

CHAPTER 1 Introduction

This study was prompted by the rapid growth in Ukraine of the HIV/AIDS epidemic and its threat to the general population and economy. According to estimates from the Joint United Nations Programme on HIV/AIDS (UNAIDS), 360,000 (range: 180,000 to 590,000) people were living with HIV/AIDS in the country as of late 2003, with an adult (age 15-49) prevalence rate of 1.4 percent (range: 0.7 to 2.3 percent). The exact number of infections is unknown, but the officially registered new HIV cases reported each year doubled over four years: from 6,216 in 2000 to 12,491 in 2004. In addition, 2000-2004 witnessed a four-fold increase in the annual official numbers of new AIDS cases and AIDS deaths. Between 1994 and 2005, Ukraine's epidemic was concentrated in sub-populations, mainly injecting drug users (IDUs), with the prevalence rate among pregnant women in urban areas still below 1 percent. However, a Barnett et al. (2001) study's warning to take very seriously the probability of a "generalized"² heterosexually transmitted epidemic was reinforced in Feshbach and Galvin (2005), who deduce that "all the evidence, however incomplete, suggests that a heterosexual epidemic has certainly begun." The epidemic's tendency to spill into the general population is reflected in official Ukrainian AIDS Center data: the share of infections caused by intravenous drug use decreased over 1997-2004 from 83.6 percent to 46.5 percent, while the percentage of heterosexually transmitted infections grew from 11.3 percent to 32.4 percent. To prevent the epidemic from becoming self-sustaining outside of the risk groups, such as IDUs, commercial sex workers (CSWs), and people with sexually transmitted infections (STIs), effective prevention and education are called for.

High-risk groups remain the worst affected by the epidemic: 2004 sentinel surveillance data indicate that the average prevalence rate among IDUs is 37.2

percent, and among commercial sex workers (CSWs) it is 22.2 percent. At the same time, mounting evidence shows that the wider population is increasingly at risk, mostly through heterosexual contacts. Potential catastrophic increases in HIV/AIDS morbidity and mortality are likely in the medium term if measures to curb the epidemic fail. Several factors exacerbate the situation: persistent demographic decline, a high prevalence of tuberculosis (TB) and sexually transmitted infections (STIs), and a health system needing reform.

Access to antiretroviral therapy (ART) has been very limited but is expanding. A Global Fund for AIDS, Tuberculosis and Malaria (GFATM) pilot project for 200 patients is being extended to 2,000, and on July 1, 2005, 1,950 persons were receiving ART (Ukrainian AIDS Center data). By the following October, 2,866 AIDS patients were undergoing treatment funded by GFATM. In April 2005, ART was commenced in six of the country's worst affected areas: the oblasts of Donetsk, Dnipropetrovsk, Odesa, and Mykolaiv; the Autonomous Republic (AR) of Crimea; and Kiev city.

Although HIV/AIDS is becoming a major obstacle to economic growth in Ukraine, recognition of the need to re-assess priorities and implement an effective, anti-HIV/AIDS national strategy is growing. Losing the momentum of the recent economic recovery would be tragic after Ukraine's painful economic

² "Generalized" and "concentrated" epidemics are defined as follows: a concentrated epidemic has HIV prevalence in most-at-risk subpopulations at 5 percent or higher and among pregnant women in urban areas below 1 percent. In a generalized epidemic, social networking in the general population is sufficient to sustain the epidemic outside the most-at-risk sub-populations, and HIV prevalence among pregnant women is consistently above 1 percent. See http://data.unaids.org/Topics/Epidemiology/Manuals/EPP_GeneralizedEpidemic_05_en.pdf.

transition since independence in 1991. Prior to recent positive developments, Ukraine experienced a decade of severe political and economic instability and decline (World Bank 2004). An economic adjustment phase included extreme macroeconomic instability and hyperinflation in 1993. By 1998, the officially reported gross domestic product (GDP) had fallen to 40 percent of its 1990 level. Even if the degree of the actual fall is overestimated due to the large size of the informal sector, there was a severe economic decline and genuine hardship for many Ukrainians in the 1990s. The difficulties of the transition stage are reflected in Ukrainian demographic statistics, with life expectancy falling for males and females from 66 and 75 years to 62 and 73 years, respectively, between 1989 and 1997 (World Bank 2004). Furthermore, massive depopulation (by almost 4 million during 1991-2003) through reduced fertility and out-migration has accelerated a growing share of the elderly population. Superimposed on these demographic trends, the HIV epidemic suppresses already-low fertility even further, both deepening and extending population decline.

