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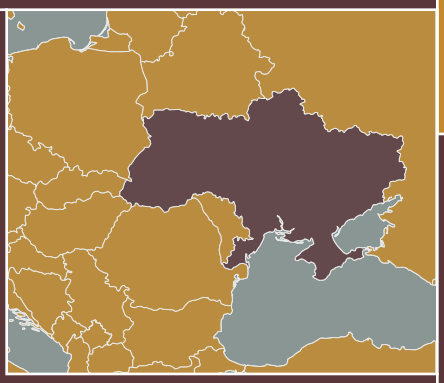
LIVES ON THE LINE



Funding Needs and Impacts of Ukraine's National HIV/AIDS Program, 2014–2018

This publication was prepared by Arin Dutta[1], Nicole Perales[1], Oleg Semeryk[1], Olga Balakireva[2], Tetiana Aleksandrina[3], Olena Ieshchenko[3], and Maryna Zelenska[3].

[1]Health Policy Project, [2]The Ukrainian National Academy of Sciences, [3]State Service of Ukraine on HIV/AIDS and Other Socially Dangerous Diseases

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Державна служба України з питань протидії ВІЛ-інфекції/СНІДу та інших соціально небезпечних захворювань

HEALTH POLICY PROJECT

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EXECUTIVE SUMMARY

Background

Ukraine has a severe and concentrated HIV epidemic, with an estimated 211,800–237,000 HIV-positive individuals in the population as of 2013 [1]. The Ukrainian epidemic continues to evolve. In this context, the USAID-supported Health Policy Project (HPP) partnered with the State Services of Ukraine on HIV/AIDS and Other Socially Dangerous Diseases (State Service) and the Institute of Economy and Forecasting of the National Academy of Sciences of Ukraine to conduct a focused analysis of the future effectiveness of HIV prevention in the country. The purpose of this report is to provide information regarding the targets and assist in mobilizing future resources for the National AIDS Programme (NAP) 2014–2018.

Evolution of the epidemic

Since the peak of incidence in the 1990s, the HIV epidemic has evolved substantially. The estimated number of new HIV infections among adults 15–49 years old peaked in the mid-to-late 1990s and has declined substantially ever since. Over this period, there has been a shift in the source of adult HIV infections. The Ukrainian epidemic was dominated by infections among people who inject drugs (or injecting drug users [IDUs]) by the 1990s. However, since then, infections among IDUs have declined, while other key population groups have become more important targets for prevention. Such populations include female sex workers (FSWs), clients and casual partners of FSWs, and men who have sex with men (MSM), among others. The national average HIV prevalence among IDUs has been stable, in the range of 21–22 percent, since 2009. In 2011, the HIV prevalence was 10.3 percent among all FSWs and 6.4 percent among all MSM [2–4].

Status of the response

An external evaluation from 2009 rated the progress made in prevention programming for key risk groups as ‘moderate’ [5]. This review noted that services had been unevenly provided, both geographically and in quality. Among all of the key groups, HIV prevention services were most developed for IDUs and less scaled up for FSWs, MSM, and prison-based populations. The current Ukrainian harm reduction program includes outreach, antiretroviral treatment (ART), HIV counseling and testing, needle and syringe exchanges and related counseling, as well as medication-assisted therapy (MAT). Quality and coverage of these interventions have improved, though gaps remain, especially in the coverage of MAT and interventions for partners of IDUs. Coverage of care and support for people living with HIV (PLHIV) also have achieved insufficient levels, with only 40 percent of the ART need met in 2013.

The 2012 assessment of the National AIDS Programme concludes that Ukraine will require a “more sustainable, efficient and effective approach” over the next NAP [6]. Interventions also will need to be scaled up. Currently, the proposed NAP 2014–2018 aims to build upon the achievements of NAP 2009–2013, with a focus on prevention among key risk groups. The previous NAP depended heavily on Global Fund resources. As the 2012 assessment also envisages declining external funding across donors, there is added pressure on the government to raise allocations for the NAP 2014–2018.

