

Review Article

The HIV epidemic in Pakistan

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Abstract

Pakistan's HIV epidemic is fully established and expanding among injection drug users (IDUs) of whom 20% are infected with HIV. Nascent epidemics are seen in some cities among Male sex workers and transgenders who form sexual contacts of IDUs. With involvement of sex workers, Pakistan appears to be following the "Asian Epidemic Model". On the other hand, nearly all patients in HIV clinics are expatriated migrant workers and their immediate relations. Almost all principle population sub-groups have at least some cases of HIV in most cities. While universally known risk of HIV transmission are present among sex workers, IDUs, a sub-group of men from the general population and other groups, epidemics among male sex workers have preceded those among female sex workers suggesting local nuances in sex behaviors. Universal male circumcision and limited contact between sex workers and IDUs may have slowed the initial progress of the epidemic thus far although that will change as the numbers of HIV-infected IDUs and their sexual contacts grows. The

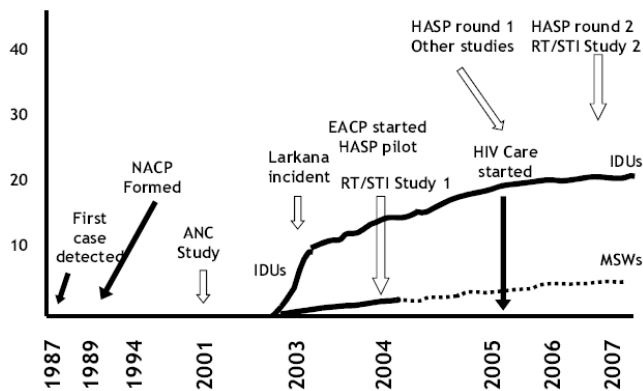
government runs HIV prevention programs for IDUs and sex workers in many cities, but must enhance the levels of coverage and quality of services provided. The slow early progression has provided a window of opportunity; it must not be allowed to close.

Introduction

After a late start, the HIV epidemic in Pakistan is well established and expanding among injection drug users (IDUs) and their sexual contacts including male and transgender sex workers (MSWs),¹⁻⁵ forming the core of the epidemic.⁶ Thus, Pakistan appears to be following the "Asian Epidemic Model."⁷ On the other hand, nearly all patients in HIV clinics are expatriated migrant workers, their spouses or children; and the infection has been diagnosed among nearly all demographic groups in the country. Extant individual injection drug use, sexual risk behaviours, poverty, economic instability, pervasive stigma and discrimination, low HIV awareness, illiteracy, extensive internal and external labour migration and porous borders

expose and infect an increasing number of people with HIV.

Since 1987, over 4000 cases have been reported to the National AIDS Control Program, Ministry of Health (NACP). The NACP, WHO and the UNAIDS estimate that there may be 80,000 persons living with HIV,⁸ although actual data suggest about half that number.⁹ Until an outbreak among incarcerated IDUs in Larkana in 2003, there was little evidence of epidemic transmission of HIV in the country.¹⁰ National surveillance has since found increasing HIV prevalence among IDUs and MSWs in several cities (Figure). However, female sex workers



NACP: The National AIDS Control Program of Pakistan (Ministry of Health).
 ANC Study: The Antenatal Clinic Study (2001).
 EACP: The Enhanced AIDS Control Program of Pakistan.
 HASP: The HIV/AIDS Surveillance Project.
 RT/STI Study: The National Study of Reproductive Tract and Sexually Transmitted Infections (2004).
 IDUs: Injection Drug Users.
 MSWs: Male Sex Workers.

Figure: Timeline of HIV in Pakistan.

(FSWs) and the general population remain largely unaffected by the epidemic so far. This review describes the risks, prevalence and transmission potential of HIV among various population subgroups and the national response to the epidemic in Pakistan.