This study evaluates the broad economic effects of the epidemic, delving beyond the costs of prevention and treatment. Both near- and medium-term (2004-2014) cost estimates were developed to inform policy makers of the potential costs of the epidemic during this decade. To inform decision making on prevention and treatment programs, the study highlights the channels through which HIV/AIDS affects the national economy as well as households.

HIV/AIDS has a direct impact on human health, an input in economic development and an indispensable component of human capital.³ Infectious diseases influence economic activities and economic growth both directly and indirectly. At the first instance, disease has a negative impact on healthy life expectancy. Early death and chronic disability result in the loss of future income and in medical care expenditures. The second effect includes reduced investment in one's own and one's children's education and health, especially in societies with high infant/child mortality and high fertility (a behavioral quality-quantity trade-off). Third is a negative impact on

investment in the economy through the increased consumption of health care and an increased country risk premium. In addition to the quantifiable economic costs of disease, there are also intangible losses from pain and suffering.

HIV/AIDS affects all agents in the economy: households, businesses, and the government. On both the *household and business levels*, its direct effects are due to the increased mortality and morbidity (loss of years of healthy life, reduced labor supply, and reduced efficiency of labor due to illness). HIV/AIDS leads to changes in labor force composition due to its heavier effect on the productive-age population. AIDS-related mortality disproportionately affects people during their productive years; it also affects women more than men. Morbidity reduces healthy life years, causing increased expenditure on medical care with a negative effect on the income available for other purposes, including saving and household investment in human capital. A sick employee supplies fewer hours in the labor market, and sickness makes anyone less efficient. When other household members must leave the labor force to care for a sick family member, labor supply drops again. Lower fertility ultimately produces a longer-term negative demographic effect and fewer people to contribute to the economy. Also, the number of orphans rises with AIDS deaths, increasing the economic burden on the state and surviving family members. Last, medical expenses associated with the treatment of HIV/AIDS and opportunistic infections may become catastrophic at the household level, driving marginally poor households below the poverty line. This is particularly so in economies with underdeveloped social and private insurance markets. As a result, income inequality may worsen.

In the *private sector* HIV/AIDS affects employers through the loss of investment in recruiting and

³ A positive correlation between health and economic growth has been established in Bloom and Sachs (1998), Bhargava et al. (2001), Cuddington, Hancock, and Rogers (1994), Cuddington and Hancock (1994), Robalino, Voetberg, and Picazo (2002), and Robalino, Jenkins, and Maroufi (2002) and analyzed in detail in WHO Commission on Macroeconomics and Health (2001) and Haacker (2004b).

training an employee who becomes disabled by AIDS. Loss of productive labor shifts the burden of contributing to benefits, including the pension system, to fewer healthy workers. This in turn may reduce benefits or healthy workers' labor supply.

The *public sector* can also encounter losses through its investment in recruiting and training of its labor force when its employees become sick. Public revenues drop when workers reduce their contribution, either due to illness or to give care to family members, which in turn means fewer people paying income taxes.

The *health sector* is likely to take a direct blow from increasing demand for medical care and reduced numbers of health workers due to the epidemic.

Other negative effects include likely effects on trade (both in goods and services) and on balance of payments.

This study uses several methods to detail the likely impacts and costs of Ukraine's HIV/AIDS epidemic. Chapter 2 draws together available data to describe the current AIDS epidemic. Chapter 3 presents differing demographic impacts based on various projections with and without AIDS. Chapter 4 shows specifically where the impacts on the labor force and government revenue will be greatest, and Chapter 5 estimates the cost of the epidemic and implications of providing ART. Chapter 6 presents policy implications. The methodology, assumptions, and models and their results are detailed in the annexes.

