PART I

The Epidemiology of HIV and Prevention Strategies
Introduction

After almost three decades, the understanding of the epidemiology of HIV has greatly improved with respect to the global distribution and diversity of HIV, the HIV transmission dynamics in different contexts, and effective prevention responses. The dynamics of the epidemic are increasingly apparent, with sufficient similarities across the continent to speak broadly of an “Asian” epidemic pattern. Within the Asian epidemic, however, there are important variations.

Experience over the last decades has shown that it is critical to ensure that the responses to HIV and AIDS are based on a rigorous and objective analysis of the biobehavioral determinants of HIV transmission, and that they are tailored to address the major drivers of transmission. Often, national and regional responses to HIV and AIDS have been undermined by generic approaches, which do not address the major local drivers of the epidemic in each context. An understanding of both the underlying similarities and the variations of the pattern of HIV across the region is therefore central to effective responses to the epidemic in South Asia.

Alongside an improved understanding of the transmission dynamics, we have learned how important it is to identify and invest in effective, proven HIV interventions, and to monitor their coverage. Crucially, effective
approaches must be undertaken on a large scale and reach a majority of those at risk of infection. These principles are particularly important in Asia, where the complexities and disparities within and between countries regarding the spread and the transmission of HIV compel a well-informed epidemiological reading and effective, focused responses.

This chapter takes stock of the improved knowledge of the epidemiology of HIV. It provides an overview of the scale and heterogeneity of the HIV epidemic, drawing some lessons from the global experience and discussing the situation in South Asia in some detail. It reviews the regional transmission patterns and analyzes key factors and underlying determinants that contribute to it. Finally, it summarizes what is known about the status of implementation of effective prevention interventions and programs in countries. Understanding the epidemic and applying the lessons learned about what works have important implications for current priorities and the future direction of the epidemic in South Asia.

The Global Context

Before discussing the situation in South Asia in more detail, we summarize some lessons learned regarding the global HIV epidemic, to accentuate the specific features of the situation in South Asia and provide some background for a discussion of links between the profile of the epidemic and prevention priorities. In particular, we discuss improvements in estimates of the scale of the HIV epidemic, and key differences in terms of the major HIV drivers and transmission modes across countries.

The Scale and Heterogeneity of the Global HIV Epidemic

Improved surveillance has yielded important results and insights. Most important, estimates of HIV prevalence used to be primarily based on data from antenatal clinics (ANCs). Estimating HIV prevalence for the overall population based on a (possibly small) sample of blood tests from pregnant women poses substantial challenges. In the last five years, these estimates have been complemented by findings from large-scale population health surveys in numerous countries, including Cambodia, Papua New Guinea, Indonesia, and India. These surveys have enabled us to refine and revise previous estimates of HIV prevalence derived from antenatal surveys, and have given us more accurate global HIV prevalence estimates. The results of antenatal and population-based HIV surveillance for the countries that have completed national population-based HIV surveys appear below in figure 1.1.
As figure 1.1 shows, population-based estimates are lower than antenatal estimates in almost all cases, and significantly lower in many cases. The differences are particularly pronounced in parts of East Africa (notably Rwanda and Ethiopia), much of West Africa (including Sierra Leone, Burkina Faso, and Ghana), and in Asia. Cambodia’s population-based HIV prevalence of 0.6 percent is also far lower than its antenatal estimate of 2.6 percent, as are the differences in India, discussed below.

Although the estimates based on ANC surveillance show higher levels than subsequent population-based estimates, the ANC monitoring continues to serve an important purpose in following and analyzing national trends and alerting policy makers to generalized spread of the epidemic in areas of high prevalence. However, improved and expanded biobehavioral surveillance has given us greater insight into the heterogeneity of HIV globally, enabling national governments and development partners to prepare more differentiated national AIDS strategies and programs.

The global HIV epidemic is far more heterogeneous than previously recognized, with strong linkages between the HIV caseload, the major transmission routes, and the optimal prevention interventions and strategies required to curb transmission. A generalized epidemic, as seen in South Africa and Papua New Guinea, is predominantly driven by unsafe sex among the general population. Where HIV is predominantly driven by injecting drug use and unsafe sex among vulnerable groups at highest
risk, such as sex workers and their clients, and men having sex with men, a pattern of concentrated epidemics evolve. However, these are not mutually exclusive epidemic patterns, and several other key factors, such as concurrent partnership and male circumcision, contribute to the epidemic dynamics. Although South Asia primarily has concentrated epidemics, injecting drug use (IDU) can jump start a rapidly spreading epidemic within and beyond the IDU community, fueled by sexual transmission among partners, and through a nexus of injecting drug use and commercial sex work, as shown in China and Indonesia. This is a situation to be alert to in several parts of South Asia (Afghanistan, Nepal, northeast India, Pakistan, and Bangladesh).

Key Factors in HIV Transmission

There is increasing evidence that two factors appear to play a major role in understanding HIV transmission globally and the nature of concentrated epidemics specifically: the first factor is acute infection, coupled with concurrent sexual partnerships, and the second is the presence (or absence) of male circumcision. These factors, and the role that injecting drug use plays in the Asian epidemic dynamics, will be discussed here, as they are critical pieces in our understanding of why South Asia is unlikely to face generalized epidemics and why our discussion on the impact of the epidemic and the risk to development in the following chapters are not centered around hypotheses and projections of large-scale generalized epidemics, but instead on the size, spread, and consequences of concentrated epidemics.

The size of an HIV epidemic is significantly influenced by both the **rate and patterns of sexual partner change**. While there is a robust association between the number of sexual partners and HIV infection in many contexts, patterns of partner change may be at least as important (Halperin and Epstein 2004). Growing biological evidence shows that HIV viral load, and thus infectivity, is far higher during acute HIV infection, that is, in the initial weeks after HIV infection (Chao et al. 1994; Quinn et al. 2000). This leads to the important distinction between serial and concurrent sexual patterns (Halperin and Epstein 2004). In serial partnerships, one typically has one ongoing sexual relationship at a time. In concurrent partnerships, one may be in a sexual network with more than one ongoing sexual relationship at a time. Whereas serial partnerships limit exposure to a partner with acute HIV infection (who has higher infectivity), concurrent partnerships expose everybody in an ongoing sexual network to greater risk. Mathematical models suggest that concurrent sexual partnerships may
increase HIV transmission tenfold—projections that are firmly supported by growing biological evidence of variability in viral load and infectivity (Morris et al. 1997).

As shown in figure 1.2 below, HIV infectiousness varies over the disease stage, with infectiousness far higher in the first weeks or months after initial seroconversion, during viremia. Infectiousness then declines during asymptomatic infection, before climbing again during HIV illness.

If a person has multiple concurrent sexual partnerships during acute infection, he or she may infect several partners. If they in turn have concurrent sexual partnerships, a cascading chain of infections may rapidly occur. In contrast, serial or sequential sexual partnerships may limit the number of partners who are exposed during acute infection, essentially trapping the virus in a dyadic relationship.

There is some preliminary evidence that concurrent sexual partnerships may be lower in Asia than Africa, suggesting a lower potential for widespread sexual epidemics in Asia. These data are presented in figure 1.3 below.

These patterns tentatively suggest that generalized epidemics are unlikely to occur in East Asia. The extent to which we can extrapolate and generalize from these studies to the South Asian epidemic is debatable since more data is needed from South Asian populations on sexual networks and practices, including the frequency of multiple sexual partners. Data from the district level in India, for example from the Bagalkot district of Karnataka state, show a heterogeneous picture, with significant differences in sexual networks and practices between neighboring

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**Figure 1.2  HIV Infectiousness by Disease Stage**

- **Risk of transmission**
  - 1/25 - 1/1,000
  - 1/100 - 1/1,000
  - 1/50 - 1/1,000

- Disease stage:
  - three weeks
    - seroconversion (acute infection)
  - months to years
    - asymptomatic infection
    - HIV progression (falling CD4 count)
  - AIDS

**Source:** Galvin and Cohen 2004.
districts and subdistricts influencing HIV prevalence rates (India-Canada Collaborative HIV/AIDS Project (ICHAP) 2004).

An association between HIV and the absence of male circumcision has been noted in high HIV prevalence areas since the late 1980s. The following analysis is not intended as an argument for male circumcision as a priority public health intervention in South Asia, but as a heuristic to understand epidemic potential in South Asia. Scientists have noted an association between male circumcision and HIV rates since the 1980s (Bongaarts et al. 1989), including in India (Reynolds et al. 2004). For years, the evidence was considered plausible, but many observers have argued that it is difficult to disentangle other factors, such as religion, culture, sexual behavior, and geography as potential confounding factors. However, the weight of evidence has grown stronger. A meta-analysis of 38 studies from Africa concluded that uncircumcised men were more than twice as likely to have HIV as uncircumcised men (Weiss et al. 1999). A longitudinal study of male sexual partners of HIV-positive women in Rakai, Uganda, found that 40 out of 137 uncircumcised men and 0 out of 50 circumcised men acquired HIV (Grey et al. 2000). Ecological evidence demonstrates an increasingly close geographic
association between lower male circumcision rates and higher HIV prevalence rates. A major UNAIDS multicountry comparison of high- and low-prevalence African cities concluded that male circumcision was the major predictor of disparities in HIV levels (Auvert et al. 2001). As figure 1.4 illustrates, no Asian country with a high rate of circumcision has HIV prevalence above 0.1 percent.

The gold standard of public health programs is, of course, a randomized trial. In mid-2005, a randomized trial of male circumcision of 3,035 men in Orange Farm, South Africa, was halted when an interim analysis demonstrated a protective effect so large that it would have been unethical to continue the trial. The analysis showed that male circumcision reduced HIV incidence by 60 percent, from 2.2 percent to 0.77 percent (Auvert et al. 2005). Two other trials in Kenya and Uganda were halted early after they showed a similar protective effect for male circumcision. It should be noted that similar trials have not yet been done in low-HIV-prevalence areas, or in South Asia, which would be of importance to inform prevention policies and program priorities there. In addition, feasibility studies that take into account appropriateness and cultural acceptability factors, and comparative intervention studies, such as studies comparing the effectiveness of the treatment of sexually transmitted infection (STI) to circumcision in low-prevalence settings, are also needed in order to include male circumcision in the list of priority public health interventions for South Asia (appendix table 1).

There are plausible biological explanations for the documented relationship between male circumcision and HIV infection. The intact foreskin has far more Langerhans’ target cells than other genital tissue. The

**Figure 1.4 Male Circumcision and HIV Prevalence in Asia**

![Bar chart showing male circumcision and HIV prevalence in Asia](chart.png)

*Source: UNAIDS 2004.*
internal foreskin has a soft mucosal surface, unlike the hardened skin-like surface of the external foreskin. Circumcision results in keratinization, or toughening of the glans. An intact foreskin provides the optimal environment for infectious agents (Patterson et al. 2002; Szabo et al. 2000).

The implications of these data for the South Asia region may be summarized as follows. Male circumcision is an important explanatory factor in our understanding of the epidemic potential and the nature of concentrated versus generalized epidemics. Male circumcision is widespread in Pakistan, Bangladesh, and Afghanistan, and uncommon elsewhere in the region. Thus, Pakistan, Bangladesh, and Afghanistan may have a more limited potential for heterosexual HIV epidemics. However, injecting drug use may ignite potential epidemics, particularly if there is a nexus between injecting drug use and sex work. HIV transmission among men having sex with men may also play a proportionately greater role in Pakistan, Bangladesh, and Afghanistan, because of greater transmission efficiency related to anal intercourse, even among circumcised men. Conversely, the absence of extensive male circumcision may increase the relative epidemic potential in other South Asian countries, particularly where it coincides with other behavioral and structural factors, as discussed below.

**Injecting drug use** may trigger heterosexual HIV transmission in contexts where it may otherwise have been unlikely, including in Pakistan, Bangladesh, and Afghanistan, and amplify it where the potential already exists. A nexus between injecting drug use and sex work may play a particularly important role in igniting and amplifying HIV transmission. The Golden Crescent, which is the nerve center of the global opium trade, straddles South Asia, the Golden Triangle flanks South Asia, and trafficking routes transect the entire region. Four countries in South Asia are directly affected by these production areas—Afghanistan and Pakistan by the Golden Crescent, and India and Bangladesh by the Golden Triangle (United Nations Office on Drugs and Crime (UNODC) 2004). It is clear from map 1.1, showing the two major drug-producing areas in Asia, that HIV risk transcends national borders and requires transregional programming, linking drug-related HIV prevention activities in Afghanistan and parts of Pakistan more closely to Iran, and Central Asia and parts of India and Bangladesh more closely to Myanmar and East Asia.