Methodology

We examined four different scenarios for the scale-up of key prevention interventions, using different assumptions about the availability of financing and policy priorities. For each of these scenarios, we looked at the effect on HIV incidence, using a mathematical model of the HIV epidemic and the effectiveness of interventions in reducing sexual and injecting risk behaviors. This model is known as “Goals.” The Goals model is integrated within the Spectrum software suite of models and has been applied to the Ukraine HIV epidemic several times since 2008. Goals simulates an HIV epidemic among

adults ages 15–49 years, based on the likelihood and frequency of sexual and injecting risk behaviors and a decrease in the possibility of HIV transmission when HIV-positive patients are receiving treatment. Sources for behavioral and epidemiological inputs were Ukraine specific and include the Multiple Indicator Cluster Survey 2012; recent integrated bio-behavioral surveillance reports for FSWs, MSM, and IDUs; and other primary data [2–4, 7, 8]. We also conducted a financial analysis of the HIV response and based unit costs on an existing cost analysis conducted by the State Service for the NAP 2014–2018.

The four alternative scenarios we analyzed differ in their coverage assumptions for key prevention and treatment interventions in Ukraine. Scenario 1, *Constant 2012 Coverage*, is the baseline scenario and reflects unchanged reach of key interventions from the last fiscal year (2012). Scenario 2, *NAP 2014–2018 targets (NAP)*, reflects the draft NAP 2014–2018 targets, with a focus on prevention among certain key risk groups and provision of ART for PLHIV. Scenario 3, or *Universal Access/NAP 2014–2018 (NAP with UA)*, sets ambitious targets for any intervention from the NAP scenario that otherwise will not achieve such targets by 2018. Scenario 4, a *Global Fund Risk Assessment (GF risk)*, was designed to examine the impact of losing Global Fund support from 2017 on for key prevention and support interventions focused on certain groups.

Results

HIV infections: In 2013, the baseline year, there will be 9,900 new HIV infections among adults ages 15–49 years in all of the scenarios. This year, the coverage does not differ across scenarios. By 2018, large differences emerge. For the entire period 2013–2018, the highest number of infections is seen in the *Constant 2012 Coverage* scenario, while the least infections occur in the *NAP with UA* scenario. Comparing the two scenarios, *29,032* infections can be averted by an ambitious scale-up of interventions.

The *NAP* and *GF Risk* scenarios both show a modest decline in new adult HIV infections from 2013 levels. In 2017, the *GF Risk* scenario shows a sharp rise in new infections, stemming from the loss of funding for prevention programming for certain key populations. As a result, the *GF Risk* scenario results in an additional 6,542 HIV infections overall compared to the *NAP* scenario.

Scale-up scenarios involve an increase in adult ART. This is potentially life-saving in the short term. Approximately *39,455 deaths* could be averted by the scale-up of ART over 2014–2018.

Costs: Implementing the NAP 2014–2018 will cost Ukrainian hryvnias (UAH) 6,380 million (US$776 million). The *NAP with UA* scenario will cost an additional UAH 928 million (US$113 million).

Cost-effectiveness: We analyzed cost-effectiveness by calculating the incremental costs, but only for all of the key biomedical and behavioral interventions with an effect on HIV infections in Goals, and HIV infections averted, when scenarios are compared against *Constant 2012 Coverage*. The incremental cost per HIV infection averted for the *NAP with UA* scenario was US$12,318, and this scenario emerges as the most cost-effective of the scenarios. We can interpret these results to suggest that it is rational to plan for the ambitious scale-up of prevention interventions if resources are available.

Discussion

Our analysis suggests that Ukraine can afford to do more. If additional resources are invested in key prevention interventions, treatment, and care and support, further reductions in HIV infections are achievable. In this context, a program with ambitious yet achievable targets up to 2018, such as under the *NAP with UA* scenario, can yield an additional 11,491 averted infections compared to implementing the targets under the draft NAP 2014–2018.

The effects on the epidemic of any loss of funding for prevention can be significant. High priority must be given to secure funding after 2016 for key prevention interventions currently provided through the Global

Fund. Additional resources could be mobilized that increase the scale-up of key interventions beyond what is planned in the NAP 2014–2018. This will allow the program to fully capitalize on the ongoing effectiveness of the interventions already proven successful in Ukraine.