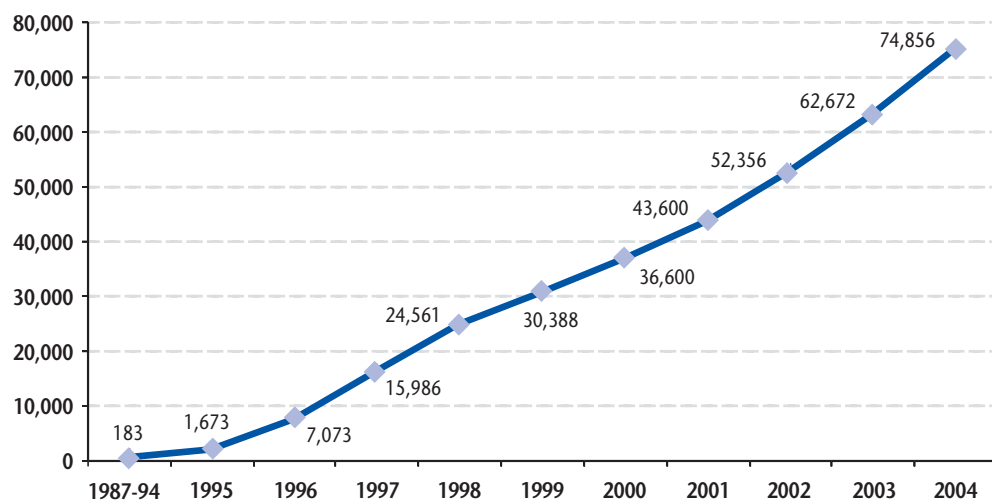
CHAPTER 2 *The HIV/AIDS Epidemic in Ukraine: Status and Trends*

Ukraine's HIV/AIDS epidemic has been spreading at an alarming rate for the past few years, with officially registered new HIV cases per year reaching an all-time high of 12,595 in 2004, a 25 percent increase from 2003. Each day brings 32 new HIV diagnoses and 8 AIDS deaths among Ukrainians. Data from the Ukrainian AIDS Center (March 1, 2005) indicate that the cumulative number of registered HIV cases was 76,875 Ukrainian nationals, including 6,055 children as well as 314 foreigners. Those data also showed that 9,065 adults and 329 children developed AIDS, and 5,504 adults and 156 children died. Official HIV prevalence based on the registered cases is 115.4 per 100,000. Newer data (October 1, 2005) place the cumulative number of officially registered HIV-positive persons at 84,437, total AIDS cases at 11,757, and AIDS deaths at 6,865. This marks an additional 7,248 newly registered HIV cases, 2,363 AIDS cases, and 1,205 AIDS deaths in seven months. The

number of new AIDS cases registered during March-October 2005 is almost as high as the official number of all AIDS cases registered in 2004 (2,745). A similar trend is seen for AIDS deaths: 1,205 deaths over March-October 2005 compared to 1,775 for all of 2004. Figure 2-1 illustrates the cumulative growth of officially registered HIV cases over 1987-2004. These data suggest that the epidemic is accelerating.

The recent increase in the number of new registered HIV infections was not driven by improved testing or more tests (Figure 2-2), an issue discussed more extensively below under "Non-uniformity across Regions and Sub-populations." It is important to note that the number of tests conducted has not increased appreciably since 1997. Annex 1 Table A1-1 reports officially registered new HIV and AIDS cases and AIDS deaths for 1987-2004, and Table A1-2 presents national HIV serosurveillance data by major category.

Figure 2-1. Cumulative Reported Cases of HIV Infection, 1987-2004



Source: Ukrainian AIDS Center.