Drug use contributes to the HIV epidemic mainly through the use of contaminated needles, syringes, and other injecting equipment, and fueled by the practice of sharing among drug users (Ohiri 2006). Injecting drug users are therefore at increased risk, while other drug users also have potential risks from high-risk sexual behavior. The synergy between
injecting drug use and sex work is implicated in the ignition and continuation of most epidemics in Asia.

Globally, there are about 13.2 million injecting drug users, of whom between 1.3 million and 5.3 million live in South and Southeast Asia (UNODC 2006). IDUs tend to be particularly vulnerable to HIV infection because of their highly stigmatized and hidden behavior, and the rapid and efficient way in which HIV spreads through the sharing of contaminated needles, syringes, and other drug use equipment. The demand for drugs is relatively inelastic to price, whereas the demand for a specific type or preparation of a drug (such as the pure form of inhaled heroin) is price elastic. Therefore, a drug addict will continue to demand drugs until he or she is cured of his or her addiction, and when the cost of a particular drug increases (or the drug becomes scarce), the user quickly shifts to other cheaper substitutes, which are often injected.

There is evidence of increased injecting and sharing of injecting equipment in the South Asian region. There is an association between increased injecting risk behavior and (i) length of injecting career (the longer a person has been injecting, the more likely he or she is to share); (ii) frequency of injection (the more frequent, the greater likelihood of sharing and reusing needles); (iii) type of drug used (increased sharing is often observed in heroin users, and some drugs need to be mixed with blood before they are injected (Ohiri 2006)). If such drugs are shared, then the risk of infection increases. The reasons often given for sharing injecting

\[ \text{VOLUME IN KILOGRAMS} \]

\[ \text{MAIN PRODUCTION AREAS} \]

equipment include the unavailability of needles and syringes, due to their high relative cost and inaccessibility; fear of being caught with injecting paraphernalia, which in many places remains illegal; inadequate knowledge about HIV and AIDS, other diseases, and the risk of sharing needles and syringes; the use of shooting galleries and professional injectors, where injecting equipment is shared and reused; and group norms and rituals associated with injecting.

Thus, we have examined some of the factors that explain the dynamics of HIV transmission. To understand HIV transmission in general, and the heterogeneity in South Asia specifically, we need to take into consideration these key biological and behavioral factors and how they interact: infectivity during early HIV infection, concurrent unprotected sexual partnership, sexual networks, including male-tomale sex and commercial sex work, male circumcision, and injecting drug use practices and their socioeconomic determinants. In the next section of this chapter we will examine how these factors play out in the South Asian region.

HIV Transmission Patterns in South Asia

In South Asia, as in the rest of Asia, the epidemic is driven by the prevalence of risky practices, such as injecting drug use and unprotected sex, among vulnerable groups. The overall size of the Asian epidemic depends on the prevalence and transmission of HIV within and between vulnerable groups at high risk; their size; number of sexual or injecting partners; unprotected sex with partners, spouses, and clients; and the extent of preventive measures, such as condom use and clean needle exchange.

In some Asian countries, such as Thailand, Cambodia, and parts of India, the scale and frequency of commercial unprotected sex have been sufficient to ignite sexual epidemics among sex workers, their clients, and a growing number of the clients’ sexual partners. In many countries, such as Indonesia and China, injecting drug use triggers epidemics that spread to sex workers, then to their clients and beyond. In many Asian countries, prisoners inject drugs and they constitute a priority group in their own right. Mobility can amplify the problem, putting truckers and their helpers, migrants, and refugees at higher risk, as is the case, for example, in Afghanistan. Cross-border mobility of sex workers also contributes to different exposure risks, as shown by the different HIV prevalence rates among sex workers in Nepal, for example, who cross the border to India to sell sex. As will be discussed in future sections, in the absence of effective prevention responses among
vulnerable groups in South Asia, HIV spreads inexorably among vulnerable groups and to their immediate sexual partners.

An understanding of sexual and injecting practices, and their determinants in each context, is central to an informed response that requires both an understanding of vulnerability and risk, and how to engage and reach vulnerable groups with effective responses. Widespread stigma makes it harder to reach vulnerable groups and to implement proven approaches. An informed sociobehavioral understanding and compelling evidence base will better assist countries to develop effective approaches to reaching and working with vulnerable groups.

The South Asian countries demonstrate all these complexities. There is a growing body of biological and behavioral surveillance and research in South Asia, which provides the basis for a better understanding of South Asia’s epidemics. India’s data-driven response can serve as a model for evidence-based planning and programming (Claeson and Alexander 2008); however, most studies are seldom analyzed and interpreted in an integrated, analytical manner. There is a continuing need for rigorous analysis and synthesis of the major biobehavioral factors and drivers of the epidemic, the structural determinants, and the trends in South Asia’s HIV epidemic, reinforced by an equally rigorous review of the evidence base for various interventions, and a review of the scope and reach of existing programs. Such analyses are particularly important at the local level. It is vital to examine the heterogeneity of the epidemic across and within South Asia. The notion of regional or even national epidemics belies the reality of multiple, variegated local epidemics.

By the early 2000s, most countries in South Asia had established some form of sentinel serological surveillance. In addition, India, Nepal, Pakistan, and Bangladesh have initiated second-generation surveillance, and have conducted at least two rounds of behavioral surveillance. Based on these data, South Asia’s epidemic is summarized in table 1.1.

South Asia’s most severe epidemics are in India and Nepal, where significant transmission occurs through sex work, injecting drug use, and unprotected sex between men. Significant numbers of both men and women have HIV. Both Pakistan and Bangladesh face growing epidemics, primarily among men sharing injecting equipment and men having sex with men. HIV rates remain low among sex workers and there is still an opportunity to avert a heterosexual epidemic. Although there are limited HIV data for Afghanistan, it must act urgently to limit HIV infection in its growing population of injecting drug users. Other countries—Bhutan, the Maldives, and Sri Lanka—have low HIV prevalence rates.
Based on data from UNAIDS, the World Bank estimates that 2 million to 3.5 million people in South Asia may have HIV (table 1.2). This estimate is dominated by India, which has an estimated 2.45 million people living with HIV, with a 95 percent confidence interval of 1.75 million to 3.15 million people living with HIV.

**India**
India’s HIV estimates were revised significantly in July 2007, after the results of the National Family Health Survey, India’s first national population-based HIV survey, yielded a lower adjusted HIV prevalence rate (0.41) than previous estimates (0.92) based on antenatal data. The revised and previous estimates are summarized in table 1.3 below.

With approximately 30 percent of Asia’s population, India has over one-half of the continent’s estimated HIV infections. The heterogeneity of...
the HIV epidemic in India is critically important. Given India’s size and complexity, it is best analyzed as a continent, some of whose states are larger than many African countries, and many of whose districts are larger than some African countries. When its size and diversity are acknowledged in this manner, the heterogeneity of its epidemic becomes easier to recognize. HIV in India is concentrated in a few high-prevalence states—in south, west and northeast India—specifically Tamil Nadu, Karnataka, and Andhra Pradesh in south India; Maharashtra and Goa in west India; and Mizoram, Manipur, and Nagaland in northeast India. Data from Kumar et al. (2004) suggest that HIV prevalence in south, west and northeast India is approximately four- to five-fold higher than the rest of India (figure 1.5). Data also suggest that people in south and west India have significantly more sexual partners.
A district-level analysis of India’s HIV epidemic is important and revealing (Moses et al. 2006). About 50 key districts in India may have over half of the country’s HIV cases. Many of these districts are found in the following three clusters: northern Karnataka and southern Mahasrashta; coastal Andhra Pradesh; and northeastern India. The evidence suggests that India’s highly heterogeneous epidemic poses its greatest risk and challenge through locally concentrated epidemics, particularly in south India. There is evidence from mapping studies that in many locations of south India there are substantial pockets of high-risk networks. Most networks involve female sex workers, but there is growing evidence that high-risk networks of men having sex with men (MSM) also contribute significantly to HIV transmission in some contexts. IDU networks are largely concentrated in the northeast states and in urban areas throughout India. The evidence suggests that few places in India are likely to experience a truly “generalized epidemic.” While significant numbers of the general population may acquire HIV, it is largely likely to be through exposure to buying and selling sex and injecting drug practices. There is also considerable evidence from Karnataka and elsewhere of a significant rural epidemic, with rural HIV prevalence and per capita numbers of sex workers exceeding urban figures in many cases (Moses et al. 2006). Recent evidence indicates that the incidence of HIV has begun to fall among young antenatal clients ages 15–24 (the first group in which change is expected) in south India (Kumar et al. 2005), while HIV seem to remain overall low and stable in north India (see figure 1.6).

In summary, India’s epidemic remains containable. It is ignited by IDU in northeast India and by sex work elsewhere, with MSM contributing significantly in many areas. It requires a highly disaggregated analysis and response—focusing on high-prevalence districts and hotspots. There

**Figure 1.6  HIV Trends among Pregnant Women Ages 15–24 in India**

![HIV prevalence graph](image)

*Source: Kumar et al 2006.*
is evidence of a significant rural epidemic in parts of south India. Encouragingly, HIV appears to be falling in south India. India has made major strides and recorded notable successes in its response to the HIV epidemic, discussed more in subsequent sections. Nationally, the epidemic has slowed and may be stabilizing or falling in south India. In the state with one of the earliest and most severe epidemics in India, Tamil Nadu, several indicators point to encouraging trends, although vulnerability and risk remain a challenge.

**Nepal**

Although surveillance in Nepal is limited and has been disrupted by political unrest, the epidemic appears to be more severe than recognized. It is somewhat similar in character to that observed in parts of India and it appears to have the potential for a significant epidemic among vulnerable groups at high risk, especially sex workers and injecting drug users. Injecting drug use is widespread in Nepal and overlaps with commercial sex. Migration to India, in particular to Mumbai, is also associated with increased HIV prevalence. However, with better data at hand, it appears the HIV prevalence rate stabilized between 2004 and 2006. These include surveillance data among populations at higher risk (that is, integrated biological and behavioral surveys among female sex workers (FSW), IDUs, MSM, and migrants, antenatal clinic data, population-based surveys such as the Nepali Demographic and Health Survey, and case reporting (HIV estimations briefing by the National Center for AIDS and STD Control, April 2008). HIV prevalence among adults is estimated at 0.49 percent, with a consistent distribution across regions. Almost 50 percent of all HIV infections are in the area around the Terai Highway and 20 percent are in the far Western hills.

As elsewhere in South Asia, the HIV epidemic in Nepal is likely to continue to be largely driven by injecting drug use and sex work—and in particular, the nexus between the two. As figure 1.7 shows, HIV increased sharply among injecting drug users and sex workers in Kathmandu over a period in the mid- to late 1990s, and these rates seem to have stabilized among FSW and IDUs in recent years (2004–06). HIV prevalence rates in a study of 400 MSM show 6.7 percent HIV prevalence among male sex workers (MSW) and 2.3 percent among non sex workers (MSM) (Family Health International 2007).

The extent to which migration to India is a risk factor is compellingly illustrated in figure 1.8 below. An estimated 40 percent of Nepal’s epidemic is linked to migration to India, and particularly Mumbai.
HIV responses in Nepal have been hindered by instability. Actions to date have mainly been led by NGOs. Nepal requires more urgent assistance to tackle its HIV epidemic than any other country in South Asia.

**Pakistan**

After many years of limited surveillance, Pakistan has recently completed two high-quality biobehavioral survey rounds, which shed significant light on its HIV epidemic Molecular epidemiological evidence suggests that Pakistan’s epidemic is at an early stage. There is evidence of a rapid increase in HIV infection among injecting drug users in Karachi and several other cities. Mapping studies have revealed significant populations
of injecting drug users in several Pakistani cities (National AIDS Control Program (NACP) 2006). Unless Pakistan rapidly increases the scale and quality of its programs for injecting drug users, it will face a significant epidemic in this population, which also overlaps with sex workers and their clients. Pakistan also has a significant population of male sex workers and hijras, who are showing low but slowly increasing HIV rates. There are also large numbers of female sex workers, whose HIV prevalence is currently low, but who are particularly vulnerable to HIV infection through the nexus between commercial sex and injecting drug use. Figure 1.9 below indicates the major epidemic Pakistan now faces among injecting drug users in Karachi and the growing epidemic among male sex workers.

While high male circumcision rates are clearly playing a major role in dampening sexual transmission in Pakistan, there are powerful lessons from Indonesia, another largely Islamic country with high rates of male circumcision (except in Papua), where HIV rates were low (outside Papua) until the growth of injecting drug use a decade ago changed Indonesia’s epidemic trajectory, spreading HIV into commercial sex and fundamentally amplified the epidemic potential. Without effective interventions, similar trends are likely in Pakistan. There is no place whatsoever for complacency.