ABBREVIATIONS

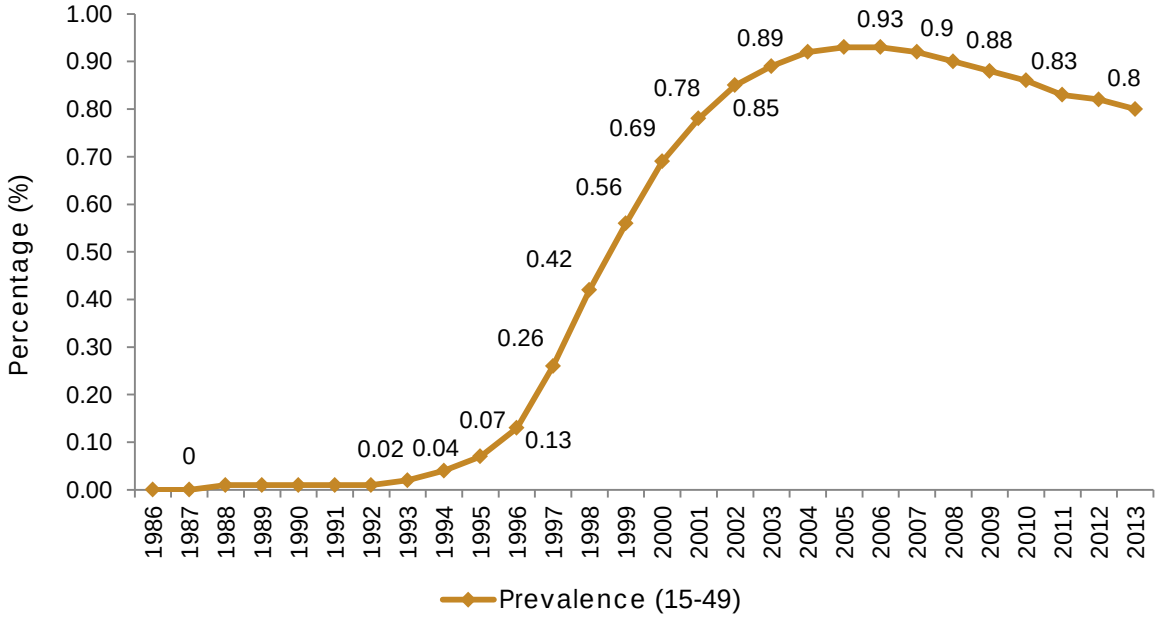
AIM	AIDS Impact Model
ART	antiretroviral therapy
ARV	antiretroviral
CBO	community-based organization
CSW	commercial sex worker
FSW	female sex worker
GNI	gross national income
HIV	human immunodeficiency virus
HPP	Health Policy Project
HCT	HIV counseling and testing
IDU	injecting drug user
IEC	information, education, and communication
MARP	most-at-risk population
MAT	medication-assisted treatment
MICS	Multiple Indicator Cluster Survey
MSM	men who have sex with men
NAP	National AIDS Programme
NESP	needle and syringe exchanges and related programming
NGO	nongovernmental organization
OI	opportunistic infection
PEP	post-exposure prophylaxis
PLHIV	people living with HIV
PMTCT	prevention of mother-to-child transmission
PrEP	pre-exposure prophylaxis
State Service	State Services of Ukraine on HIV/AIDS and Other Socially Dangerous Diseases
STI	sexually transmitted infection
TB	tuberculosis
UAH	Ukrainian hryvnias
UAC	Ukrainian AIDS Center
UCDC	Ukrainian Center for Socially Dangerous Diseases Control of the Ministry of Health of Ukraine
UNAIDS	United Nations Program on HIV/AIDS
UNGASS	United Nations General Assembly Special Session (on HIV/AIDS)
VCT	voluntary counseling and testing

BACKGROUND

Ukraine has a severe HIV epidemic that continues to evolve. The current number of HIV-positive individuals in the population cannot be known exactly. This number has been estimated using various methods, including mathematical models of the HIV epidemic tailored to Ukraine's situation. The range of estimates suggests that the number of HIV-positive individuals of all ages in Ukraine in mid-2013 was between 211,800–237,000 [9, 10]. Figure 1 shows the evolution over time in the prevalence among the adult sexually active population, defined to be those in the age group 15–49 years. The trend in overall adult prevalence is similar to that of HIV prevalence among women who are initially screened for HIV in pregnancy[1] (code 109.1), which declined from 0.55 percent in 2008–09 to 0.47 percent in 2011, and to 0.45 percent in 2012 [11, 12]. Among all pregnant women delivering in a year, the HIV prevalence rose from 0.72 percent in 2007 to 0.81 percent by 2010. The 2011 value is estimated to be 0.8 percent [13]. These data are suggestive of a trend toward stabilization of the epidemic in the general population.

