among injecting drug users in Karachi in 1996. Nevertheless they were still at risk

**Table 3** Logistic regression analysis of risk factors associated with receptive needle sharing among IDUs in Karachi recruited from February through June 1996

Risk factors	$\beta$	Adjusted odds ratio (CI)	p-Value
Age at first injection (years)	-0.07		0.002
Inhaling fumes of heroin on a foil in the year before injecting	1.7	5.6 (2.6–12)	<0.0001
Perceived change in one's social network in the past 6 months	1.4	4.0 (2.2–7.4)	<0.0001
Model			<0.001

of spreading HIV among themselves because of several factors including perceived changes in their social networks, low-level knowledge about HIV and its prevention, and wide-spread receptive needle sharing. Later drug injecting studies have shown that receptive needle sharing is not limited to Karachi. In the Lahore study in 1999 it was 64% and in the 2000 national survey it was 53%, which increased among street IDUs to 69%. In the 2001 drug injecting studies in three cities (Quetta, Peshawar, and Rawalpindi) more than half of the IDUs shared needles.<sup>12</sup> In Lahore in 2001, an increase in receptive needle sharing was observed after the 2001 Afghan war, which was attributed to decreased availability and increased pricing of heroin.<sup>25</sup> Poor knowledge of HIV/AIDS and its prevention were common to all studies. Afghani IDUs in Quetta have been identified as another vulnerable population in Pakistan. They were statistically significantly found to be more likely to have injected on at least one occasion, less likely to have heard of HIV/AIDS, and less likely to use condoms when compared to Pakistani IDUs in Quetta.<sup>13</sup>

The low prevalence of HIV among IDUs in Pakistan at the time of the study was not unpredictable. This is because Pakistan was a low prevalence country for HIV<sup>26–28</sup> and, though HIV might have been introduced in critical numbers, the epidemic had not yet exploded among IDUs in 1996. This may partly be explained by the relative isolation of Pakistan from India preventing eastward spread of HIV, social isolation of IDUs in Karachi, and the lack of networking with other high-risk groups. Among the reported cases of HIV in Sindh, most were workers deported from Gulf States who acquired the disease through sexual contact or through blood transfusion.<sup>28,29</sup> None were IDUs or commercial sex-workers. In studies performed in Karachi in 1994, HIV was also absent in male and female sex workers, long distance truck drivers, and low among prisoners (0.05%), though high-risk behavior was common.<sup>13,30</sup>

Nonetheless with the high-risk behavior, we had predicted that HIV could spread rapidly among IDUs in Karachi, and then to the general population. Two out of three important risk factors for rapid spread that were identified in other cities were present in Karachi.<sup>31</sup> These were lack of perception of HIV/AIDS as a local threat (most IDUs did not know about HIV and its implications), and the other was rapid mixing which was prevalent in all districts of Karachi. The third factor, restriction on availability and use of new injection equipment, was not present in Karachi as new injection equipment could be easily purchased from a pharmacy. Although this is considered complementary to a needle-exchange program,<sup>6</sup> receptive needle sharing and the above two factors may negate such an effect. Another risk factor, which was history of incarceration, was prevalent among IDUs.<sup>3</sup> There was a lack of overlap with other HIV risk groups and across the border networking. IDUs in our study hardly ever traveled outside the country to other HIV endemic areas. Fortunately we did not find in our study overlap between IDUs and sex-workers in Karachi. This was in contrast to the Lahore study, where sex with commercial sex workers was prevalent (50%) among IDUs. This may be explained by the fact that IDUs in Karachi were homeless, socially ostracized, and solely used heroin which decreases libido.<sup>32</sup> In Karachi, IDUs were at risk of infecting their spouses as few used protective contraception. Another means by which HIV could be spread to the general population would be by IDUs who are professional

blood donors, as 45% of blood banks in Karachi do not screen for HIV<sup>33</sup> and syringes are commonly re-used without being disinfected in clinical settings.<sup>34</sup> In our study the fact that fewer IDUs (8%) donated blood for money as compared to the previous study in Karachi (26%) might be due to the higher number of socially ostracized street IDUs in our study.