Methodology

A search of Medline® combining "Pakistan" and "HIV" yielded 185 references; of which only about half are directly about aspects of HIV in Pakistan. However, many of these are smaller studies with limited scope. Over 50 studies from grey literature and non-Medline journals are also available. We included only published and grey studies with an adequate sampling methodology, sample size >100 and relevance to the epidemic. This review relies principally on the reports of the national HIV surveillance²⁻⁵ and 4 large research studies¹¹⁻¹⁶ commissioned by the NACP that combine to assess HIV risk and prevalence among over 50,000 IDUs, sex workers, men and women from the general population and truckers. Much of these data are

unpublished but are reported at <http://www.nacp.gov.pk/library/reports>. Surveillance methodology is also described at <http://www.nacp.gov.pk/library/publications>. This review aims to make the rich data from these "grey publications" available in the scientific literature.

Finally, this review interprets the available data to explain Pakistan's HIV scenario in terms of the roles of different population sub-groups and contextual factors that may influence the epidemic progression.

The Epidemic among the Core Groups:

IDUs and MSWs²⁻⁵ are the main core group^{6,17} for HIV in Pakistan (Table-1).

Injection Drug Users:

There are an estimated 650,000 problem drug users¹⁸ and 80,000-145,000 IDUs nationwide. Much of the knowledge about IDUs pertains to male, street based users; very little is known about home based or female users. Until 2003, many studies had described high risk but no HIV among IDUs.¹⁹⁻²¹ Since then, HIV prevalence has steadily increased among IDUs in the 12 cities that have been surveyed, with the national average around 20% (Range: 13% - 30%)⁷⁻¹⁰ (Table-1). IDUs often inject in groups of 5-10 or more and syringe sharing varies from 3% to 65% between cities, with younger IDUs more likely to share.²⁻⁵ The usual injection frequency is about 2-3 injections daily but is higher with heroin use.²⁻⁵ Almost half (46%) of the IDUs report sexual activity with regular non-commercial female partners in the past 6 months and only 10% use condoms. Many (27%) of IDUs report commercial sex with an FSW and 13% with an MSW in the last 6 months (although it is not known how often they do so); <20% ever used condoms.²⁻⁵

Street based injecting in large groups has likely contributed to the rapid rise in HIV prevalence among IDUs. Their sex with commercial and non-commercial partners and use of informal health sector, where non-sterile therapeutic injections are common,^{22,23} may possibly spread the infection to the general population. Some of this may already be underway as manifest from 2 recent outbreaks in Punjab. An ongoing investigation of one outbreak suggests that many of those infected received therapeutic injections from local providers but did not have any of the conventional sex or drug injection risk factors (Punjab AIDS Control Program report, 2008).

Sex Workers:

Sex work has a long tradition in Pakistan.²⁴ Over the

Table-1: Members of high risk groups in major Pakistani cities.

	IDU estimates	HIV Prevalence among IDUs	FSW estimates	HIV Prevalence among FSWs	Hijra (transgenders) estimates	HIV Prevalence among Hijras	MSW estimates	HIV Prevalence among MSW	Total HRG
Lahore	2560	3.8%	14168	0	1920	0.5%	1262	0	19910
Faisalabad	5244	13.3%	2040	0	1514	0.5%	1070	0	9868
Multan	685	0.3%	2557	0	690	0	1136	0	5068
Rawalpindi†	123	0	1596	0	811	0	478	0	3008
Karachi†	12282	27%	11546	0.8%	8582	1.5%	5687	4%	38097
Hyderabad	1003	25.4%	1749	0	580	1%	694	0	4026
Sukkur	2234	19.2%	1719	0	337	1%	399	0	4689
Peshawar	283	0.4%	963	0	98	1.6%	1153	0	2497
Quetta	155	9.5%	752	0.7%	202	1.5%	397	0	1506

‡Population size calculated based on 1998 census data and adjusted according to the Federal Bureau of Statistics provided adjustment for increase in population

† Karachi and Rawalpindi were surveyed in 2005. All other cities were surveyed in 2006 and 2007.