The data in Figure 1 were derived from the AIDS Impact Model (AIM) projection file finalized in 2013 by the Ukrainian Center for Socially Dangerous Disease Control (UCDC) and its technical partners. According to these model-based data, the peak of the epidemic in the adult population is already in the past—it occurred in 2005. Registrations of new cases continued to increase after 2005, as individuals infected earlier became immunosuppressed and sought care [13]. The critical issue now is the nature of HIV incidence in 2013, its evolving nature, and how best prevention efforts can combine to reduce the rate of infection.

Figure 1. Adult (15–49 years) HIV prevalence over time in Ukraine, 1986–2013



Source: [9]

[1] These are cases found among women screened during their pregnancy who were not previously registered as HIV positive.

Ukraine's most recent national report under the aegis of the United Nations General Assembly Special Session on HIV/AIDS (widely known as UNGASS) summarizes the status of the epidemic and the response [11]. This UNGASS report draws attention to the fact that incidence has been high in the recent past, and that HIV infection and AIDS disease put a significant burden on affected individuals, local and national governments, and the partners of people living with HIV (PLHIV). It is important for Ukraine to keep the momentum going on the HIV response as a whole, while targeting resources for care, treatment, and prevention where they will be most effective and equitable.

In this context, the USAID-supported Health Policy Project (HPP) partnered with the State Services of Ukraine on HIV/AIDS and Other Socially Dangerous Diseases (State Service) and the Institute of Economy and Forecasting of the National Academy of Sciences of Ukraine to conduct a focused analysis of the future effectiveness of HIV prevention in the country. This analysis considers the forecasted trend of the HIV epidemic in Ukraine and the costs and effects of different choices related to scaling up HIV prevention interventions. We present the results of this analysis in this report.

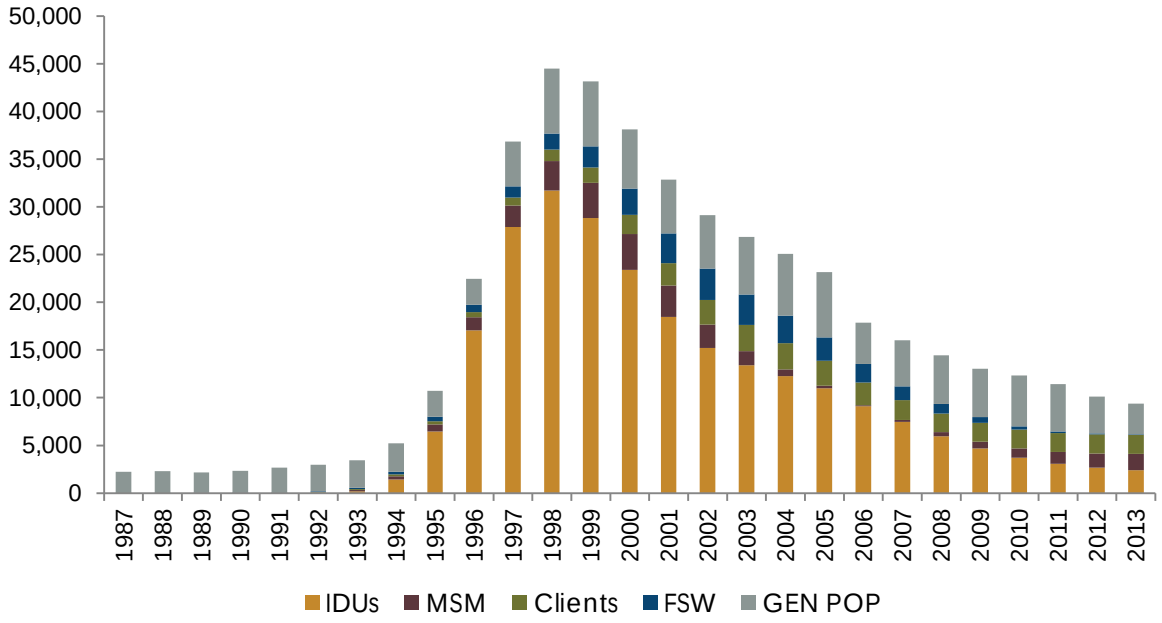
Based on this analysis, policymakers in Ukraine can weigh the costs and benefits of increasing the coverage of certain key interventions related to prevention. All of these issues are considered in more detail below. The analysis in this report has been conducted explicitly in the context of the draft National Target Social HIV/AIDS Programme for 2014–2018, hereafter called the National AIDS Programme, or NAP. This program will continue the work of the previous NAP for 2009–2013. Given that the NAP 2014–2018 is being finalized and resources for the future response need to be mobilized now, this analysis comes at an opportune time.