The Changing Pattern of Transmission of the HIV/AIDS Epidemic

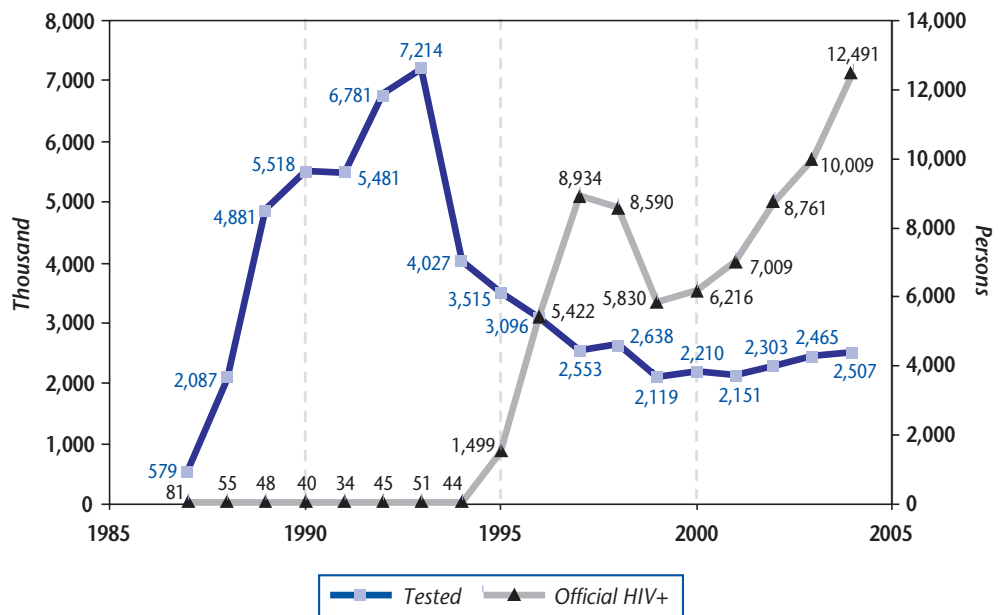
The leading modes of HIV transmission in Ukraine are through intravenous drug use, followed by heterosexual transmission. However, official data suggest that the share of transmission mode is shifting and that the epidemic has started to spread outside the high-risk groups through heterosexual transmission. HIV entered the population of intravenous drug users and expanded among them during

1995-98 through the sharing of contaminated needles and equipment. It is spreading increasingly through heterosexual contact. The share of IDUs among all new HIV victims dropped from 63 percent in 2000 to 46.3 percent in 2004, while the share of infection through heterosexual contact increased from 23 percent to 32 percent. During 2000-2004, the epidemic broadened, with the percentage of cases growing on average by 30 percent per year from heterosexual contact and by 32 percent per year from vertical transmission (mother-to-child transmission or MTCT). By comparison, the cases of HIV infection among the IDUs grew on average by 10 percent per year in 2000-2004. Male-to-male sexual contacts account for an insignificant number of reported cases (see Figure 2-3 on page 6 and Annex 1 Tables A1-2 and A1-3). One can visualize Ukraine's epidemic as the superimposition of three waves: an explosive spread among the IDUs, a slower but broader wave through heterosexual contacts, and—as a consequence of both—a third component through MTCT.

HIV Sentinel Surveillance Data

Serosurveillance data (Annex 1 Table A1-2) show that HIV seroprevalence among all tested increased from 0.75 percent in 2003 to 0.92 percent in 2004. Seroprevalence increases are also observed among pregnant women, reaching 0.34 percent in 2004, and donors, reaching 0.13 percent that same year. Females aged 15-30 are more likely to be infected through heterosexual contact than males of the same age, and almost half (47 percent) of the reported HIV cases are among females of the most active reproductive age, 20-29. Above the age of 30, males are more likely to be infected through heterosexual contact

Figure 2-2. Total Numbers of HIV Tests and Officially Registered HIV Cases, 1987-2005



Source: Ukrainian AIDS Center.