IDU: Injection Drug User. FSW: Female Sex Worker. Hijra: Transgenders. MSW: Male Sex Worker.

past 3 decades, this has transitioned from a predominantly brothel based sex-work culture to a diverse and dispersed pattern where women, men and transgenders (Hijras) sell sex. MSWs, Hijras and a third of all FSWs operate in public spaces such as parks or streets; the remaining FSWs operate out of homes or "kotikhanas". Only about 3% work in brothels.^{2-5,15} The sex workers range from full time FSWs to mobile phone accessible, part time call girls.^{2-4,25} Extrapolation of surveillance data suggests around 125,000 FSWs and about 35,000 each of the MSW and transgender sex workers nationwide. Most are young (median age: 22 for MSWs and 27-28 years for FSWs/ Hijras), debut early in sex trade (age 16-17 years for MSWs and Hijras and about 21 for FSWs) and engage about 7-10 clients/week. About half rely exclusively on sex work for an income of about Rs 3000 (\$50) a month for MSWs, Rs 3600 (\$60) for Hijras and Rs 12000 (\$200) for FSWs. Only about 20% (MSWs/Hijras) to 30% (FSWs) of the sex workers report condom use with clients and this trend has remained unchanged in past five years.^{2-5,16}

In one study^{1,12} of 2400 sex workers in 2004, 58% of Hijras had at least one and 38% had multiple STIs. In Karachi, 62% Hijras had acute syphilis and 31% had either anal or urethral gonorrhoea. Similarly, 18% MSWs had anal gonorrhoea and 36% had syphilis.^{1,16} Finally, 78% FSWs reported STI symptoms in past 6 months but only 10% from Karachi and 19% from Lahore had any current STI. However, HIV prevalence was <1.5% among MSWs, Hijras and FSWs.^{1,12} This disparity in STI prevalence is consistent with surveillance findings of rising HIV among MSWs and Hijras but not among FSWs.²⁻⁴ In the 2008, the mean prevalence in 8 cities was 1.1% (range: 0 - 3%) among MSWs and 4.3% (range: 0 - 27%) among Hijras.

Religious edicts and social norms strongly forbid male to male sex and is punishable under the Pakistan Penal Code. However, socio-religious proscription against non-marital sex with women and easier access of men to other men for sex

mean that many men seek sex with other men (MSM), often leading bisexual lifestyles that include the culturally accepted female relationships along with their sex with men. As a result in some cities, MSWs plus Hijras equal or exceed FSWs (Table-1)^{2,3,25} and MSW epidemic is preceding the FSW epidemic in all Pakistani cities.²⁻⁴ Anal intercourse transmits HIV more efficiently than vaginal intercourse²⁶ and once established among key MSM/ bisexual groups, HIV may spread rapidly to the general population particularly women who are married to these men.²⁷

National surveillance shows limited sexual contact between IDUs and sex workers with only 14% FSWs reporting ever selling sex to an IDU and only 10% MSWs/Hijras doing so in the past 6 months.^{2,3} Long term IDUs may also be relatively sexually inactive (Ahmad et al, under review). However, IDUs sell sex for drugs or money and this form of commercial sex remains unquantified in terms of frequency and the density and type of networks. However, patterns vary across cities, with higher HIV prevalence seen in cities reporting higher contacts among IDUs and MSWs/ Hijras.⁴ Other factors such as accrued contacts between IDUs and sex workers over time, baseline HIV prevalence, and potential drug injection by sex workers themselves²⁸ will also determine the rate of spread of HIV from IDUs to the sex workers and then perhaps on to the general population.

The Epidemic among Bridge groups:

Bridge groups transmit HIV from the core groups to the general population.²⁹ They have been more difficult to characterize in the Pakistani context, but wives of male IDUs, clients of sex workers,¹⁴ truck¹² or bus drivers³⁰ and perhaps migrant workers³¹ may be pertinent bridge groups.