Multivariate analysis showed that those who shared needles were more likely to be young, were more likely to have perceived a change in the social network in which they inject in the past 6 months, and were using heroin with panee prior to injecting. This suggested a sub-group of IDUs who were young and changing groups and hence were more prone to acquire and transmit HIV. Comparing IDUs with a cohort of non-IDUs from a part of the same study has identified income generation via illegal modes, non-sharing of income with family and presence of suicidal thoughts as risk factors for injecting.<sup>35</sup> A case-control study done in Lahore has identified a number of risk factors for heroin drug addiction.<sup>36</sup> Hence interventions to reduce drug demand and also to prevent addiction should be focused on those who inhale heroin and populations susceptible to drug addiction.

This trend from non-injectable to injectable forms of heroin in Karachi in 1996 was consistent with the trend of opium smoking to eventual heroin injecting seen in other Southeast Asian countries, partly due to the addictive nature of heroin itself, which was also the most common reason identified by IDUs for shifting to injecting heroin in our study. Unfortunately only few IDUs (five) were making a transition towards sniffing heroin. Now the injecting route for heroin is prevalent in all major cities in Pakistan, particularly in Karachi as seen in subsequent surveys.<sup>17</sup> This may be due to the availability of heroin, as in other cities drug users have made a transition to injecting other substances like buprenorphine.<sup>37</sup>

In univariate analysis other variables that have public health implications were not significant in the multivariable analysis but were associated with receptive needle sharing. These were fewer years of schooling, a low monthly income, and decreased receptive needle sharing among those who had heard about AIDS. HIV/AIDS education has been shown to diminish sharing and reduce HIV incidence among IDUs in Bangkok.<sup>38</sup> Various health belief models and constructs have been identified or applied gearing IDUs towards a positive behavior change among IDUs including out-reach HIV/AIDS education,<sup>39–41</sup> a media education campaign,<sup>42</sup> and high perceived self-efficacy for risk reduction.<sup>43</sup> Educating IDUs in Karachi based on these health belief models about risk of acquiring HIV/AIDS through sharing could be an effective low cost intervention.

To further curb HIV from spreading among existing IDUs in Pakistan, well-proven interventions<sup>31</sup> would be (a) an HIV/AIDS education program,<sup>39–40</sup> preferably a community-based outreach program, (b) a needle exchange program (NEP),<sup>44,45</sup> and (c) a methadone maintenance program.<sup>46</sup>

Free availability of needles in pharmacies in Pakistan could act as a surrogate to a needle exchange program.<sup>6</sup> An advantage of a formal needle exchange program is that it provides community outreach and education<sup>6</sup> and is calculated to be a cost-effective strategy for HIV prevention.<sup>47</sup> Newer and innovative strategies include obtaining clean needles through a physician's prescription,<sup>48,49</sup> purchasing them through a pharmacy without prescription,<sup>50</sup> and

obtaining them through vending machines that mechanically exchange new syringes.<sup>51</sup>

Currently there are 10 drop-in centers in Pakistan providing harm reduction services including needle exchange at non-governmental drug detoxification centers and two mobile vans (personal communication: Rehman N; Program Coordinator United Nations Office of Drug Control, Pakistan). The first program was started in Lahore in 2000, and in 2001 three harm reduction drop-in centers were opened in Karachi. These programs need to be expanded in Karachi and in other cities of Pakistan where injecting drug use is a problem. Unfortunately methadone is prohibited by law in Pakistan. However, although there is a lack of long-term studies on alternatives to methadone, evaluating reduction in injecting drug use and HIV incidence, sublingual buprenorphine is a promising alternative.<sup>52</sup> This has been implemented successfully in neighboring India in drug rehabilitation centers<sup>53</sup> and drug demand/harm reduction programs.<sup>54</sup> The harm reduction centers in Pakistan provide detoxification services and no drug demand reduction with sublingual buprenorphine or methadone. Pakistan can follow India's strategy.