In the rest of this chapter, we provide additional background on the epidemic to indicate the need for this analysis, summarize the status of the HIV response in recent years, introduce the strategies of the NAP 2014–2018, and outline the rest of this report.

The Changing Nature of the HIV Epidemic in Ukraine

The HIV epidemic in Ukraine initially was urban dominated. In recent years, the caseload has become distributed across rural and urban areas proportional to population [14]. It is a concentrated epidemic. Since the mid-2000s, there has been accelerating change in the nature of this HIV/AIDS epidemic in Ukraine. Ukraine's 2012 UNGASS report and a recent data triangulation study[2] (forthcoming) highlight the changes in the epidemic from 2007 to 2011 in age and gender. In registered cases, the most severely affected group continues to be those between the ages of 25 and 49, who made up 66.3 percent of the new cases in 2011. Within this group, the epidemic is increasingly concentrated in the older segment—the median age of a registered HIV-positive individual was 35.6 years for men and 32.8 years for women in 2011 [13]. The proportion of men in the new caseload has declined slightly over time, from 56.2 percent in 2007 to 54.5 percent by 2011 [11]. These aspects of the caseload reflect only some of the changes in the nature of the epidemic, which can be further understood from surveillance data and bio-behavioral surveys. These types of data can be utilized in mathematical epidemiological modeling approaches such as AIM, described in Annex A.

Figure 2. Adult HIV incidence by key population groups* over time, 1987–2013



* IDUs: injecting drug users; MSM: men who have sex with men; FSWs: female sex workers; Clients: clients of FSWs; Gen. Pop.: lower-risk adults 15–49.
Source: [9] AIM projection.

Results of such mathematical modeling in AIM are shown in Figure 2. The data show incidence through sexual as well as parenteral (injecting-related) transmission over the course of the epidemic.

Role of different population groups in incidence over time

Figure 2 shows the magnitude as well as composition of historical HIV incidence. Several conclusions emerging from these modeled results are crucial for the purposes of this report and for developing policies for the future.

[2] Ukraine Triangulation Updated Analysis / UCSF Global Health Sciences, - Stakeholders meeting, Kiev, May 2012

First, the estimated number of new HIV infections among adults 15–49 years old has declined substantially from the peak of the epidemic in terms of incidence in the mid-to-late 1990s. This peak is different from the peak in HIV prevalence discussed in the previous section. At the peak levels of incidence, new infections per year ranged from 30,000–44,000 according to the AIM estimates [9]. From the AIDS Epidemic Model, a separate mathematical model that utilizes distinct assumptions on the same background data, the peak incidence levels ranged from 23,000–36,600 per year over the years 1994–1998 [15]. In recent years, the estimated AIM incidence has been declining steadily, from about 16,000 in 2007 to 11,425 in 2011. In 2012, the AIM estimate of total HIV incidence in the adult population 15–49 years old was about 10,110, whereas the AIDS Epidemic Model estimates that about 13,400 infections occurred. We can conclude that, despite variation in the results across different mathematical models, they generally suggest that incidence has declined substantially since the end of the1990s.

Second, there has been a shift in the source of adult HIV infections. The Ukrainian epidemic originally started from sexual transmission among certain high-risk individuals, but was dominated by infections among people who inject drugs, i.e., injecting drug users (IDUs) in the 1990s. As per the AIM estimate, in 2000, 60 percent of all adult infections occurred among IDUs. By 2011, this proportion was estimated to be just below 30 percent. This estimate can be compared with the official data from case registration. (We note that registered cases are always a subset of the true total number of infections in the population.) Results from the 2011 update of official data suggest that the contribution of IDUs was 31 percent as a proportion of all registered new infections [1, 2], down from a peak of 84 percent in 1997. This can be revised to 38.4 percent after removing HIV-exposed infants, many of whom later are found to be uninfected, and re-estimating the ratio [14]. There is also the potential that the case registration data may be prone to some misclassification errors, in which IDU-related transmission is reported as heterosexual transmission, especially if IDU status is not revealed or known [14]. Thus, IDU-related infections may be higher.