**Bangladesh**

Bangladesh has several rounds of high-quality biobehavioral surveillance. Although Bangladesh’s epidemic is broadly comparable to Pakistan’s, there

**Figure 1.9  HIV Trends among Vulnerable Groups in Pakistan**

![Graph showing HIV trends among vulnerable groups in Pakistan](image)

**Source:** National AIDS Control Program 2005.
are some important distinctions. First, the scale and vulnerability of sex workers is probably greater. They are larger in number, poorer, and appear to have more clients. Indeed, their numbers of clients are among the highest in Asia. However, Bangladesh also has more established surveillance and interventions than Pakistan. Nonetheless, the scope and coverage of interventions remain inadequate, and Bangladesh faces a potentially major HIV epidemic, particularly among vulnerable groups.

As figure 1.10 below shows, HIV is rising steeply among injecting drug users, particularly in the Central region, which includes the capital, Dhaka (National AIDS and STI (Sexual Transmitted Infections) Program (NASP) 2005). However, the quality of Bangladesh’s surveillance also provides important insights into the concentration of HIV in the central region.

HIV prevalence among other groups in Bangladesh is currently low, as shown in figure 1.11. However, rates will not stay low unless the coverage of effective interventions for injecting drug users and sex workers increase significantly. An estimated 62 percent of female injecting drug users are sex workers and they have over 40 clients monthly, many of whom are married (47.8 percent) and live with a regular sex partner (50 percent) in slum areas (50 percent) (NASP 2005).

The main reason why HIV is not circulating more widely through commercial sex is because HIV rates among female IDUs are still far lower than among male IDUs—0 percent in the most recent survey, as shown in figure 1.12. If and when this changes, HIV rates may increase
steeply among clients buying sex. Such evidence underscores the pivotal role that effective programs for injecting drug users will play in determining the future of Bangladesh’s HIV epidemic.

The record on programmatic effectiveness in preventing the spread of HIV to date is mixed. While large-scale needle and syringe exchange programs (NSEPs) for IDUs in Bangladesh have shown strong associations between participation in those programs and lower rates of sharing equipment and less likelihood of reported STIs, the HIV
prevalence rates (2004) have varied from 4 percent (16 out of 403) in one geographic area to zero percent (none out of 605) in another area (The Monitoring the AIDS Pandemic (MAP) Report 2005. More recent data have shown similar differences in behavior change outcomes and HIV prevalence rates among locations. For example, needle and syringe sharing among IDUs has worsened or remained unchanged in the cities sampled for biobehavioral surveys, with the exception of Dhaka, where there has been a reduction in reported sharing from 85 percent to 55 percent. However, Dhaka, with the greatest reduction in needle sharing, is also where HIV has been increasing among IDUs, reaching 10 percent in some pockets, illustrating that it is imperative to scale up comprehensive harm reduction approaches and carefully monitor the quality of the services.

**Afghanistan**

The HIV epidemic is at an early stage in Afghanistan, concentrated among high-risk groups, mainly IDUs and their partners. Due to the current increase in injecting drug use, there is great potential for the rapid spread of HIV, as has been the case in neighboring countries and in other parts of Asia. A study among IDUs in Kabul city found that 3 percent of the IDUs were already HIV positive (Todd et al. 2006), and the officially reported number of HIV-positive cases in Kabul was 245 (August 2008), most of them men. UNAIDS and WHO, however, estimate that there may be more than 2,000 HIV-positive cases in Afghanistan. Evidence from ex-inmates suggests that injecting drug use takes place in Afghan prisons, a situation also found in many other countries. Long-distance truck drivers and their helpers, and the many abandoned street children are also vulnerable groups, potentially at risk for HIV infection. A social mapping and situation assessment of key populations at high risk of HIV in three cities of Afghanistan showed quite different injecting practices (Chase et al. 2007). Most of the surveyed IDUs had injected within the previous six months, varying from 77 percent to 29 percent in different cities. Most IDUs injected in open spaces in one city, whereas those in another city were more likely to inject at home or in other venues. Most IDUs injected in heroin. Overall, 75 percent of IDUs reported ever having sex with a female, and almost 50 percent had paid a female for sex. Approximately 21 percent of IDUs reported ever having had sex with another male. However, those reporting they had paid for sex with a female or sex with another man within the past six months was uncommon. Condom
use appears to be low, with over 80 percent of IDUs who had paid for sex reporting never using a condom during paid sex.

Several other factors contribute to the high risk for the rapid spread of HIV, including war and conflict, migration, displacement, and poverty. Approximately 8 million Afghans spent some time living abroad as refugees, in Pakistan (5 million) and Iran (3 million). Today, about 1 million widows and 1.6 million orphans, 4 million returnees, and 500,000 internally displaced persons reside in Afghanistan, while almost 4 million Afghan refugees still live in Pakistan and Iran. In addition, the literacy rate in the general population is very low (36 percent and lowest among women, at 21 percent), with little awareness about HIV and AIDS and almost no condom use. Unsafe blood transfusion adds to the risk of spreading HIV to the general population, with only 30 percent of transfused blood being tested for HIV.

The current drug situation is amplifying the problem. Production of opium in Afghanistan increased by 59 percent in 2006, and now exceeds 6,000 tons (equivalent to 600 tons of heroin) representing 92 percent of the opium produced in the world. The opium crop is estimated to provide US$2.7 billion to Afghanistan, representing 36 percent of the nondrug or 27 percent of the entire national economy. Although almost all of the opium and heroin produced in the country was previously exported, it is now estimated that 2 percent of the output is consumed locally. A 2005 survey estimated that Afghanistan has almost 1 million drug users, including 200,000 opium users and 19,000 drug injectors, of whom 12,000 inject prescription drugs and 7,000 inject heroin (UNODC 2005). A 2006 survey in Kabul estimated that several categories of drug use had increased by more than 200 percent in 12 months (UNODC 2006). The overwhelming majority of drug users are male, but the proportion of females using prescription drugs is relatively high. As the overall drug problem in Afghanistan continues to receive international attention and most counternarcotics efforts focus largely on supply reduction, there is a risk that opium users will turn to injecting heroin, thus amplifying the risk of HIV transmission.

HIV programs to date have been fragmented and on a small scale. There are a few local and international NGOs and development partners that provide prevention services to high-risk and vulnerable populations, mainly HIV prevention interventions for IDUs, including harm reduction activities. A limited number of interventions have also been designed and launched among sex workers, MSM, truck drivers, and police and prison staff, mainly focusing on HIV and AIDS awareness,
condom distribution, and counseling. These activities utilize peer- and community-based education, but are limited in coverage and need to be expanded rapidly. Among the priorities of the national plan are: strengthening communications and advocacy; improving surveillance; providing targeted interventions for people at highest risk; and building program management capacity. To tackle stigma, a HIV code of ethics to protect vulnerable groups that are at high risk has been drafted, which serves as best practice for the region.

**Sri Lanka**

While Sri Lanka is a low-prevalence country, several conditions contribute to high vulnerability, such as the current conflict, high mobility of the military, internally displaced persons, and separation of spouses due to overseas employment. These structural factors could amplify the problem. Moreover, new economic developments such as the expansion of internal free trade zones, and broad social changes, including the increasing migration of young adults from rural areas to large urban centers, increase their vulnerability and potential exposure to HIV.

Sri Lanka has conducted sentinel serosurveillance surveys on an annual basis among several subpopulations since 1993 (including sexually transmitted disease patients, TB patients, those undergoing pre-employment testing, armed service personnel, antenatal clinic patients, and female sex workers). Available evidence indicates that Sri Lanka continues to have very low prevalence of HIV. Current surveillance estimates (2007) indicate that there are about 5,000 adults and 100 children (under 15 years) infected with HIV, i.e. less than 0.1 percent of adults. Surveillance data on the most at-risk populations (MARPs) are available only for sex workers, who continue to have very low rates of HIV (also below 0.1 percent). While data suggest injecting drug use is uncommon, there are several subpopulations of MSM. However, neither IDU nor MSM have been included in surveillance surveys, and thus little is known of their HIV prevalence, although there are some behavioral data that shed some light on the vulnerability of these population groups at high risk.

The first behavioral surveillance survey (2006–07) collected information related to sex workers, MSM, three-wheeler drivers, drug users, and free trade zone factory workers that indicate relatively high levels of risky behaviors among some of them. Although it is unclear if the drug users surveyed include any IDUs, there are considerable data on
sex workers and MSM that note very varied levels of risky behaviors, such as the condom use among sex workers with clients, which varies from 40 percent to 81 percent, and hovers around 10 percent for non-paying clients. Data indicate that MSM have sex with both men and women, and have low to medium condom use with male partners, and even lower use with female partners. One-quarter of MSM and 80 percent of beach boys had had sex with women in the last year. It is difficult to assess levels of risk as the questionnaire asks only about sex in the last 12 months, and thus no distinction can be made regarding frequency of sexual encounters. But given that condom use was less than 50 percent in casual male encounters, and much lower with women, particularly with regular partners, there is a significant potential for HIV transmission. And, while drug users rarely inject drugs, they frequently engage in unprotected sex. The survey indicates lack of knowledge among all groups about how HIV is transmitted.

The survey also includes a sample of free trade zone male and female factory workers, most of them internal migrants. Contrary to common perceptions about risk and vulnerability among these internal migrants, the survey noted very low risky behavior, with only half of men and one-third of women having had sex in the last 12 months, and most did so with their regular partner. Only 5 percent of those sampled had had commercial sex, and 90 percent had used a condom in that event. The risks were higher among three-wheeler drivers. Only 20 percent had had sex with casual partners in the last year, and condom use with casual partners was only 31 percent. Twelve percent had had sex with sex workers in the last year and most (78 percent) reported having used a condom with these partners.

While the national program has focused on the general population and generated awareness about HIV, data show that overall knowledge about how HIV is transmitted remains low. The national AIDS program needs to shift its focus from awareness to behavior change interventions, and from a general population focus to reaching and involving vulnerable groups at highest risk, with continuation of behavior surveillance surveys that can monitor the effectiveness of such programs.

**Bhutan**

Data in Bhutan are very limited. Serosurveillance has been conducted on a biannual basis since 2000 and large numbers of ANC patients have been tested, as have most in the armed forces. Both of these groups have
shown extremely low HIV prevalence rates. UNAIDS estimates that about 500 people out of a total population of 700,000, could have been living with HIV and AIDS at the end of 2005, which would amount to a prevalence of less than 0.1 percent of the population. Information about sex work and IDU is limited, and there is no data on MSM.

While HIV prevalence among the general population is very low, there are some risk factors that indicate the need for a good biobehavioral surveillance system to monitor trends and ensure that prevalence remains low. Data from the general population survey of 2006 noted that multiple concurrent relationships are common. One-fifth of all married people have engaged in extramarital sex in the last year, and 14 percent of unmarried people had sex in the last year. Rates are considerably higher among urban males (43 percent had extramarital sex in the last year, and 42 percent of urban single men had sex in the last year). Condom use with extramarital sex partners is high (76 percent in urban areas, 64 percent rural areas), and ranges from 84 percent for urban males to 44 percent for urban females. Condom use in premarital sex is also high, at 73 percent in both rural and urban areas. Among men having sex with nonregular partners, 15 percent frequent sex workers. While overall this is a small number (4 percent to 5 percent of all men), casual attitudes toward sex in this small, sexually active subgroup of the population, combined with unsafe sex, could eventually lead to small, truncated epidemics.

The open discussion of sexual and reproductive health issues is a positive factor in setting the stage for effective prevention programs, although Bhutan faces several implementation challenges, such as human resource constraints and lack of local NGOs and community-based organizations (CBOs) that have the necessary experience to work on HIV prevention, targeting interventions and working with those most at risk of HIV.

**Maldives**

As in the case of Bhutan and Sri Lanka, the Maldives currently has very low HIV prevalence, even among vulnerable groups, such as sex workers and MSM, and the IDU population is very small.

Thus, throughout South Asia, increasing the coverage of high-quality interventions for vulnerable groups at high risk, such as sex workers, men having sex with men, and injecting drug users, is critical to sustain the low prevalence rate. The lessons learned of what works are discussed in the next section.
What Works—Lessons from HIV Prevention Interventions and Programs

It is noteworthy that we have solid evidence for what works in terms of high-impact preventive interventions and how to tackle concentrated epidemics in South Asia through large-scale programs, focusing on vulnerable communities at highest risk. But although we know “what works” and how to deliver effective interventions among vulnerable groups, who are often marginalized in society and widely stigmatized, there are still critical implementation and knowledge gaps in South Asia. Despite encouraging trends in parts of southern India, coverage of prevention interventions remains low overall among vulnerable groups at high risk, as illustrated by figure 1.13, below, which shows coverage of female sex workers below 20 percent, coverage of IDUs below 5 percent, and coverage of MSM below 1 percent in Asia overall (UNAIDS 2005). We lack evidence on coverage of HIV prevention interventions, disaggregated by locality and income, to enable a solid analysis in subsequent chapters of the emerging inequalities and inequities in HIV prevention interventions. Still, emerging global evidence, and monitoring and evaluation of coverage in some areas and among some population groups in South Asia, provide information for trends analysis and lessons of what works for scaling up in South Asia.