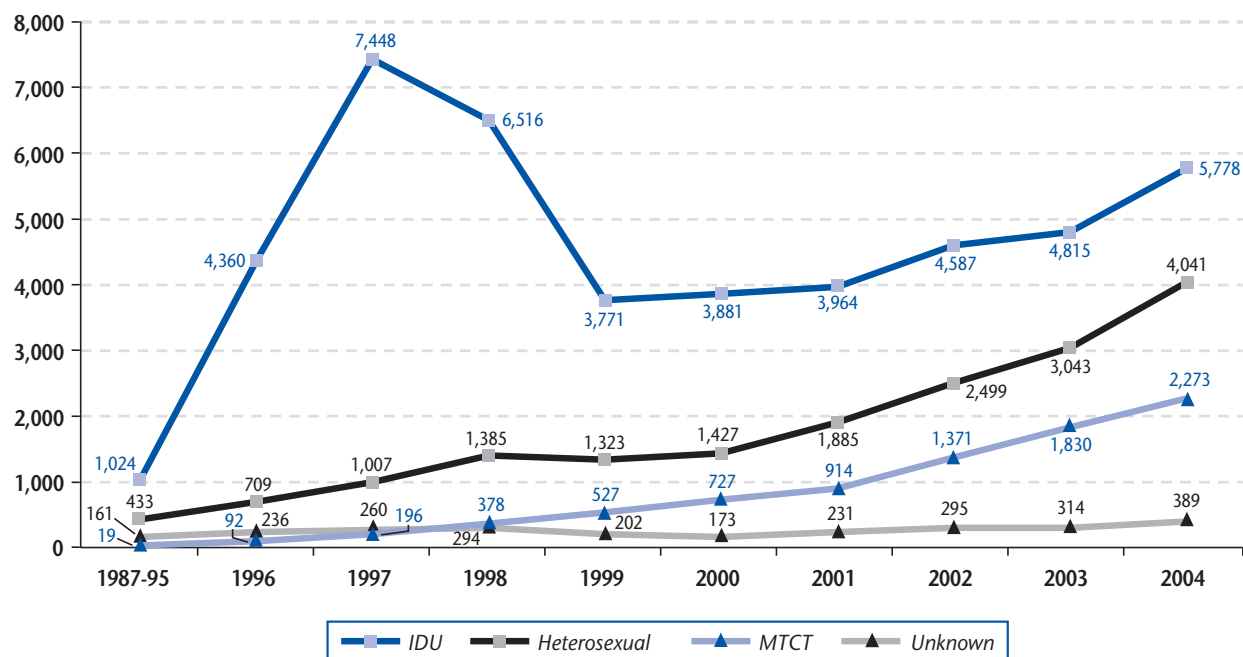
than females. The increased share of females from 36.5 percent to 42 percent of total HIV infections over 2000-2004 signals that the epidemic's generalization may have commenced (Annex 1 Table A1-5).

Ukrainian AIDS Center data indicate that the HIV/AIDS epidemic is unfolding in all regions, albeit non-uniformly (see Annex 1 Table A1-5). The worst-affected regions in terms of registered HIV prevalence are the oblasts of Donetsk (16,161 cases), Dnipropetrovsk (13,868), Odesa (10,855), and Mykolayiv (4,986); the AR of Crimea (4,976 cases); and Kiev city (3,144 cases). Most of those infected are aged 20-29. In terms of incidence rates, Dnipropetrovsk Oblast is the worst affected with 59.81 new cases of per 100,000 in 2004, closely followed by the oblasts of Odesa (58.92), Mykolayiv (57.49), and Donetsk (52.86); Sevastopol city (50.21); and the AR of Crimea (37.2).

Most-at-Risk Populations (MARPs)

The epidemic so far in Ukraine is still concentrated among certain population groups that are at higher risk of infection: IDUs, commercial sex workers

Figure 2-3. Leading Modes of HIV Transmission, 1987-2004



Source: Ukrainian AIDS Center.

(CSWs), men who have sex with men (MSM), people with sexually transmitted infections (STIs), and prisoners. Surveillance data on these groups enables forecasting the epidemic's future spread among them and extrapolations to estimate prevalence in the general population. The shape of epidemic profile will depend on the size of the risk groups and interactions between them and sexual partners from outside these groups.