Spouses of IDUs:

Nearly half of all IDUs and sex workers are married.¹² While surveillance data suggest their vulnerability to HIV,³² the role of spouses/non-commercial

partners of sex workers and IDUs in epidemic propagation is less well understood. Furthermore, prevention programs have not yet addressed this group. Anecdotes suggest that many wives of IDUs supplement their income through sex work. However, a recent study found that only 3% of IDU spouses reported ever selling sex, but 21% of these women injected drugs (usually diazepam) via community based medical practitioners who also give therapeutic injections to community members using the same non-sterile injecting equipment (Ahmad et al, under review). These findings raise concerns that IDUs' spouses may bridge the transmission of HIV from IDUs to the general population through shared syringes with other community members who also received therapeutic injections from the same health providers rather than via sexual contact.

Clients of Sex Workers:

Extrapolation of the national surveillance data suggests that over 60 million sex acts are sold annually in Pakistan to 3 million clients. In a recent study of 2400 men, 30% reported some non-marital sex in their lifetime (11% in the past 3 months) and that 41% of these acts were with FSWs and 14% with MSWs.³³ Another study of 600 intra-nationally migrant found that 13% reported non-marital sex in the past 12 months of which 62% were FSWs.³⁴ Although clients of sex-workers are critical drivers of the HIV epidemic worldwide, their role in the Pakistani epidemic not well studied. As many of these men are married or have non-marital, non-commercial partners, they may bridge the transmission of infections from sex workers to these women.

Truck drivers:

Truck drivers are at an increased risk of acquiring and transmitting HIV/STIs from unprotected sex with sex workers or casual partners during their prolonged absences from home. Their sexual partners include young boys/adolescent who travel on these trucks as "helpers", female or male sex workers other female non-commercial partners and their wives. There are estimated 200,000 truckers nationwide (Pakistan Truckers Association and NACP, 2006). They debut sex around 17 years, > 60% are married and a quarter engage in commercial or non-commercial extramarital sex and rarely (<8%) use condoms. The same study found 1% HIV prevalence among truckers in Lahore;¹² although, a subsequent HIV prevention programme for truckers found only 0.25% HIV via VCT (NACP 2008).

Miners:

Miners work away from home for months. Unconfirmed estimates suggest >100,000 miners nationwide. An assessment from one location found that 42% had sex with their colleagues and 16% reported at least

one STI symptom within the past 3 months (Balochistan AIDS Control Program, 2007).

Migrant Workers:

Migrant workers are predominantly low skilled rural men that travel either abroad or within the country for work and remain away from their families for months. Most are unprepared for the HIV exposures in large urban centers where they find work.

Nearly all registered patients in HIV clinics in Pakistan are those repatriated after acquiring HIV while working abroad, mostly from the Middle East. Mandatory HIV testing is conducted at recruitment and repeatedly to renew work permits in the Middle East. Those who acquire HIV are quickly identified and deported back - often without being told the reason for the deportation (Clinic patients and NGO interviews). The quick testing and re-testing means that most are diagnosed and deported during acute HIV infection, when they are healthy and affluent from their Middle East stay and are most likely to transmit the infection to their spouses/sex partners. Upon return, many marry or continue risky sex behaviours (Clinic patient interviews) and infect their spouses/sex partners.

With nearly 2 million migrant workers currently in the Middle East (Bureau of Emigration, Pakistan), the potential number of individuals at risk of contracting HIV is huge. However, no national mechanism exists to enumerate or locate HIV+ repatriated workers. On the other hand, except those from Karachi, most are rural residents from NWFP, FATA and southern Punjab. The infections they transmit will likely lead to truncated epidemics (an epidemic that will likely not propagate further since their partners have limited or no further partners) when they infect their spouses and their limited number of extramarital partners.³⁵ However, this assumption may underestimate the risks as was illustrated by rural commercial sex networks in India which are highly interconnected and spread HIV between villages.³⁶

Individuals that migrate internally are more numerous. An estimated 10% of all adult men live and work away from their families (Census 1998). International experience including that from the neighbouring India, suggests that they may indulge in high risk behaviours including commercial sex (both buying and selling), drug use and sex with other men. In a recent study of such men, 13% reported extramarital sex, more than half with commercial partners but only 3% had STIs.³⁴ More research is needed to understand the risk profiles and networks of migrant men.