Evidence-based preventive intervention packages have been defined, tailored specifically for groups such as youth, women, injecting drug users, men having sex with men, migrants, and employed workers. Appendix table 1 provides examples of such focused, tailored, and targeted
HIV interventions. For each intervention, the core services are listed, along with indicators to monitor access and utilization of these services and behavior change. Some of these indicators are useful proximate determinants for monitoring changes in HIV prevalence, for example condom use and use of clean needles. To expand and evaluate coverage of these services, there are several opportunities through integration of services and convergence of programs in all the countries of the region. These opportunities are also summarized in appendix table 1.

Most national AIDS programs in the countries of the South Asian region have prioritized among these intervention options but coverage is low overall, as highlighted by figure 1.13 above—their challenge now is to scale up coverage to have an impact on HIV prevalence and curb the epidemic. They can learn from some of the successful prevention programs in Asia how to do so.

While there is a strong evidence base for effective interventions, fewer data is available regarding the effectiveness of large-scale programs and the impact of these programs on HIV prevalence. Evidence from India, Thailand, and Cambodia suggests that effective targeted programs can reduce overall transmission. In Thailand, for example, by 1989, HIV prevalence among sex workers reached 44 percent in Chiang Mai brothels and ranged from 1 percent to 5 percent elsewhere. The Thai government prioritized targeted sex work interventions and pursued a 100 percent condom use program in sex establishments. From 1985 to 1993, condom use in commercial sex rose ninefold, from about 12 percent to 95 percent. Over the same period, STDs fell by three-quarters, from over 400,000 to approximately 100,000 (Hanenberg et al. 1994). HIV prevalence declined from 4 percent to 1.9 percent among military recruits and drug users, and antenatal HIV prevalence rates remain under 2 percent (UNDP 2004).

As figures 1.14 and 1.15 below illustrate, both Thailand and Cambodia successfully reduced concentrated HIV epidemics through increased condom use in sex work and decreased consumption of commercial sex.

In India, the first site to demonstrate the impact of prevention programs on behavior change and STI and HIV prevalence trends among sex workers and their clients was the Sonagachi Project, West Bengal, as shown in figure 1.16. This project works with about 6,000 sex workers, who serve about half a million clients annually in Sonagachi, Kolkata’s major red light district. The project promotes a comprehensive approach to HIV prevention, encompassing contextual reform through improved policing practices, solidarity and community empowerment, improved
sexual and reproductive health care, child care, peer education and outreach, and condom promotion. The program, which is cited as a model of social change and community empowerment, has several impressive achievements, including:

**Figure 1.14 Reduced HIV Transmission in Thailand**

![Figure 1.14 Reduced HIV Transmission in Thailand](image)


**Figure 1.15 Reduced HIV Transmission in Cambodia**

![Figure 1.15 Reduced HIV Transmission in Cambodia](image)

• Increasing condom use in sex work from 3 percent in 1992, to 70 percent in 1994, to 90 percent in 1998. By 1998, these rates were far higher than those observed in surrounding red light areas.

• Reducing STI rates among sex workers by over 75 percent: recent syphilis and genital ulcer cases fell from 28 percent and 7 percent, respectively, in 1992, to 11 percent and 2 percent in 1998.

• Stabilizing HIV prevalence among sex workers at 1 percent to 2 percent from 1992 to 1994. However, in 1996, it rose to 11 percent and remained at this level in 1997. HIV rates among sex workers elsewhere in India have generally risen more steeply.

There is also growing evidence that HIV may be declining in south India, particularly in states and districts with well-established HIV prevention responses. The decline is shown in figure 1.5, in the preceding discussion. Changes in unprotected commercial sex attributed to targeted prevention efforts are illustrated by figure 1.17, below, which shows a decline among truck drivers who were buying sex. Similar trends have been observed among sex workers.

These southern India trends in coverage of preventive services and behavior change, measured in Tamil Nadu, influence the overall decline in India since the southern states contribute so much to the overall national HIV burden. Most illuminating are the results of the National Family Health Survey that further validate the effectiveness of existing prevention programs. Table 1.4 below shows some of the selected findings from the India national behavioral surveillance survey, the largest of
Figure 1.17  Reductions in Unprotected Sex in Tamil Nadu, 1996–2003 (percent of respondent truck drivers and helpers)

![Graph showing reductions in unprotected sex](image)


<table>
<thead>
<tr>
<th>Table 1.4</th>
<th>Changes in Sexual Behavior and Condom Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>India national behavioral surveillance survey</strong></td>
<td>2001</td>
</tr>
<tr>
<td><strong>Female sex workers</strong></td>
<td></td>
</tr>
<tr>
<td>Condom usage during last nonregular sex</td>
<td>49.3</td>
</tr>
<tr>
<td>Consistent condom usage in nonregular sex during last 12 months</td>
<td>32.4</td>
</tr>
<tr>
<td><strong>General population</strong></td>
<td></td>
</tr>
<tr>
<td>Condom can be procured within 30 minutes</td>
<td>49.6</td>
</tr>
<tr>
<td>Condom usage with paying partners in last sex (Base: All Respondents)</td>
<td>74.5</td>
</tr>
<tr>
<td>Consistent condom usage with paid partners (Base: All Respondents)</td>
<td>57.3</td>
</tr>
<tr>
<td>Condom usage with casual partners in last sex (Base: All Respondents who had casual sex in last 3 months)</td>
<td>32.8</td>
</tr>
</tbody>
</table>


its kind globally, which enables a comparison of risky behaviors between 2001 and 2006.

The successful prevention programs to date have a few characteristics in common: they all invest in evidence-based targeted interventions, such as condom promotion and treatment of sexually transmitted infections; they engage peer educators in outreach; they are well monitored and evaluated, focusing on coverage of effective prevention interventions; and, technical, human, and financial resources are available. There have been similar successful intervention programs among injecting drug users, but
on a smaller scale. These HIV prevention programs have also been characterized by outreach and peer education, in addition to comprehensive harm reduction, including clean needle exchange. Evidence from the Stopping HIV/AIDS through Knowledge and Training Initiative (SHAKTI) in Bangladesh suggests it also works in resource-constrained settings. The project reaches an estimated 5,000 IDUs in Dhaka, providing them with drop-in centers, detoxification services, HIV prevention education and individual counseling, and safe injecting equipment. An evaluation (Tasnim, Hussein, Kelly 2005) showed that HIV prevalence has remained relatively low among IDUs, and risky sexual practices have declined. However, needle sharing soared, climbing from 66 percent in 2002 to 86 percent in 2004. Fieldworkers attribute the increase to police actions against those carrying injecting equipment, which underscores the importance of legal reform to support harm reduction.

The last example highlights one of the challenges to scaling up effective interventions in the region: stigma—especially among the general population toward vulnerable groups engaged in high-risk practices. Lack of awareness and low capacity remain common obstacles to scaling up. Box 1.1, below summarizes some of the principles for scaling up in South Asia, drawing from implementation lessons learned on how to tackle the common constraints across the region. Large-scale programs with high coverage interventions that reflect these principles can achieve at least three critical things. Specifically, they can greatly reduce the size of South Asia’s HIV epidemic; prevent HIV from becoming widely established in the general population; and markedly reduce AIDS treatment and other costs, providing a high return on investment.

**Conclusions: Prevention Priorities for South Asia**

As shown in the preceding sections, the future size of South Asia’s epidemics will depend on the scope and effectiveness of programs for sex workers and their clients, injecting drug users and their sexual partners, and men having sex with men and their other sexual partners. The effectiveness of efforts to address the underlying socioeconomic determinants of the epidemic, and to reduce the stigma and discrimination toward people living with HIV, will also be critical to scaling up and sustaining the response.

South Asia’s epidemic is highly preventable. Programs for sex workers, injecting drug users, and men having sex with men, work to a large extent. We do know what to do and how to do it. Achieving high coverage is the
greatest challenge. High coverage of preventive interventions among vulnerable communities is essential to reduce HIV transmission. HIV prevention among sex workers and clients, injecting drug users and their sexual partners, and men having sex with men and their sexual partners is relatively inexpensive and provides a high return on investment.
(Disease Control Priorities by Jamison et al. 2006). Effective programs for sex workers, injecting drug users, men having sex with men, and the sexual partners of these communities can still prevent HIV from becoming widely established in the general population, and such action greatly reduces the need for treatment, care, and other costs. HIV priorities and investments should closely reflect the transmission patterns and their key structural determinants at the subnational level.

Regarding the situation in each of the South Asian countries (Moses et al. 2006), the key conclusions about the HIV epidemiology and the implications for the response to HIV are the following:

The future size of India’s HIV epidemic will depend above all on the scope and effectiveness of programs for sex workers and clients, and also significantly on the scope and effectiveness of programs for men having sex with men and their other sexual partners, and injecting drug users and their sexual partners, particularly in the northeast. Throughout India, it remains vital to tackle stigma and discrimination toward people living with HIV. HIV prevention and AIDS treatment have reciprocal benefits: HIV prevention makes AIDS treatment more affordable and AIDS treatment creates important opportunities for enhanced HIV prevention.

The future size of Nepal’s HIV epidemic will depend above all on the scope, coverage, and effectiveness of programs for injecting drug users and their sexual partners, and sex workers and clients. Sex between men constitutes a further risk, which must also be addressed. Nepal’s longstanding political difficulties mean that civil society’s already important role is even more critical, and that effective and creatively deployed international assistance is urgently needed.

Pakistan and Bangladesh’s HIV epidemic will depend above all on the scope and effectiveness of programs for injecting drug users and their sexual partners, and men having sex with men and their sexual partners. Infection among sex workers is low and can be kept low through intensive programs for sex workers and clients, including a major focus on sex workers who inject drugs or whose sexual partners inject drugs. Stigma reduction is essential in order to achieve high-quality, high-coverage programs.

Despite limited data, Afghanistan has a large drug-using population and a growing injecting drug use community, who are highly vulnerable to HIV infection. It must act urgently to limit HIV infection in its large population of injecting drug users. For different reasons, Bhutan, the Maldives, and Sri Lanka have very low HIV prevalence and relatively
small numbers of injecting drug users, sex workers, and clients. Early, effective, affordable programs for injecting drug users and their sexual partners, sex workers and clients, and men having sex with men and their sexual partners can ensure HIV remains very low in these countries. These countries have an opportunity they must not miss.