As part of the HIV monitoring and surveillance program, HIV sentinel surveillance has been conducted since 1999 among the most-at-risk populations. The results among these groups suggest that the number of reported HIV cases is grossly underestimated based on the estimated HIV prevalence among the MARPs (Artyukh et al. 2005a).

Injecting Drug Users

The survey of HIV seroprevalence among IDUs indicates that in eight regions studied, seroprevalence ranged from 10-59 percent, confirming that IDUs, followed by CSWs, were a major driving force behind the epidemic in Ukraine.

The highest level of HIV infection among IDUs (59 percent) was recorded in Simferopol, more than double that found in earlier surveys (see Annex Table A1-7). Seroprevalence remains consistently high (58.3 percent) among IDUs in Odesa Oblast. Among IDUs in Donetsk it remained relatively unchanged over 2000-2004, at about 41.6 percent, but this does not indicate stabilization of the epidemic: Donetsk has the highest rate (55.6 percent) of new cases among very young (15-19) IDUs, perhaps indicating the rapid spread of infection among teenage IDUs in this region. Volyn Oblast posts a stable yet high HIV seroprevalence rate among IDUs of 32.8 percent.

The Poltava region has seen a reduction in surveyed HIV prevalence rates of IDUs, but more than a third of new cases (36 percent) occur in the 15-19 age group. The corresponding number for Odesa Oblast is 26.1 percent despite the generally higher seroprevalence rate among the IDUs. In Kharkiv the HIV prevalence among IDUs declined somewhat lately and now stands at 14 percent, while the Sumy Oblast IDU seroprevalence indicator (11.6 percent) is the lowest in the eight regions.

Commercial Sex Workers and STI Patients

HIV seroprevalence surveys were conducted among CSWs in five Ukrainian regions, where seroprevalence ranges from 11 percent in Kherson city to 31 percent in Odesa city (Artyukh et al. 2005b; see Annex 1 Table A1-8). The rising share of HIV transmissions through heterosexual intercourse has been driven in part by infections among CSW partners, many of whom inject drugs. The average HIV prevalence rate among all tested CSWs was 18.7 percent in 2002, 22.2 percent in 2004, and 8-32 percent in 2005 (Ukrainian AIDS Center, 2005).

HIV cases are also being reported increasingly in STI patients. Serosurveillance of this group indicates widely varying rates by region and year.

Men Who Have Sex with Men and Other Sexual Transmission

The lack of data for the group of men who have sex with men results from the limited accessibility to this group by survey programs. However, serosurveillance among the MSM groups conducted on a small sample in two cities reveals high prevalence rates (7 out of 25 tested in Odesa and 3 out of 22 tested in Simferopol: Amdzhadin et al. forthcoming). The sentinel surveillance report shows the prevalence rate among MSMs was between 10 and 30 percent in 2004 (Ukrainian AIDS Center).

Data reported in Annex 1 Table A1-9 also suggest that sexual transmission of HIV infection is rising.

Prisoners

Increasingly, HIV cases are also being reported among prisoners. From 1987 to the end of 2005, 14,998 new cases of HIV were diagnosed in the penitentiary system in Ukraine, and 999 prisoners had developed AIDS. Among the prisoners tested for HIV, 5.5 percent were HIV positive in 2002, and that rate increased to 9.4 percent in 2005 (State Department of Prisons).

Low-Risk Groups

Official data on low-risk groups such as blood donors and pregnant women provide an important

means to monitor HIV's spread in the general population. Mandatory screening of blood donors for HIV has been in place since the 1989 Ministerial Order by the Ministry of Health. Donors in Ukraine receive a payment for donating blood (apart from donating to relatives) and may be motivated to donate by the payment. During 1998-2004, the share of infected donors rose from 0.07 percent to 0.13 percent. In 2004 the highest levels of HIV seroprevalence among donors were observed in Mykolayiv, Odesa, Dnipropetrovsk, Chernigiv, Donetsk, and Kiev Oblasts, all of which are the regions with the highest HIV prevalence apart from Chernigiv, which is below the national average incidence level (see Annex 1 Table A1-6).