Despite the potential problems with the case registration data, it is very likely that IDU-related infections have declined, while still remaining significant. The AIDS Epidemic Model also predicts a decline in the contribution of IDUs to new infections, though less significantly. Its results suggest that IDU infections accounted for slightly less than half (48%) of new infections among the adult population in 2011 [15].

As infections among IDUs have declined, while still remaining significant, other key population groups have gained importance regarding the need for prevention. Commercial sex work accounts for an increasing share of total incident cases, based on new infections among female sex workers (FSWs) and their clients. Men who have sex with men (MSM) always have been a vulnerable group in the Ukrainian epidemic, and new infections among them have contributed more significantly to the total in recent years. In addition, there is a continuing level of new infections among other groups in the adult population—partners of clients, casual sex partners of FSWs and IDUs, etc. Within the general population, there is a recent trend of decline in the proportion of all new registered cases that have occurred among those ages 15 to 25 years [11]. In 2007, this proportion was 15 percent, and in 2011 it was 9 percent. If the program response is sufficient to detect most of the new infections among young people, these figures suggest that the epidemic is stabilizing among youth, who could be engaging in less risky behavior.

A full discussion of the current status of the epidemic and potential for changes in incidence must cover trends in key risk behaviors related to sexual and parenteral transmission. Such a discussion cannot be attempted here, given constraints of length and time. Certain issues are covered in the discussion of modeling assumptions in Chapter 2, "Methodology." However, these trends have been summarized in recent analyses of long-term integrated bio-behavioral monitoring of key risk groups [2–4, 8, 13]. These analyses were incorporated in the modeling calculations for this report. What emerges from these analyzed trends in behavior is that, to substantially reduce incidence from its current levels, a multi-pronged strategy must continue. It must retain a strong focus on harm reduction among IDUs, as well as comprehensive programs for care, treatment, and prevention among other key risk groups.

HIV prevalence among key risk groups

Trends in the HIV prevalence of key population groups at the national level in Ukraine reflect different trends in mortality, incidence, and quality of the background seroprevalence data over time (including the estimate of the denominator for the prevalence calculation). Historically, there have been variations across regions in the volume of HIV testing and its focus, which has distorted the trend data for prevalence among key population groups. Thus, the data discussed below should be interpreted with caution; they do not necessarily predict the future course of the epidemic, unlike the discussion of incidence above. Prevalence is a critical indicator of the cumulative burden of disease in the group at a moment in time, the need for care and treatment, and the potential for generating new infections if prevention efforts are unsuccessful or inadequate.

Injecting drug users: Several rounds of bio-behavioral surveys have been undertaken in recent years. The national average HIV prevalence among IDUs has been stable—in the range of 21–22 percent—since 2009. The average prevalence was about 22 percent over 2009 and 2011. Data from the 2010 survey [8] show that prevalence among female IDUs (25.1%) was higher than among male IDUs (20.5%). There are regional differences—cities in Eastern Ukraine have higher HIV prevalence among IDUs, though the level has declined since 2008/09. In certain other cities, such as Cherkasy, prevalence has increased in the same period. HIV prevalence among IDUs is strongly correlated with duration of injecting drug use and age. Older IDUs are more likely to have been injecting longer and, as a result, those above the age of 35 years have a prevalence of 29 percent, compared to 8 percent among those ages 20–24. Those who use stimulants (15% of IDUs) are also less likely to be infected, compared to those using opioids [2].

Female sex workers: Nationally, the prevalence among all FSWs dropped from 12.7 percent in 2008/09 to 10.3 percent in 2011, with the sharpest decrease seen among young FSWs below the age of 25 [4]. Again, due to cumulative exposure to infection risk, older FSWs who may have been in their occupation longer are more likely to be infected, and there was a smaller decrease in their levels of HIV prevalence, from 15.8 percent to 14.8 percent. For FSWs, injecting drug use behavior is a strong risk factor, as is apparent from the statistics. Among FSWs who self-reported injecting drugs in the 12 months prior to the survey, HIV prevalence was 41.1 percent, compared to 6 percent among those FSWs who had never used any drugs. In the subset of FSWs who used non-injecting drugs in the last 12 months, the prevalence was 10.5 percent. The decline in prevalence among FSWs is not universal. Some cities show a trend toward increase, such as Donetsk, Kyiv, and Poltava. These trends suggest that prevalence efforts need to continue, and a regional focus may be necessary.