### Annex 1

#### HIV Prevention Interventions

<table>
<thead>
<tr>
<th>Prevention intervention</th>
<th>Core services</th>
<th>Outcome (proxy) indicator</th>
<th>Opportunities to scale up coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTI/STI case management</td>
<td>Syndromic management (oral/anal STIs) single-shot options</td>
<td>% STI cases assessed and treated (and advised on consistent condom use and partner treatment)</td>
<td>Convergence with reproductive health programs/Integration into rural health and private sector care</td>
</tr>
<tr>
<td>Condom promotion</td>
<td>Promotion of knowledge and consistent use Increased access</td>
<td>% consistent condom use in different population groups</td>
<td>Education, health services/Strategic communications Transport sector/Rural development-Private sector</td>
</tr>
<tr>
<td>Comprehensive IDU program</td>
<td>Needle, syringe exchange/Oral substitution/Residential care Drug de-addiction/Referral (for treatment of OI, TB and STI, voluntary counseling and Testing (VCT), ART</td>
<td>% HIV prevalence among injecting drug users</td>
<td>Community-driven services/NGO peer educators/Strategic communications/Sensitization of police and legal system</td>
</tr>
<tr>
<td>MSM services</td>
<td>Commodity supply (lubricants &amp; condoms)/Community-based response/risk-reduction services/Referral STI services</td>
<td>% HIV prevalence among MSM</td>
<td>Community-driven programs/NGO peer educators/Communications/Sensitization of police and legal system</td>
</tr>
</tbody>
</table>

(continued)
**HIV Prevention Interventions (Continued)**

<table>
<thead>
<tr>
<th>Prevention intervention</th>
<th>Core services</th>
<th>Outcome (proxy) indicator</th>
<th>Opportunities to scale up coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace program</td>
<td>Workplace policy and protocols implemented (HIV and AIDS code, referral VCT, information, education &amp; counseling (IEC), nondiscrimination</td>
<td>% of employees with access to HIV and AIDS information and services</td>
<td>Private sector/Labor unions</td>
</tr>
<tr>
<td>Blood safety program</td>
<td>Voluntary nonremunerated blood donation/Rational use of blood, HIV testing of blood units/quality assurance of blood banks</td>
<td>% HIV incidence of blood-borne transmission</td>
<td>Red Cross/Red Crescent Health systems</td>
</tr>
<tr>
<td>Youth-friendly services</td>
<td>Life skills (sexuality, substance abuse, etc.)/Health, education and other social services</td>
<td>% HIV prevalence among adolescents</td>
<td>Education sector, sports/Community-driven development schemes/ Social development programs</td>
</tr>
<tr>
<td>Migrant support center</td>
<td>Referral for VCT, STI, ART/Behavior change counseling/ Peer education</td>
<td>% HIV-positive pregnant women</td>
<td>Transport sector, roads projects/ Social services/ Development programs</td>
</tr>
<tr>
<td>HIV preventive services for women</td>
<td>VCT, ARV Reproductive health services/ Prevention of mother-to-child transmission (PMCT)/Community-based response</td>
<td></td>
<td>Convergence of reproductive health, TB program/ Community-driven services/Social development programs</td>
</tr>
</tbody>
</table>

*Source:* Adapted from Moses and others 2006

**References**


CHAPTER 2

Responding to HIV in Afghanistan

Jed Friedman and Edit V. Velenyi

Introduction

Following almost three decades of war, Afghanistan is one of the poorest countries in the world. GDP per capita is estimated at about US$360 for 2007 (IMF 2007a). Life expectancy at birth is only 44.5 years (UNDP 2008), and maternal and child mortality are among the highest in the world. The literacy rate in the general population is very low (36 percent), especially for women (13 percent) (World Bank 2007).

There are very limited data available on the state of HIV and AIDS in Afghanistan. The number of known cases of HIV infections has been relatively low so far. However, there is a risk of an escalation in HIV prevalence owing to a high and increasing number of injecting drug users in the country. The experience from other countries across Asia suggests the potential for rapid spread of HIV within the drug-injecting population and onward transmission of the virus (Friedman and Des Jarlais 1991; Riehman 1998; Monitoring of the AIDS Pandemic (MAP) 2005; Ohiri 2006). At the same time, opium production in Afghanistan reached record levels in 2007 (IMF 2007b).

Keeping HIV prevalence low is one of the development objectives in Afghanistan. An increase in HIV and AIDS also has the potential to complicate progress in the attainment of other key development objectives.
A recent mapping of groups at high risk for HIV—IDUs and sex workers in three cities of Afghanistan (Chase 2008)—sheds some light on vulnerable groups at high risk in urban Afghanistan. The large numbers of returning refugees contribute to the spread of the epidemic, as many of them started injecting drugs while abroad. At the same time, lack of comprehensive harm reduction to prevent the spread of HIV and limited health system capacities imply that adequate prevention, care, or treatment are not available to many. The low social status of many affected by HIV and AIDS and the stigma associated with both risky behaviors and HIV and AIDS add to the challenges.

Against this background, control of HIV infections is a development priority in Afghanistan. While the level of HIV prevalence arguably remains low, the available evidence suggests that high vulnerability and risk are present and may contribute to an escalation of new HIV infections in Afghanistan. On the other hand, timely intervention activities proven to be cost-effective in a variety of settings may forestall or prevent such an occurrence. The first national HIV prevention project was launched in 2007, with a focus on targeted prevention programs, surveillance, strengthening management capacity and advocacy, and communications.

Section 2 discusses the state of the HIV epidemic in Afghanistan, summarizing the available data, discussing the social and economic context, and analyzing factors affecting the risk of transmission of HIV. Section 3 reviews the evidence on the effectiveness and cost-effectiveness of HIV preventions, with emphasis on interventions targeted at injecting drug users. Section 4 attempts an economic analysis of an HIV prevention program for Afghanistan and provides some measures of the economic effects of such a program. Section 5 summarizes the findings.

**The State of the Epidemic in Afghanistan**

An effective disease control strategy must respond to the nature and scope of the relevant disease patterns. We start out by summarizing the limited information available on the state of the epidemic in Afghanistan. Next, we discuss the social and economic context of the epidemic, including the country’s history of conflict, which has resulted in destitution and a large number of refugees. The remainder of the section focuses on the role of injecting drug use and its implications for HIV transmission.
**Stage and Scope of the Epidemic**

The number of recorded AIDS cases in Afghanistan is low at present. The Ministry of Public Heath reported a total of 69 cases of HIV infection in Afghanistan in late January 2007, based on data from the Kabul blood bank and an HIV seroprevalence survey of injecting drug users in Kabul. A few months later (August 2007), the government reported 245 cases of HIV infection in Afghanistan (Saif-ur-Rehman et al. 2007). These data, however, likely substantially underestimate the actual number of people living with HIV in Afghanistan. UNAIDS (2006b) put HIV prevalence in Afghanistan at 1,000 people, with an “upper-range” estimate of up to 2,000 people, most of whom are male, and recent estimates have doubled.

Almost all the known cases of HIV infection in Afghanistan today are due to injecting drug use (IDU). A study of 464 injecting drug users in Kabul showed an HIV prevalence rate of above 3 percent, and highlighted the extremely high risk of the spread of the disease among injecting drug users and their partners, and to the general population (Todd et al. 2007).

While prevalence in the general population seems to be negligible, evidence shows that under a combination of unfavorable conditions¹ HIV prevalence in vulnerable groups can increase dramatically within short periods (see Claeson and Wilson, this volume). These conditions include the existence of multifaceted high-risk behavior, low education and social status, as well as weak health systems, severe public resource constraints, limited social responsibility, and lack of information, health education/promotion, and social marketing. According to a global review, in some of the 80 countries where HIV infections have been reported among IDUs, HIV has spread extremely rapidly within this group, with increases in seroprevalence of 20 to 40 percentage points within a single year (Friedman and Des Jarlais 1991). More generally, while HIV infections at present appear to be concentrated among IDUs, there is often intersection between IDU and sex work. HIV transmission among IDUs often serves as the entry point for HIV to spread to other vulnerable groups and the general population (Jha et al. 2001).

Given the initial stage of the epidemic in Afghanistan and the paucity of information, it is natural to also look to Afghanistan’s neighbors as potential examples of future development. Central and South Asia are experiencing a rapid increase in HIV cases, with injecting drug use and the commercial sex trade as the major sources of HIV transmission...
Iran has the highest rate of heroin addiction in the world: 20 percent of Iranians ages 15 to 60 are engaged in drug abuse, and between 9 percent and 16 percent of these inject drugs. In Tehran, 23 percent of IDUs are HIV positive; just one year earlier this prevalence stood at 15 percent (Zamani et al. 2005).

**Context**

Future transmission patterns of HIV in Afghanistan depend on the economic and social context and behavioral factors that determine risk profiles and transmission probabilities. Afghanistan is a conflict country, devastated by protracted armed conflicts since 1978. As a consequence, many factors associated with an increased risk of HIV transmission are present, including poverty, displacement of a population with high HIV prevalence to areas of lower prevalence, and sexual abuse or use of sex as a survival commodity. The low levels of education, literacy, and health education contribute to the continuation of risky behaviors, particularly among IDUs. Illiteracy presents a severe barrier to HIV awareness and prevention. The literacy rate in the general population is very low (36 percent) and lower still among women (13 percent), with little popular awareness of HIV and AIDS and the protective effects of condom use (World Bank 2008). Women in Afghanistan experience one of the lowest social positions in the world. Denied access to education and jobs, and often not allowed to leave their homes without a male relative, they lack access to information on how to protect themselves (World Bank 2007).

The war has resulted in over 1 million widows, 1.6 million orphans, 0.5 million internally displaced people (DP), and 4 million Afghan refugees who returned from neighboring Pakistan and Iran (World Bank 2008). Today, still, about 4 million Afghans live in these countries, which have rapidly growing IDU-driven HIV epidemics of their own. Spillover of the epidemics from these countries raises grave concerns.

During the recent decades of conflict, up to 8 million Afghans fled to neighboring countries. Some Afghans began using and injecting heroin during their difficult years as refugees. In Quetta, a town in Pakistan bordering Afghanistan, for example, an HIV prevalence of 24 percent has been reported in a cluster of injecting drug users. These data have increased the fear of an epidemic in Afghanistan, since an estimated 4 million Afghans have returned home in the past few years.

The Iranian experience may be particularly relevant for the future of the epidemic in Afghanistan. HIV and AIDS is closely associated with
injecting drug use in both countries, and a 2005 United Nations Office on Drugs and Crime (UNODC) report found that at least 50 percent of IDUs in Afghanistan reported to have started in Iran.

Iran has an estimated 200,000 injecting drug users (Razzaghi et al. 2006). Recent data indicate that 67.3 percent of HIV-positive cases and 85 percent of AIDS cases have a history of injecting drug use (Ministry of Health and Medical Education (MOHME) 2003). Furthermore, the HIV and AIDS epidemic in Iran appears to be accelerating rapidly. Between 2003 and 2005, the estimated population of those with HIV in Iran has increased from 37,000 to 66,000, the latter corresponding to 0.2 percent of the adult population (UNAIDS/WHO 2006).

Poverty in Afghanistan is both deep and broad, and can lead to increased risk of HIV infection. Impoverished, socially marginalized, and disempowered populations face access barriers to even basic care and information. There is an acute shortage of health facilities and trained staff, particularly female staff, in most rural areas. Of the facilities that exist, most are ill-equipped and unable to treat opportunistic infections or prevent mother-to-child transmission (MTCT) of HIV. Unsafe blood transfusion adds to the risk of HIV spreading to the general population, with only 30 percent of transfused blood being tested for HIV. People engaged in high-risk behaviors often have limited access to health care (World Bank 2007). At the same time, because it is located in the Golden Crescent, one of the major drug-producing areas and trafficking routs globally, access to drugs in Afghanistan is easy (Saifurrehman 2007; Ohiri 2006; World Bank 2007). Production of opium in Afghanistan reached record levels in 2007, with the estimated amount produced reaching 8,200 metric tons, an increase from the previous year of 34 percent, and amounting to 93 percent of the world’s supply. The 2006 opium crop was estimated to have provided US$3.1 billion to Afghanistan, representing 32 percent of the entire national economy. Whereas almost all of the opium and heroin produced in the country was previously exported, 2 percent of the output is now believed to be consumed locally (UNODC 2007). Since production is now believed to exceed worldwide demand by a vast margin, large quantities are probably being stockpiled.

Behavior and Transmission Risk

As in many other traditional and deeply religious countries, estimation of the scale of the spread of HIV associated with IDUs, sex workers (SW), or men who have sex with men (MSM) is difficult in Afghanistan.
Local opinion varies as to the importance of these factors. Ex-inmates report that a substantial amount of drug injection occurs in Afghan prisons, a situation also reported in many other countries. Vulnerable groups potentially at risk of HIV infection include long-distance truck drivers and their helpers and the many abandoned children. Only 30 percent of transfused blood or blood products is currently tested for HIV (UNAIDS 2006b), which will be of increasing concern as HIV prevalence rises. There is much re-use of injecting equipment and other medical equipment in the formal and informal health care sectors, although there is little documentation about the extent and distribution of this practice.

As for the behavioral context and consequent risk of transmission, the sharing of contaminated injecting equipment is thought to confer the greatest risk of contracting HIV compared with other risk factors. Although the dominant routes of drug use in Afghanistan have previously been oral and inhalation, injecting practices are becoming increasingly prevalent. A 2005 survey estimated that Afghanistan has almost 1 million drug users, including 200,000 opium users and 19,000 injecting users, of whom 12,000 inject prescription drugs and 7,000 inject heroin. A 2006 survey in Kabul estimated that several categories of drug use had increased by more than 200 percent in 12 months (World Bank 2007). Most drug users were men, although the proportion of women among people using prescription drugs was high.

A recent study of the IDU population in Kabul showed that high-risk behaviors were very common: 35 percent had ever shared syringes; 76 percent had ever paid for sex with a woman; 27 percent of men had ever had sex with men; 23 percent had received so-called therapeutic injections in the previous six months; 4 percent had ever been paid for donating blood; and 35 percent had injected drugs in prison (Todd et al. 2006). The four viral samples assessed in the study had the same genome sequences previously identified in injecting drug users in Iran, where HIV prevalence is known to be much higher than Afghanistan. Moreover, the prevalence of hepatitis C—also predominantly spread by the sharing of injecting equipment—was already 37 percent, which indicates the very high risk of spreading blood-borne viruses in this population.