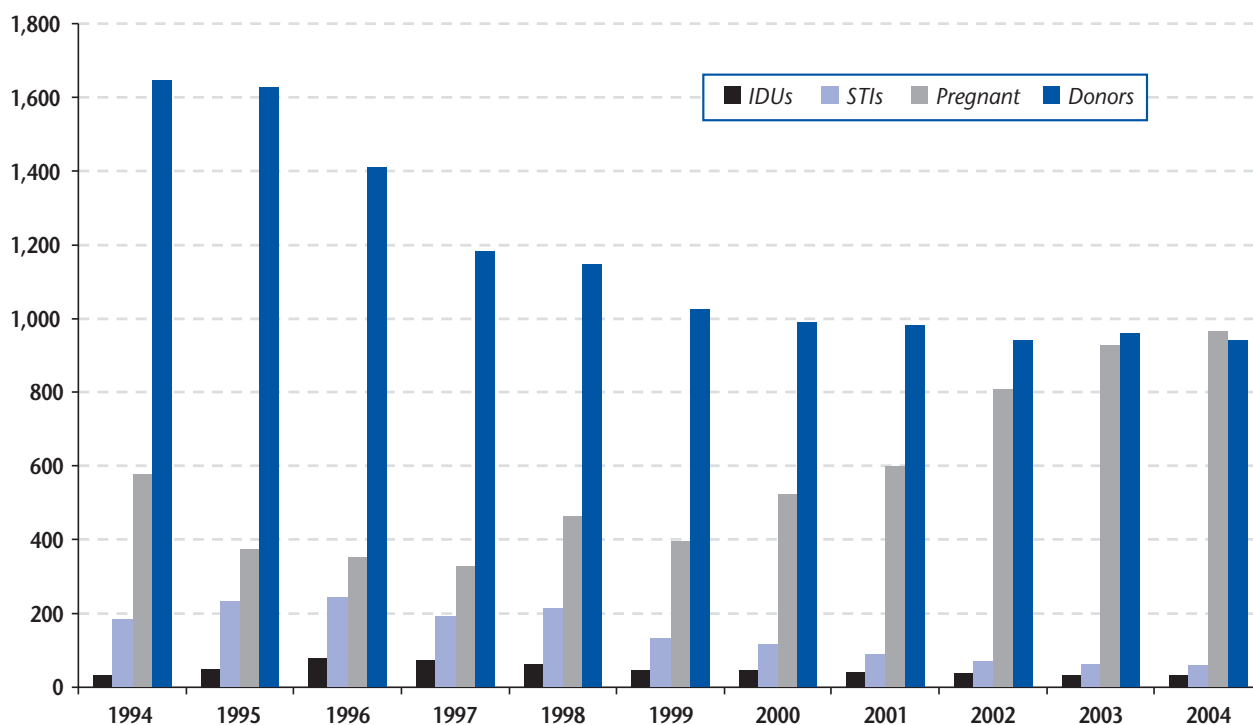
Seroprevalence among pregnant women also indicates epidemic trends in the adult population. According to Ukrainian AIDS Center data, the seroprevalence rate among pregnant women rose from 0.12 percent in 1998 to 0.34 percent in 2004, with the highest rates observed in Mykolayiv, Dnipropetrovsk, Donetsk, Odesa, Chernigiv, and Kiev Oblasts. The first four oblasts in this list have the highest IDU rates. Since 2000 measures have been implemented to prevent MTCT, targeting all pregnant women who agree to undertake voluntary HIV testing. In 2003, 15.9 percent of infants born to HIV-positive mothers tested positive, a 43 percent reduction compared to 2001.