From the studies prior to the HIV outbreak in Karachi in 2003 at the drop-in centers where an NEP was available, receptive needle sharing (HCV prevalence = 86–94%) and drug injecting in groups (80%) was common among IDUs.<sup>17</sup> Also they had a high prevalence of syphilis (13%) and hepatitis B (7.5%). A good aspect was that 90% of IDUs claimed that they usually used a new needle. The failure of harm reduction programs in preventing this outbreak of HIV among Karachi IDUs has been attributed to a number of flaws/gaps in these programs (e.g., lack of advocacy, lack of coordination with HIV/AIDS programs, lack of drug treatment and an enabling environment for IDUs).<sup>19</sup> Although a systemic analysis is needed to evaluate the exact reasons for the HIV outbreak among IDUs in Karachi, the most likely reason would be IDUs changing groups and needle sharing, which transmitted and propagated a virulent strain of HIV from the Larkana outbreak (as one IDU from the drop-in center in Karachi was identified to be HIV positive from the Larkana outbreak prior to the HIV epidemic in Karachi). We speculate that the HIV epidemic in Karachi could have been worse if the needle exchange program was not in place.

Active surveillance of HIV needs to be continued to find the exact estimates of HIV prevalence and to motivate drug addicts to participate in drug demand/risk reduction programs. To have effective HIV control among IDUs in Pakistan, HIV surveillance and IDU harm reduction/risk drug reduction programs need to be coordinated, and have long-term commitment and funding. Their effectiveness as well as determinants of IDU risk behavior need to be evaluated on a continual basis in order to develop more effective interventions.<sup>55</sup> Gaps in HIV surveillance and program evaluations can lead to a false sense of security as was seen in Nepal, where HIV rose from 0 to 50% among IDUs in a surveillance-free period from 1994 to 1999 despite a needle exchange program.<sup>56</sup>

This study has important limitations. Firstly, these data do not reflect the current situation in Karachi, however they do serve as a background for comparison. Secondly, we did not find a sufficient number of IDUs as projected by the National surveys.<sup>11</sup> This could be due to a number of reasons: (1) overestimates from the NSDA 1993 survey as there was a decrease of 67% of heroin addicts in the 2002 estimate, (2) we

missed 'home addicts' as the national surveys were based on household surveys, and (3) we did not find any females in the study as heroin users are mostly males in Pakistan, though newer surveys have identified a small number of females.<sup>57</sup> These make our study less representative. However, our study was more representative than other studies<sup>13,14</sup> that were based on convenience sampling. Our study was more systemic in approach and focused on destitute street addicts who are at the highest risk of acquiring HIV and receptive needle sharing,<sup>1</sup> as confirmed by the national survey of 2000. Also, in our study 4% ( $n = 11$ ) of IDUs refused or could not be tested for HIV, which may have affected the prevalence estimate. Our low prevalence of HIV was consistent with prior<sup>13</sup> and subsequent studies<sup>14,17</sup> of HIV prevalence among IDUs in Pakistan. Lastly, because of the cross-sectional nature of the study a cause–effect relationship between the variables associated with receptive needle sharing cannot be ascertained.

In conclusion despite the low background HIV prevalence among IDUs in Karachi in 1996, injecting behavior was risky enough for easy HIV transmission as we are seeing in the current HIV epidemic. Drug demand interventions are needed to prevent drug users shifting towards injecting. HIV surveillance needs to be done on a continual basis in all places where injecting drug use is a problem. To keep HIV prevalence from further increasing among IDUs in Karachi, well-coordinated HIV risk reduction and demand reduction programs need to be continued and expanded. These programs need to be evaluated on a continual basis for effectiveness and coordinated with HIV surveillance and risk behavior studies. Efforts need to be prioritized to areas that are undergoing an HIV epidemic or are most vulnerable.

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