The high number of refugees and displaced people in Afghanistan, and of Afghan refugees and displaced people living in neighboring countries, is exacerbating the risk. Compared to Pakistani heroin users,
displaced Afghan heroin users exhibit less knowledge regarding HIV transmission and engage in high-risk behavior (Zafar et al. 2003). They are also at risk due to isolation from their families and lack of means to support themselves.

The use of contaminated needles results in much higher risk of transmission than almost all other types of exposure (see annex table 2.1 for a comparison of risk behavior); hence reduction in these harmful practices is a policy priority. Injection frequency, size of the sharing network, and probability of sharing, drive changes in incidence. The higher the prevalence of HIV within a community, the more likely an instance of sharing can result in HIV transmission (Ball 1998; Hankins, Gendron and Tran 1994). For example, in a population with 10 percent HIV seropositivity, a new user injecting once a day has a 90 percent chance of using an infected needle within 21.5 days from onset of injecting. If the user injects three times a day, the number of days drops to seven; at a rate of five times a day, a new user has a 90 percent chance of using an infected needle within four days (Riehman 1998).

Simple estimates of expected incidence for different vulnerable groups (measures of risky behavior and HIV prevalence) have been useful to guide HIV prevention (Pisani et al. 2003). In the context of Afghanistan, the existing described facts, estimates, and listed behavioral risks pose a strong call for more qualitative analysis, simulations, and collection of observational data in order to better model the future course of disease transmission and to determine the most effective policy responses.

**Evidence on the Effectiveness and Cost-Effectiveness of HIV Prevention**

Policy makers are aware of the possibility that without preventive measures, Afghanistan may transition from the current low epidemic profile into the stage of concentrated epidemic, where HIV prevalence in key populations is above 5 percent. However, health policy decisions in countries such as Afghanistan are made under extreme resource constraints and informational uncertainty; a difficult double challenge. Additionally, reliable cost-effectiveness studies are lacking in low-income settings, and especially so in this context. Nevertheless, a review of cost-effective disease interventions offers some general lessons for policy priorities.
**Effectiveness of Prevention**

A general principle for prevention, especially relevant in the context of a low to concentrated epidemiological course, is that it is more important to change behavior of people with high-level or risk behavior than those with low risk (Bertozzi et al. 2006). Interventions targeting key populations with high-risk behavior are expected to be the most effective and efficient. Global experience suggests that if HIV epidemics associated with IDUs can be prevented or slowed, then the overall HIV epidemic can also be delayed (Ball, Rana, and Dehne 1998). Given the Afghan context, we primarily focus the discussion on the effectiveness and cost-effectiveness of preventive measures related to IDU.

Rapid increases of HIV prevalence among IDUs have usually been associated with a lack of awareness of AIDS as a local problem among IDUs, scarcity of sterile injection equipment, and the presence of other mechanisms for rapid and efficient transmission, such as law enforcement efforts that spur frequent movement among drug users (Des Jarlais and Friedman 1996). Harm reduction activities targeted to IDUs provide possible antidotes to these major drivers of risk (Needle et al. 1998). Harm reduction programs include simultaneously changing drug use practices (reduced injecting, use of alternate, noninjectable substances), needle practices (cleaning and reduced sharing of needles and syringes), and sexual behaviors (Ball 1998). Injection drug use also contributes to sexual transmission of HIV. Evidence from China indicates that younger IDUs have more sexual partners and are unlikely to use condoms (Wu et al. 1997). There is an association between injection drug use and commercial sex work for women (Ball 1998). Its spread among injection drug user populations to their non-IDU sex partners and their offspring is dependent on the mixing patterns between populations, as well as safer sex behavior practices. HIV prevention efforts targeting individuals injecting drugs should therefore include efforts aimed at reducing risks resulting from unprotected sex.

Annexes 2.2 and 2.3 in the annex provides a summary of intervention effectiveness and cost-effectiveness based on systematic review of the literature. General lessons that emerge from this review are the following:

- A number of regional reviews, which examine cost-effectiveness of HIV prevention in low-income countries, agree that health benefits can be best maximized if the next increment of funding is devoted to prevention, some non-highly active antiretroviral therapy (HAART) treatment, and care (Marseille, Hofmann, and Kahn 2002; Creese et al. 2002; Masaki et al. 2003; Hogan et al. 2005).
• While there is difficulty in teasing out which components are most effective in reducing HIV risk behaviors among IDUs, there is clear evidence that needle exchange programs, peer outreach, and oral substitution therapy are effective (Jha et al. 2001).

• Possibly effective interventions to interrupt HIV transmission among IDUs and between IDUs and other groups include programs promoting detoxification and abstinence, and programs targeting risky sexual behaviors of IDUs.

• Efforts to halt drug trafficking through increased surveillance, stiffer criminal penalties for suppliers and users, and other measures in the “war against drugs” generally have not been successful. New drug trafficking routes emerge as existing ones are patrolled or cut. A consequence of market globalization has been the diffusion of drugs into countries or regions that before had no history of injection drug use (Stimson, Adelekan, and Rhodes 1995).

Little has been published on the cost-effectiveness of harm reduction in a low-income context, partly because these interventions are not widely implemented. Given the low cost of syringes, the extremely high efficiency of HIV transmission by this route, and the demonstrated effectiveness of harm reduction programs in changing syringe-sharing behavior, needle exchange programs should be one of the most cost-effective interventions (Bertozzi et al. 2006).

Three studies on a harm reduction strategy in Belarus (Kumaranayake et al. 2004), Russia (Bobrik et al. 2004), and Ukraine (Vickerman et al. 2006), have explored the costs and cost-effectiveness of a harm reduction project working with IDUs. The results show that harm reduction is effective, with a cost of US$359 per HIV infection averted and US$18 per disability-adjusted life year (DALY) (Belarus); US$564 per HIV infection averted and US$28 per DALY (Russia); and US$97 per HIV infection averted (Ukraine). Two studies on a harm reduction strategy in Svetlogorsk, Belarus, have explored the costs and cost-effectiveness of a harm reduction project working with IDUs. Walker et al. (2003) found that the cost per person reached was US$1.19, and the cost per disposable syringe distributed was US$0.39. Using a mathematical model (Vickerman and Watts 2002), the cost-effectiveness of the Needle Exchange Program (NEP) project was estimated to be US$71 per HIV infection averted (Kumaranayake et al. 2000). Yet studies note that as prevalence increases, harm reduction is likely not sufficient, but must be combined with other measures. In high-prevalence settings,
harm reduction may reduce incidence, but not as much that it also reduces prevalence in the short term. This speaks to the need for assuring an effective harm reduction program in Afghanistan targeted toward IDUs in as timely a manner as possible.

There is some evidence on the cost-effectiveness of outreach to IDUs. In general, HIV prevention strategies for IDUs are highly targeted (Kumarayanake et al. 2000). Much of the behavior change and AIDS risk reduction that occurs among IDUs appears to occur through social processes (Trotter, Rothenberg, and Coyle 1995). For example, in a study of AIDS risk reduction among IDUs in Bangkok, Glasgow, New York, and Rio de Janeiro, talking with one’s drug-using peers about AIDS was the one factor associated with risk reduction in all four cities (Seidman 1983; Des Jarlais and Friedman 1995). As for costs, an IDU outreach project in Kathmandu, Nepal, which relied on street-based outreach on foot, had a cost per client contact of US$3.21 (Söderlund et al. 1993).

The evidence indicates that harm reduction should be applied early in high-risk populations so the epidemic is controlled before it gets to the stage where additional resources and interventions are required even just to maintain the status quo. Alongside this international evidence, locally specific estimates of the relative social efficiency of investments in harm reduction activities can also help guide policy. The next section demonstrates a simple method to generate such estimates.

HIV Prevention in Afghanistan—An Economic Perspective

Building on our observations on the epidemiological situation in Afghanistan, and the lessons from our discussion of the effectiveness of prevention measures, the present section provides an economic perspective on a national HIV and AIDS prevention program being implemented in Afghanistan, specifically the activities supported by the Afghanistan HIV and AIDS Prevention Project supported by the World Bank.3

In our earlier discussion, we described the central role of injecting drug use in the transmission of HIV in Afghanistan. More generally, Wilson and Claeson (this volume) point at the intersection of injecting drug use and high-risk sexual behavior in the transmission of HIV. The Afghanistan HIV and AIDS Prevention Project (AHAPP) therefore is geared toward scaling up of prevention programs targeting people engaged in high-risk behaviors, notably injecting drug use and unsafe sex, including vulnerable groups at high risk, like IDUs, sex workers and their clients, truckers, and
prisoners. Additionally, the project aims to improve the knowledge of HIV prevention among the general population, strengthen surveillance of HIV prevalence and high-risk behaviors, map and estimate the sizes of groups engaged in high-risk behavior, and use communications and advocacy to reduce stigma related to HIV and AIDS.

As noted earlier, obtaining an accurate picture of Afghanistan’s current epidemiologic situation, let alone forecasting the future course of disease, is fraught with difficulties in this data-scarce environment. Nevertheless capturing and conveying the economic impact of prevention efforts requires forecasts of possible future courses of the disease. Afghanistan’s neighbors may serve as one example. If Afghanistan were to follow the Iranian example described above, then an increase from less than 0.1 percent of the general adult population (ages 15–49) to 0.2 over five years represents a minimum of 16,000 new infections. This hypothetical course of the epidemic in the absence of enhanced disease prevention serves as the baseline progression of the disease in Afghanistan for the economic analysis below.

There are numerous approaches commonly applied to assessing the economic consequences of HIV prevention measures. The two most common approaches are (1) an assessment that relates the costs of some measures to the benefits in terms of years of life saved or some other health measure such as the number of infections prevented, or (2) an assessment that relates the economic benefits of some intervention to its costs. Below, we apply each approach to assess the postulated economic benefits of an HIV prevention program in Afghanistan.

Afghanistan, with support from the World Bank, is planning to spend US$10 million over the next three years on the HIV and AIDS prevention project. This is part of a larger national operational program to which other donors also contribute, notably the Global Fund to Fight AIDS, Tuberculosis and Malaria. The World Bank support corresponds to a net present value of US$9.4 million. Subsequently, the expected annual costs will be somewhat lower than in the initial period, at around US$3 million per year (table 2.1).

For the purposes of this exercise, the assumed impact of the project in its entirety on transmission is set at the deliberately conservative expected value of a 30 percent reduction in expected infections over the period 2007–10 (approximately equal to 4,800 infections averted). A conservative assumption of hypothesized impacts seems particularly germane given the information uncertainties previously discussed. With this assumption, disease prevalence in the overall adult
population in five years time would be 0.03 percent less as a result of the program if the trajectory of the epidemic had followed the Iranian pattern. To further underscore the uncertainty of both intervention effectiveness and future disease transmission, we assume a standard deviation of 25 percent, or 1,200 infections averted, in outcomes. The uncertainty is expressed through a Monte Carlo analysis, where key parameters, such as infections averted, are treated as random variables. In each simulation, a new draw of infections averted is taken from the hypothesized distribution of this key parameter in order to explore the benefits of the project under various levels of effectiveness.

In order to estimate program costs per life-year saved—in the absence of more precise demographic and epidemiological information—it is necessary to make some assumptions regarding the number of life years saved per infection. The benchmark that we will use below is that one infection averted corresponds to 20 life-years saved. Judging from aggregate demographic estimates, this assumption appears to be conservative. In Afghanistan, the remaining life expectancy at age 20 is about 40 years, and it falls to 20 years only by age 50 (UN Population Division 2007). With most deaths due to HIV and AIDS occurring between ages 20 and 50, the effect on life-years saved could be much higher, based on these data. However, to the extent that HIV infections are driven by injecting drug use, and injecting drug users have a lower life expectancy even excluding the impacts of HIV and AIDS, the aggregate data would be misleading, so we adopt a lower benchmark of 20 life-years saved per infection averted. Given uncertainty over this estimate, we assume a standard deviation of four years, or 20 percent.