The Epidemic in General Population:

There is little evidence that the general population in Pakistan is immediately at risk. The NACP, WHO and the

UNAIDS estimate around 80,000 HIV+ cases (Range: 24,000-150,000) in Pakistan,³⁷ with an overall HIV prevalence at 0.05% of all population. Surveillance based estimates suggest the actual number of HIV+ individuals may actually be about half that.^{9,38} A study of men from the general population in 2007 found that 0.1% had HIV and 4% had any STI including HSV-2.³³ Another study of 2400 antenatal clinic and labour ward attendees in 2001 found no HIV and <1% of any STI.¹¹ More recently, screening of antenatal clinic attendees showed that only 21 out of the 8000 (0.003%) were HIV infected. Nearly all were wives of known HIV patients (PPTCT Center Preliminary Data NACP 2008).

Over 95% of Pakistani men are circumcised¹² which reduces HIV transmission³⁹ and has likely curtailed HIV in Pakistan. However, not all is well. In Lahore, 13% of internally migrant men reported extramarital sex with an average of 8 partners (38% non-commercial) in the past year.³⁴ In another study, 30% of men from the general population reported some non-marital sex in their lives and 11% in the past 3 months. Only 16% used condoms and 4% had an STI.³³ Furthermore, extrapolation of surveillance data suggests that over 60 Million sex acts are sold nationwide annually to approximately 3 million clients.³ Finally a study of wives of IDUs found that 21% of these women were IDUs themselves and nearly all of these injected via local doctors or quacks, usually with un-sterile equipment that was also used to provide therapeutic injections to other members of the community.²⁸ In short, significant transmission potential exists within the general population once HIV is introduced among it.

Therapeutic Injections:

Pakistan has one of the highest rates of therapeutic injections globally. In one study, 51% respondents in a peri-urban community had received an injection within the past week and 74% had received >10 injections in the past year.⁴⁰ Other studies confirm similar overuse of therapeutic injections for minor health ailments in general medical practice, small hospitals and in the informal medical care sector.²² Additionally, medical practitioners, barbers and street-side teeth-extractors often use non-sterilized equipment. Due to marginalization from conventional medical facilities, many IDUs and their spouses (many of whom also receive their drug injections from non-formal providers²⁸) frequent these providers. While detailed studies are needed to understand the precise transmission dynamics via this route, it is concerning that the prevalence of Hepatitis B and C is 4-5% even in rural areas and among individuals who were most likely infected via these routes.^{23,41,42}

Blood Transfusions:

Of the >1.5 million units of blood that are transfused

nationwide annually, approximately two third are in the public sector and the remaining in the private sector or through NGOs. About 20-40% of blood is not screened for any communicable diseases (NACP 2006) and the law for mandatory blood screening remains unenforced. Despite these, HIV prevalence remains low among non-selected blood donors. Among >41,000 non-selected blood donors at a major tertiary care center serving mostly indigent patients between 1996 and 2005,⁴³ HIV was 0-0.06%, with no more than 4 cases detected in any year. Syphilis (RPR) was 0.19-0.48%, Hepatitis B: 1.46-2.99% and Hepatitis C was 3.01-4.05%. Data presented at various national conferences are similar. Furthermore, blood-borne transmission accounted for 19% of all HIV cases reported to the NACP in 2004, since then very few further cases have been due to blood exposures. These are consistent with the low current HIV levels but high transmission potential within the general population.