Non-uniformity across Regions and Sub-populations

The above indicates that the epidemic spreads non-uniformly across regions and population groups, with the major explanatory factor being the geographic distribution of intravenous drug use. At the same time, the total number of HIV tests conducted among high-risk groups and other categories depends on the local administration and policies that also differ from oblast to oblast. The Ukrainian AIDS Center undertook epidemiological studies in 2004 to better understand the role of IDUs in shaping the national epidemic. The study concluded that official data on reported HIV cases are closely linked to HIV-testing practices. The targeted testing of IDUs had been relatively stable and somewhat reduced in

Figure 2-4. Total Number of HIV Tests Conducted, by Category, 1994-2004

In thousands



Source: Ukrainian AIDS Center.

recent years, while prenatal HIV testing had increased (see Figure 2-4). As a result, the increased share of females among new HIV cases and the reduced share of IDUs may be partially attributed to the change in the composition of the tested population.⁴ Examination of data from Donetsk and Odesa Oblasts on those infected with HIV who passed the virus to their sexual partners revealed that in 50-60 percent of such cases, primary exposure of index patients to the virus occurred through sharing contaminated drug injection equipment. Hence, the heterosexual transmission to the sex partners can be traced back to the equipment use by the index patient in more than half of cases.

Based on the above, the Ukrainian AIDS Center study concluded that the epidemic continued to be concentrated among IDUs and their sexual partners. However, analysis by national and international experts (Barnett et al. 2001; DeBell and Carter 2005) indicates that the epidemic may be on the brink of spilling into the general population. Feshbach and

Galvin (2005) discuss the debate on whether generalization has started in Ukraine and deduce that a heterosexual epidemic has certainly begun.

In sum, HIV infection is spreading at an increasing rate in Ukraine, with injecting drug use as the leading mode of transmission, but the share of the sexual transmissions is increasing, as is the share of MTCT: both signs that HIV infection is starting to penetrate the lower-risk population. While still low at the national level, the officially reported HIV incidence among pregnant women is 0.6 percent in Donetsk and Odesa, 0.7 percent in Dnipropetrovsk, and 0.8 percent in Mykolaiv Oblasts (Annex 1 Table A1-6). If this trend continues and further spread is sustained in the lower-risk group through heterosexual con-

⁴ Note that the registered new HIV cases among pregnant women have increased from 0.12 percent of those tested in 1998 to 0.34 percent in 2004. This increase cannot be attributed to any change in testing practice and therefore reflects the spread of infection among females.

tact, the epidemic may become generalized, at least in the worst-affected oblasts.

As mentioned above, there are significant regional disparities in HIV prevalence in Ukraine. Among the worst affected are the industrialized oblasts of Donetsk, Dnipropetrovsk, Odesa, and Mykolayiv; AR Crimea; and Kyiv and Sevastopol cities. Sentinel surveillance studies of seroprevalence among the IDUs confirms that the southern region (Simferopol and Odesa cities) has the highest HIV prevalence rates among IDUs. High seroprevalence rates were also confirmed in the western region (Volyn Oblast). Seroprevalence rate estimates based on sentinel surveillance among STI patients vary from 1 percent in Kharkiv in northeast Ukraine to 9 percent in Odesa.

Ukraine's Response to HIV/AIDS

Within the European region, Ukraine is the worst-affected country, with the highest adult HIV prevalence rate. Public awareness of HIV/AIDS has been increasing, and in recent years, the government, nongovernmental organizations, and international agencies have improved the national response. The

National AIDS Committee was established in 1992 and replaced by the National AIDS Control Coordinating Council under the Cabinet in 1999. The *Ukrainian National Program on HIV/AIDS Prevention for 2004-2008* was prepared, and various prevention programs are being implemented. As part of the public health system response, 35 regional AIDS centers are operating and provide preventive, diagnostic, medical, and counselling services through activities coordinated by the Ukrainian AIDS Center. At the district level, similar services are provided in district hospitals, through infectious diseases departments and consultation clinics. As of October 2005, 2,866 patients were receiving Highly Active Anti-Retroviral Therapy, but that is only about 15 percent of those needing it (Ukrainian AIDS Center, 2005).

The acceleration of the HIV/AIDS epidemic over 2002-04 requires re-estimation of the magnitude of the epidemic and its possible socioeconomic impact, taking into account new data on availability of ARV therapy, reduction in MTCT rates, and new estimates of the size of the IDU group as of January 2005. The results of such analysis are presented in Chapter 3.