### Table 2.1 Estimated Costs of HIV and AIDS Prevention Program in Afghanistan (in U.S. dollars)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial costs (2008–10)</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Annual costs (post-2010)</td>
<td></td>
</tr>
<tr>
<td>Communication and advocacy</td>
<td>$404,400</td>
</tr>
<tr>
<td>Strengthening HIV surveillance system</td>
<td>$533,260</td>
</tr>
<tr>
<td>Targeted interventions for vulnerable groups at high risk</td>
<td>$1,457,400</td>
</tr>
<tr>
<td>Program management and monitoring and innovation fund</td>
<td>$580,800</td>
</tr>
<tr>
<td>Total</td>
<td>$2,975,860</td>
</tr>
</tbody>
</table>

**Source:** World Bank 2007 and authors’ calculations.
With discounted estimated project costs of US$9.4 million over the first three years, and an estimated 4,800 infections averted, the mean costs per infection averted comes out at US$1,960 per infection prevented. As the 4,800 preventions averted correspond to about 96,000 life-years saved, this translates into a cost of about US$98 per life-year saved. Given the stochastic assumptions concerning the effectiveness of prevention and the uncertainty over life-years saved, the cost per life-year saved ranges from US$47 to US$439. These estimates are summarized in table 2.2, which presents various benchmark percentiles in estimated outcomes. The majority of estimates, contained in the 10th to 90th percentiles, range over the shorter intervals of (3,194, 6,452) infections averted and (US$69, US$161) per year of life saved.

With additional assumptions, the benefits from prevention activities can be translated into a monetary equivalent in order to compare directly with program costs. The monetized benefits from a reduced number of HIV infections are here determined as the sum of three factors: the costs of medical treatment forgone, the value of lost earnings for people living with HIV and AIDS (PLWHAs) given increased mortality, and the value of lost earnings for the typically familial and unpaid caretakers. These are some of the more direct costs of infection. Additional costs require even further assumptions and so the analysis makes no attempt either to directly value the years of life lost due to premature mortality or to cost the pecuniary savings from a reduction in tuberculosis and other opportunistic infections transmitted to HIV-negative individuals. Clearly, taking these values into account will substantially increase the estimated benefits depicted here.

Wage and earnings information for Afghan workers is incomplete and often of questionable validity. One careful small-scale longitudinal study conducted in three urban centers (Kabul, Herat, Jalalabad) estimate mean annual earnings to be US$425 (Beall and Schutte 2006) (see table 2.3). Since this study spans a 12-month period, it includes seasonal spells of underemployment and unemployment. Approximately 80 percent of earners are male, so this wage estimate is heavily weighted toward male earners. There are no direct estimates of wage earnings among IDUs or their likely sexual partners. Furthermore, there are no direct estimates of wages earned by recovered IDUs who are no longer injecting. Given these uncertainties, and the fact that the majority of IDUs are male, this study directly adopts the estimate of earnings mentioned above. Real wages are set to grow an average of
<table>
<thead>
<tr>
<th>Percentile</th>
<th>1st</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
<th>99th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total program cost</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Present value of total program cost</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
</tr>
<tr>
<td>Number of infections averted</td>
<td>2,087</td>
<td>3,184</td>
<td>3,891</td>
<td>4,907</td>
<td>5,764</td>
<td>6,452</td>
<td>7,202</td>
</tr>
<tr>
<td>Total averted YLL</td>
<td>35,908</td>
<td>58,283</td>
<td>72,991</td>
<td>95,152</td>
<td>119,173</td>
<td>136,899</td>
<td>185,777</td>
</tr>
<tr>
<td>Present value of cost of YLL averted</td>
<td>262</td>
<td>161</td>
<td>129</td>
<td>99</td>
<td>79</td>
<td>69</td>
<td>51</td>
</tr>
</tbody>
</table>

Source: Authors' calculations.
3 percent a year (in line with economic projections), with a standard deviation of 0.5 percent. This additional source of variation ensures that every simulation will have unique real wage growth rates.

When infected individuals fall sick, they need care, and the cost of forgone earnings for the caretakers is another substantial cost. For example, in Vietnam, three-quarters of PLWHAs interviewed in a recent UNDP-sponsored qualitative study claimed they required the assistance of a caregiver on average for five hours a day. A quarter of caregivers reported having to give up a job in order to spend time with the infected person (UNDP 2004). This analysis sets the expected earnings loss for caregivers at one-half of annual earnings, and this loss occurs in the final year of life for PLWHAs, when they are most in need of home care.

The expected lifespan, after infection, of a PLWHA is assumed to be nine years, and an enhanced level of health care will be necessary in the final five years, with the final year of life preoccupied with even greater medical care (Zaba et. al. 2004). Little information on the costs of care for PLWHAs, both out-of-pocket private expenditures and public sector spending, exists in Afghanistan. A combined facility and household survey estimates that 49 percent of total Afghan health spending was out-of-pocket private expenditure (Johns Hopkins University 2006). The same study estimates that the average monthly expenditure for a sick adult presenting to a health facility is US$20. This analysis assumes that after an HIV-positive individual begins to suffer from opportunistic infections and falls ill, by the fifth year of infection, he or she will present three times annually to a health facility, for an average private

<table>
<thead>
<tr>
<th>Table 2.3 Cost Parameters (in units indicated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual earnings of all workers</td>
</tr>
<tr>
<td>Mean annual real wage growth (random variable)</td>
</tr>
<tr>
<td>Standard deviation of annual real wage growth</td>
</tr>
<tr>
<td>Average wage loss for caregivers, in final year of illness</td>
</tr>
<tr>
<td>Average private health care costs, excepting final year of life</td>
</tr>
<tr>
<td>Average public health care costs, excepting final year of life</td>
</tr>
<tr>
<td>Average private health care costs in final year of life</td>
</tr>
<tr>
<td>Average public health care costs in final year of life</td>
</tr>
<tr>
<td>Discount rate applied</td>
</tr>
</tbody>
</table>

*Source: Beall and Schutte 2006; Johns Hopkins University 2006; Author’s assumptions.*
cost of US$60 a year. The study further assumes an equal amount of resources in the public sector is devoted to that individual’s care (since the amount of spending in the health system from private and public sources is estimated to be roughly equal).

It is to be expected that this level of care, including the maintenance of opportunistic infections, will be necessary for several years, while in the final year the costs are expected to rise substantially. The same UNDP-sponsored Vietnam study referenced above found that the average per-capita health expenditure per PLWHA rose sevenfold in the final year of life (UNDP 2004). This study takes the same multiplier and applies it in the Afghan context. Hence, public and private spending each averages US$420 in the final year of life for a PLWHA.

Table 2.4 summarizes the results of our estimates and simulations. The median present value of total costs averted is estimated at US$30.8 million, yielding a gross benefit-cost ratio of 3.28. Indeed, almost every point in the range of possible outcomes is associated with a substantially higher present value of total costs averted. In only one simulation (out of 500) is the estimated gross benefit less than cost. Given that these rough calculations—based on deliberately conservative assumptions—show a positive return, and often a substantially positive return, we find that effective harm reduction activities can result in significant savings for Afghanistan as a whole.

These savings are further increased when reduced demand for health services is also taken into account. The median present value of savings to the health care system due to reduced system expenditures on PLWHAs is estimated at US$2.04 million, resulting in a net program cost of US$7.36 million and a net benefit-cost ratio of 4.19. Between the 1st and the 99th percentile, the benefit-cost ratio ranges between 1.47 and 7.59. These ranges of gross and net benefit-cost ratios calculated here are consistent with the ratios found in other countries in the region, especially when the conservative estimates of program impact are taken into account. Even with these very conservative assumptions on program impact, made in a data-scarce environment, the anticipated net benefits are substantial.

**Conclusions**

While HIV prevalence in Afghanistan is low, the large number of IDUs suggests the potential for an escalation of HIV prevalence, both within the drug-injecting population, and onward transmission of the virus. Many of
### Table 2.4  HIV Prevention Program: Costs and Outcomes
*(costs in U.S. dollars)*

<table>
<thead>
<tr>
<th>Percentile</th>
<th>1st</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
<th>99th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total program cost</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Present value of total program cost</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
<td>9,399,600</td>
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<td>3,891</td>
<td>4,907</td>
<td>5,764</td>
<td>6,452</td>
<td>7,202</td>
</tr>
<tr>
<td>Present value of total costs averted</td>
<td>12,539,100</td>
<td>19,481,900</td>
<td>24,545,100</td>
<td>30,801,800</td>
<td>36,647,600</td>
<td>41,415,300</td>
<td>48,592,700</td>
</tr>
<tr>
<td>Present value of public costs averted</td>
<td>869,100</td>
<td>1,326,100</td>
<td>1,620,600</td>
<td>2,044,000</td>
<td>2,400,800</td>
<td>2,687,400</td>
<td>2,999,800</td>
</tr>
<tr>
<td>Net program cost</td>
<td>8,530,500</td>
<td>8,073,500</td>
<td>7,779,000</td>
<td>7,355,600</td>
<td>6,998,800</td>
<td>6,712,200</td>
<td>6,399,800</td>
</tr>
<tr>
<td>Gross program costs per HIV infection averted</td>
<td>4,504</td>
<td>2,952</td>
<td>2,416</td>
<td>1,916</td>
<td>1,631</td>
<td>1,457</td>
<td>1,305</td>
</tr>
<tr>
<td>Gross benefit-cost ratio</td>
<td>1.33</td>
<td>2.07</td>
<td>2.61</td>
<td>3.28</td>
<td>3.9</td>
<td>4.41</td>
<td>5.17</td>
</tr>
<tr>
<td>Net program costs per HIV infection averted</td>
<td>4,087</td>
<td>2,536</td>
<td>1,999</td>
<td>1,499</td>
<td>1,214</td>
<td>1,040</td>
<td>889</td>
</tr>
<tr>
<td>Net benefit-cost ratio</td>
<td>1.47</td>
<td>2.41</td>
<td>3.16</td>
<td>4.19</td>
<td>5.24</td>
<td>6.17</td>
<td>7.59</td>
</tr>
</tbody>
</table>

*Source:* Author's calculations.
the IDUs are returnees, and the refugee situation also contributes to the spread of the epidemic geographically, a situation amplified by poverty, lack of access to information about HIV and AIDS, and the lack of effective prevention interventions, such as harm reduction.

The second part of this chapter (Prevention in Afghanistan—An Economic Perspective) describes a model calibrating the costs and economic benefits of a comprehensive HIV prevention program. In light of the very limited knowledge about the state of the epidemic in Afghanistan, it allows for some uncertainty regarding intervention effectiveness or disease dynamics. The median estimates return a cost-benefit ratio of 3.3, which increases to 4.2 when fiscal savings arising from reduced demand for public health services are taken into account. These results, when considered alongside the international evidence on cost-effectiveness, reinforce the view that Afghan investments in effective harm reduction activities constitute not solely good health policy, but sound economic policy as well.

### Annex 2.1 Estimated HIV Transmission Probabilities by Exposure

<table>
<thead>
<tr>
<th>Type of exposure</th>
<th>Estimated risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive Anal Intercourse</td>
<td>≤ 3% (1/125 to 1/31) (DeGruttola et al. 1989)</td>
</tr>
<tr>
<td>Receptive Vaginal Intercourse</td>
<td>≤ 0.1% (1/2,000 to 1/677) (Mastro et al. 1994; Wiley, Herschkorn, and Padian 1989)</td>
</tr>
<tr>
<td>Insertive Vaginal or Anal Intercourse</td>
<td>≤ 0.1% (1/3,000 to 1/1,111) (Nagachinta et al. 1997; Peterman et al. 1988)</td>
</tr>
<tr>
<td>Needlestick Injury</td>
<td>= 0.3% (1/313) (Henderson et al. 1990)</td>
</tr>
<tr>
<td>Use of Contaminated Injecting Drug Equipment</td>
<td>= 0.6% (1/149) (Kaplan and Heimer 1992)</td>
</tr>
</tbody>
</table>

Source: Bertozzi et al. 2006.
### Annex 2.2 Evidence on Effectiveness of Harm Reduction in Injecting Drug Users (IDUs), and Other Preventive Measures

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcome</th>
<th>Impact/policy implication</th>
<th>Methodology</th>
<th>Country/region</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various Methods of Harm Reduction</td>
<td>HIV Incidence</td>
<td>Significant reduction in HIV incidence in the intervention group was found in both studies.</td>
<td>Meta-analysis</td>
<td>Global</td>
<td>Des Jarlais and Friedman 1996</td>
</tr>
<tr>
<td>Outreach to IDUs</td>
<td>Reduced risk behavior</td>
<td>The baseline to follow-up measurements showed substantial reductions in HIV risk behavior in the National AIDS Demonstration Research studies. However, only a few of the NADR projects showed significantly greater risk reduction in the “enhanced” versus the “standard” interventions.</td>
<td>Randomized clinical trial</td>
<td>50 cities in the United States</td>
<td>Friedman and Des Jarlais 1991</td>
</tr>
<tr>
<td>Bleach Disinfection</td>
<td>HIV incidence</td>
<td>2 studies (Baltimore and New York) found no protective effect of self-reported bleach disinfection, while the third (Miami) found a moderately strong protective effect.</td>
<td>Cohort studies using multivariate analysis</td>
<td>Baltimore, New York, and Miami</td>
<td>Vlahov et al. 1994; Titus et al. 1994; Weatherby et al. (in Des Jarlais and Friedman 1996)</td>
</tr>
<tr>
<td>Bleach Disinfection</td>
<td>Life-years saved and change in cohort HIV prevalence</td>
<td>Bleach programs can produce the greatest life-year (LY) savings in areas of low HIV prevalence. In the lowest prevalence scenario (0.02), the projected LY savings is 2.3 years/HIV negative drug user, compared with 1.7 and 1.3 under medium (0.25) and high prevalence (0.60). The results suggest the introduction of bleach programs early, when prevalence is still comparatively low in the IDU population.</td>
<td>Markov model simulation 4 hypothetical cohorts of IDUs</td>
<td>Data for simulation: urban health study, San Francisco</td>
<td>Siegel et al. 1991</td>
</tr>
</tbody>
</table>