Youth:

About half of Pakistan's population is under 18. Currently <55 HIV+ infants, children or youth have been identified. Most were infected from HIV+ mothers or from transfusion of infected blood. Extrapolations on a recent study suggest that about 30,000 youth or adolescents live on the street and of these about 1 in 6 either sell sex or abuse drugs (Risks and Vulnerabilities of MARA, http://www.unicef.org/pakistan/Situation_Assessment_Report.pdf UNICEF 2008). In another study from Karachi, street children debuted sex around 13-15 years of age and 30% had sold sex to men and women. Of these 80% had never used a condom, and when a condom was used, the decision to do so was made by the (older) partner. Most had used either solvents (90%) or marijuana (57%) (PAVHNA, 2004). While street and employed youth (those who work in shops, trucks etc) are vulnerable to drugs and sexual exploitation, children in general may be safer. In one survey of school-going 14-16 year olds, fewer than 3% of boys and 1% of girls were sexually active; however, over half were not aware of HIV or its risk factors.⁴⁴ Currently, few interventions reduce risk among at-risk youth and these efforts are further compromised by current laws that prohibit HIV testing for those under 18 without parental or state consent.

Women:

A fifth of all diagnosed HIV cases are women (NACP 2007). Many are at risk by simply being married to either IDUs³² or other HIV+ men. Most are unaware of their risks and lack empowerment or skills to negotiate for safer sex practices. Their risk is amplified by their limited access to information or VCT due stigma and societal pressures, and lack of mobility to seek care on their own. Most HIV+ patients registered at HIV centers are from conservative

households and often do not disclose their HIV status to their wives or refuse to bring their spouses for HIV services, despite counselling.

Social and religious context:

Traditional risk factors such as sex trade and drug use are affected by poverty. Despite recent advances that took, Pakistan's annual GDP over USD 800 per capita, actual poverty and rich to poor disparity have increased. These are indirectly suggested by the high numbers of sex workers and the low rates they charge for commercial sex.^{2-5,12} At these rates sex workers have little leverage to negotiate safe sex and may have to engage high numbers of partners to make ends meet; thus enhancing their vulnerability.

Religious edicts against extramarital sex and for male circumcision protect against HIV. However, sexual risk behaviours may not differ between Muslims vs. non-Muslims (R. Goyal, Population Association of Pakistan, Annual Conference 2005). Furthermore, some interpretations of religion and other conservative traditions limit open discussion of the risks and prevention of HIV, reducing awareness propagation about HIV and its protection in the society. These disproportionately impact the youth, who then turn to peers and may acquire wrong information. Furthermore, some interpret religious doctrine

to reject contraception, further increasing the risk within a society. Finally, religious edicts against non-marital sex and the repression of women may create pressures against heterosexual sex and push some men into riskier sex with other men.

HIV Prevention and Control Interventions:

Successful HIV prevention interventions should be epidemic-stage-specific and have scale and scope to reach most of the target populations with protective services.⁴⁵ Under its "Enhanced HIV/AIDS Control Program", the Government of Pakistan used \$70 Million of its own and donor funds during 2003-8 (NACP Mid-term Report 2006), to implement these interventions via NGOs (Table-2). A quarter of these funds were used for prevention interventions for sex workers and injection drug users, 20% for a mass media campaign and 10% for surveillance.

The national surveillance shows that IDUs programs resulted in improved knowledge and injecting practices. Sex worker programmes had more modest results.²⁻⁴ Using coverage of interventions as a measure of effectiveness (since coverage depends upon syringe supply, outreach, effective counseling and behaviour change among IDUs⁴⁶) a recent report showed that IDU programmes provide 35-80% coverage in the cities they operate in compared to <10% by sex workers programmes (Khan, World Bank 2008,

Table 2: Non governmental Organizations that are implementing the HIV Control Program in Pakistan.