(continued)
### Annex 2.2 Evidence on Effectiveness of Harm Reduction in Injecting Drug Users (IDUs), and Other Preventive Measures (Continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Outcome</th>
<th>Impact/policy implication</th>
<th>Methodology</th>
<th>Country/region</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syringe Exchange (SE)</td>
<td>HIV incidence</td>
<td>Low: HIV incidence among syringe-exchange participants is uniformly low in areas with low HIV seroprevalence. Participants in the syringe exchange program in Kathmandu, Nepal, have a low HIV incidence rate (Maharjan et al. 1994). Intermediate: The two cities with intermediate HIV seroprevalence levels (London and Montreal) show strong contrast. HIV incidence among Montreal SE participants was 6/100 person-years at risk. High: Results from syringe-exchange programs in the high-seroprevalence areas are generally encouraging. Syringe-exchange programs in these areas are not sufficient to eliminate all new HIV infections, but the pattern is clearly one of relatively low rates of new HIV infections.</td>
<td>Meta-analysis</td>
<td>Global</td>
<td>Des Jarlais and Friedman 1996 (based on Des Jarlais, Report to UK Health Department, Hankins personal communication)</td>
</tr>
<tr>
<td>Needle Exchange (NE)</td>
<td>Re-use/Sharing of syringes</td>
<td>Significant reduction in needle sharing in the intervention group was found in all three studies; correlation between needle exchange program attendance and lower needle sharing was found in one study.</td>
<td>Empirical analysis(^i) (i)</td>
<td>Bangladesh(^i)</td>
<td>Jenkins et al. 2001; Ksobiech 2003; Peak et al., 1995; Vlahov et al. 1997</td>
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</table>
Needle Exchange (NE) HIV infection

On average, seroprevalence increased by 5.9% per year in the 52 cities without NE programs (NEPs), and decreased by 5.8% per year in the 29 cities with NEPs. The average annual change in seroprevalence was 11% lower in cities with NEPs (95% CI –17.6 to –3.9, p = 0.004). Results, together with the clear theoretical mechanisms by which NEPs could reduce HIV incidence, strongly support the view that NEPs are effective.

Meta-analysis of NEPs in 80 cities, combined with unpublished information from the CDC on seroprevalence of IDUs entering treatment in the United States between 1988 and 1993.

Global

Global Hurley, Jolley, and Kaldor 1997

Needle Exchange (NE) HIV infection

Starting from prevalence rates for 23% (whites) and 88% (natives), based on 24 seroconversions among 257 follow-up visits, estimated HIV incidence was 18.6 per 100 person-years (95% confidence interval, 11.1–26.0). Despite having the largest NEP in North America, Vancouver has been experiencing an ongoing HIV epidemic. Whereas NEPs are crucial for sterile syringe provision, they should be considered one component of a comprehensive program including counseling, support, and education.

Prospective study. Logistical regression of semiannual case-control data on 1,000 IDUs, reached through street outreach or self-referred to NEP

Vancouver

Vancouver Strathdee et al. 1997
Annex 2.3  Evidence on Cost-Effectiveness of Harm Reduction in Injecting Drug Users (IDUs) and Other Prevention and Treatment Measures

<table>
<thead>
<tr>
<th>Outcome</th>
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<tbody>
<tr>
<td>Cost/Intervention and Cost-effectiveness (CE)</td>
<td>The most effective harm reduction is eliminating drug use. In a street-based outreach in Kathmandu, Nepal, cost per client contact was US$3.21. In Svetlogorsk, Belarus, cost per person reached was US$1.19, and the cost per disposable syringe distributed was $0.39. Using a mathematical model, the CE of the project was estimated to be US$71 per HIV infection averted.</td>
<td>Systematic review&lt;sup&gt;12&lt;/sup&gt;</td>
<td>Developing countries</td>
<td>Walker 2003</td>
</tr>
<tr>
<td>Cost/HIV Averted/ Treated, Total LYs Gained, and Cases Averted/Treated</td>
<td>Both the cost-effectiveness and the budgetary analysis suggest that HIV prevention interventions are much more cost-effective than ARV treatment. Both blood screening and STD control among sex workers are the most CE preventive interventions at the costs of US$3.35 and US$3.95 per life-year saved, respectively. ARV treatment is the least cost-effective, costing US$1,317 per life-year saved at generic drug prices. In the budgetary simulation scenario with donated drugs, ARV treatment consumes the entire budget, saving up to 2,974 life-years annually. A portfolio of prevention interventions does not require the entire budget and results in 135,030 life-years saved. HIV prevention interventions should be prioritized if poor countries hope to maximize the scarce resources available for reducing the impact of the AIDS epidemic.</td>
<td>Comparative CEA of HIV treatment and prevention&lt;sup&gt;13&lt;/sup&gt; and static budgetary simulation</td>
<td>Resource- scarce countries</td>
<td>Masaki et al. 2003</td>
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### Annex 2.3 Evidence on Cost-Effectiveness of Harm Reduction in Injecting Drug Users (IDUs) and Other Prevention and Treatment Measures

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<td>(i) Median costs in NEP per participant contact range from US$1.35 in the United States to US$3.21 in Nepal. Cost-benefit analysis (CBA) of NEPs found ranges of the cost per HIV infection averted in the United States to be between US$3,800 to almost US$100,000, below the estimated lifetime cost of treating an HIV-infected person (Lurie et al. 1997).</td>
<td>Cost/Intervention and Cost-effectiveness (CE)</td>
<td>Systematic review of effectiveness and cost-effectiveness</td>
<td>Low- and middle-income countries</td>
<td>Jha et al. 2001</td>
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<tr>
<td>(ii) Annual costs of methadone maintenance in the United States run US$5,250 per person, based on an analysis of 600 programs conducted by Barnett et al. 2001. (iii) The supply control strategies being employed in many African countries, for example, have demonstrated only limited effectiveness based on reports of increasing trading activities and drug availability.</td>
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<tr>
<td>HIV Infection and DALYs</td>
<td>US$359/HIV Infection</td>
<td>US$18/DALY</td>
<td>Cost-benefit analysis (CBA) of NEPs found ranges of the cost per HIV infection averted in the United States to be between US$3,800 to almost US$100,000, below the estimated lifetime cost of treating an HIV-infected person (Lurie et al. 1997).</td>
<td>Systematic review of effectiveness and cost-effectiveness</td>
<td>Low- and middle-income countries</td>
</tr>
<tr>
<td>HIV Infection and DALYs</td>
<td>US$564/HIV infection</td>
<td>US$28/DALY</td>
<td>Annual costs of methadone maintenance in the United States run US$5,250 per person, based on an analysis of 600 programs conducted by Barnett et al. 2001. (iii) The supply control strategies being employed in many African countries, for example, have demonstrated only limited effectiveness based on reports of increasing trading activities and drug availability.</td>
<td>Systematic review of effectiveness and cost-effectiveness</td>
<td>Low- and middle-income countries</td>
</tr>
<tr>
<td>HIV Infection and DALYs</td>
<td>US$97/HIV infection</td>
<td>Between 1999 and 2000, at the coverage of between 20% to 38%, and an IDU HIV prevalence of 54%, projections suggest 792 HIV infections were averted, a 22% decrease in IDU HIV incidence, but a 1% increase in IDU HIV prevalence. Cost per HIV infection averted was US$97. Scaling up the intervention to reach 60% of IDUs remains CE and reduces HIV prevalence by 4% over five years. At the current coverage, the harm reduction intervention in Odessa is CE but is unlikely to reduce IDU HIV prevalence in the short term. To reduce HIV prevalence, more resources are needed to increase coverage.</td>
<td>Mathematical modeling of economic providers’ costs with empirical data</td>
<td>Odessa, Ukraine</td>
<td>Vickerman et al. 2006</td>
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(continued)
### Annex 2.3 Evidence on Cost-Effectiveness of Harm Reduction in Injecting Drug Users (IDUs) and Other Prevention and Treatment Measures (Continued)

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</table>

*Source: Authors (Expanded from Bertozzi et al. 2006).*
Notes

1. Unfavorable conditions include rate and pattern of sexual partner change, the presence or absence of male circumcision, and injecting drug use—frequently coupled with sex work. War—through increased mobility and psychological distress—can amplify the problem, increasing the number of displaced people and refugees, and drug-injecting prisoners. Disempowerment of women and fragmented social networks are further contributing factors to increased likelihood of HIV transmission in vulnerable groups.


3. For more information, see http://go.worldbank.org/GL463NSC10.

4. This assumes a mortality rate of 15 percent over the next five years for individuals already or soon to be HIV positive).

5. Our analysis adopts a discount rate of 5 percent, a typical value for the evaluation of health projects.

6. Studies classified as “global” are skewed toward research in developed countries.

7. The National AIDS Demonstration Research (NADR) program was an outreach program to IDUs not in treatment in 50 cities in the United States, which randomly assigned individual subjects to “enhanced outreach” intervention (treatment group) and “standard outreach” (control group). Standard Intervention includes: risk behavior interview, HIV counseling and testing (VCT), and basic AIDS education. Enhanced Intervention includes: additional hours of individual or small-group counseling and skills training.

8. Potential reasons for failure of bleach disinfection: IDUs not following adequate disinfection procedures; formidable measurement problems (difficult to measure “good” disinfection and therefore identify valid control group); need to distinguish between IDUs using only sterile/unused equipment, IDUs using bleach disinfection, and IDUs not using bleach disinfection; and IDU injection practices vary (Des Jarlais and Friedman 1996).

9. This in part reflects the dynamics of HIV transmission, where “equal” risk-reduction programs will have greater impact if they are implemented when seroprevalence is low.

10. Maharjan et al. (1994) was the first report of a successful SE program in a developing country.

11. The reasons for the high incidence rate among Montreal syringe-exchange participants have not yet been determined (Bruneau, personal communication by Des Jarlais), but may include: (1) attracting a group of participants at extremely high risk for HIV infection; and (2) an insufficient number of...
syringes exchanged per visit, given the high frequency of drug injection among the participants.

12. Databases: Medline, HealthStar, Popline, Health Economic Evaluation Database (HEED), ISI, Science and Social Sciences, Embase, and Cab Health; and correspondence with donor organizations.

13. This study examined five prevention interventions: (1) voluntary counseling and testing; (2) prevention of mother-to-child transmission; (3) STD mass treatment for general population; (4) STD management for sex workers; and (5) blood screening, and four drug price scenarios for ART for HIV-positive patients.

14. Kumaranayake et al. (2004) undertake an analysis of the cost-effectiveness of a harm reduction and HIV prevention project for IDUs in Eastern Europe. Economic evaluation methods were adapted to consider the effect of an eight-month financing gap that negatively impacted project implementation. Financial and economic costs of implementing the intervention were analyzed retrospectively. The data were also modeled to estimate the costs of a fully functioning project. Estimates of the intervention impact on sexual and drug injecting behavior were obtained from existing pre- and postintervention behavioral surveys of IDUs. A dynamic mathematical model was used to translate these changes into estimates of HIV infections averted among IDUs and their sexual partners. Projections of the potential effect of the shortfall in funding on the impact and cost-effectiveness of the intervention were made. In Svetlogorsk, Belarus, where in 1997 the IDU HIV prevalence was 74 percent, the intervention averted 176 HIV infections (95 percent CI 60–270) with cost-effectiveness of US$359 per HIV infection averted (95 percent CI US$234–US$1,054). Without the US$2,311 reduction (7 percent) in financing, the estimated cost-effectiveness ratio of the project would have been 11 percent lower. The costing methods used to measure donated mass media can substantially influence cost and cost-effectiveness estimates. Harm reduction activities among IDUs can be cost-effective, even when IDU HIV prevalence and incidence is high. Relatively small shortfalls in funding reduce impact and cost-effectiveness. Increased and consistent allocation of resources to harm reduction projects could significantly reduce the pace of the HIV epidemic in Eastern Europe.

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