HRG	City	Implementing agency	Program since
IDUs	Karachi	Pakistan Society; Al Nijaat Foundation; Marie Adelaide Society	2003*
	Lahore	Nai Zindagi	2003†
	Sialkot	Nai Zindagi	2005
	Sargodha	Nai Zindagi	2005
	Faisalabad	Nai Zindagi	2005
	Peshawar	Dost Welfare Foundation	2004‡
	Quetta	Legends Society	2006
FSWs	Lahore	Contech International	2005
	Faisalabad	Contech International	2005
	Karachi	Amal Human Development Network	2004
	Peshawar	ORA International	2007
	Multan	Rabta Consortium	2005
MSWs	Lahore	Contech International	2005
	Faisalabad	Contech International	2006
	Karachi	Infection Control Society of Pakistan	2006
	Hyderabad	Sukkur Blood Bank	2006
	Peshawar	ORA International	2007
Jail Inmates	Karachi	Sukkur Blood Bank	2006
	Peshawar	Dost Welfare Foundation	2006
Truckers	8 cities	The Family Health International	2006

*The Pakistan Society has implemented the government project since 2003 but has provided drug harm reduction in Karachi since mid-70s.

†Nai Zindagi has implemented the government contract since 2003 but has provided drug harm reduction in Lahore since 1990.

‡The Dost Welfare Foundation has implemented the government contract since 2004 but has provided drug harm reduction in Peshawar since 1998.

unpublished). Low coverage was due to limited outreach and understanding by NGOs and government of which interventions to prioritize. Finally, while IDU coverage is high in individual cities, it equates with only about 36% coverage among the largest of cities and 20% for all of Pakistan. The national coverage was <5% for sex worker interventions.

Prevention programmes mainly provided social services, behaviour change counselling, condoms and syringes initially. Voluntary counselling and testing (VCT) for HRGs was added much later. Although it is now a part of all HIV prevention projects, only about 10,000 members of HRGs and 25,000 from the general population had been tested by July 2008. Referral linkages between these individuals and HIV care are evolving slowly. HIV care is being provided to over 2000 HIV+ individuals. Among these about 963 (NACP HIV Treatment and Care center data 2009) have AIDS and receive free antiretroviral medicines via 10 public and 3 private clinics. Despite initial successes, concerns remain about the quality of care rendered, as early analyses show around 10-17% annual treatment failure rates for antiretroviral therapy treated patients (Preliminary Data from HIV Treatment and Care centers NACP 2008).

It is possible to address programmatic concerns and improve the quality of services through in-depth analysis of surveillance data including interpretation of present trends and comparisons with other regional countries to better predict the future epidemic trajectory. Such analysis has been limited to date. Finally, bridging groups will also have to be addressed. For now, truckers are the only bridge group receiving services and surveillance data does not capture any bridge groups. Future research should also guide the content and extent of interventions needed for spouses of IDUs and sex workers, clients of sex workers, street youth, miners and other at risk groups.

Future of the Epidemic:

The HIV epidemic in Pakistan is well-established and expanding among IDUs, MSWs and expatriated migrant workers. HIV infections in MSWs preceded those among FSWs likely because of more efficient transmission through anal intercourse and the fact that although clients of MSWs while more limited, may have more interlinked and dense sexual networks. For the time being these factors may delay onward epidemic progression to the general population, which may be more at risk from the over-use of unwarranted therapeutic injections with used equipment than from sex. However once the epidemic reaches a critical threshold in FSWs and spouses of IDUs or sex workers it may spread to the general population. Almost all risk groups already have at least some cases of HIV in all cities. Overall, understanding and predicting the timing of when the epidemic crosses from one to another group will be very

useful in timely placement of prevention programmes for maximum impact.

Considerable surveillance and program data are now available that should be analyzed for programme monitoring and design. This was done recently in the re-design of the government HIV prevention programme for 2009-13 and for measurement of the impact of interventions, but should be conducted routinely. However, once programme is designed, it is essential that all prevention programmes be monitored for effectiveness and that implementation be guided by evidence. The relative lack of involvement of the general population is a window of opportunity that must be utilized to prevent a generalized epidemic in Pakistan.

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