Men who have sex with men: HIV prevalence among Ukrainian MSM has declined, from 11 percent in 2007 to 6.4 percent in 2011 [3]. Surveys that included blood testing prior to 2009 were conducted in only a limited set of cities and did not have large samples. The ability to reach significant numbers of MSM with testing services remains limited due to stigmatization. Thus, these data need to be interpreted with some caution. The 2011 survey data show that the prevalence was highest in Donetsk and Odessa, with a level substantially higher than that in the second highest cluster of cities, such as Kyiv, Zhitomir, and Khmelnitsky.

Status of Prevention in the HIV Response

HIV prevention for key risk groups other than IDUs

In 2009, an external evaluation rated the progress made in prevention programming for key risk groups as 'moderate' [5]. The review noted that services had been unevenly provided, both geographically and in quality. Among all of the key groups, HIV prevention services were most extensive for IDUs, and less scaled up for other key risk groups, such as FSWs, MSM, and prison-based populations. Since 2009, progress has continued to be uneven in this context.

Female sex workers: In 2007, the percentage of FSWs reached with HIV prevention programming (UNGASS indicator 1.7) was 69 percent, based only on FSW responses to questions related to knowledge of HIV testing locations and recent provision of condoms. In 2011, this indicator had the value 61.2 percent, slightly higher than in 2009 [11]. This suggests stagnation in achievement within this group, though there were small improvements in knowledge of locations for HIV testing in particular. A basic package of services is available through a network of nongovernmental organizations (NGOs) present across all regions of Ukraine, combining prevention for HIV and other sexually transmitted infections. With these services, program monitoring data suggest an improvement in actual coverage, from 9 percent in 2008 to 40.3 percent in 2011 [11]—a significant increase that still leaves a substantial gap regarding individuals at risk not receiving key prevention interventions.

Men who have sex with men: With a similar indicator as for FSWs, based only on knowledge of HIV testing locations and recent provision of condoms, the percentage of MSM "reached with HIV prevention programming" was 53.1 percent in 2011, the first year a large set of cities and regions were surveyed. In previous years, with a more limited sample, the value of the indicator was 63 percent in 2009 and 50 percent in 2007. Compared to FSWs, fewer NGOs (18) are involved in HIV prevention for MSM, and the coverage with prevention interventions for recent years is low—20 percent by the end of 2011. This is an improvement on 2009, when coverage stood at 13.5 percent.

HIV prevention for IDUs

The Ukrainian harm reduction program is now fairly advanced, and a range of services has been established that includes outreach, antiretroviral treatment (ART), HIV counseling and testing, needle and syringe exchanges and related counseling, and medication-assisted treatment (MAT). Quality and coverage of these interventions have improved, though gaps remain. The external evaluation of 2009 suggested that the most severe problems were related to coverage of MAT and interventions for partners of IDUs, especially given overlapping risk behaviors—sexual along with injecting. In 2011, only 29.4 percent of IDUs stated that they were clients of an NGO or community-based organization (CBO) that provided harm reduction services [2]. Overall, coverage with a comprehensive set of HIV prevention services—this includes most outreach, testing for sexually transmitted infection (STI), and counseling, along with the distribution of sterile syringes and condoms, but not ART or MAT—is still not very high; the value was 54 percent in 2011, based on the denominator of 290,000 IDUs [11]. Based on the same denominator, coverage potentially has increased to 62 percent in 2012 [16].

Needle and syringe exchanges and related programming (NESP): In early 2012, there were at least 1,667 needle and syringe exchange program sites in the country, across 27 regions [11]. The sites charge no fee and are supposed to be located conveniently near places where the majority of IDUs reside in an area. The programs distributed an average of 75 needles and syringes per IDU in 2011. The NESP effort has suffered from "incomplete legislation," which prevents effective storage, utilization, and destruction of used syringes [11].

Though the reported rate of use of sterile injecting equipment at last use was high, at 95.5 percent in 2011, based on the bio-behavioral survey, a fairly high rate of sharing syringes/needles and over the past 30

days: 7.9 percent—said of such cases. Common tools IDUs often used together with friends/acquaintances and their sexual partners, and the proportion of women using a syringe together with a sexual partner or spouse is much higher than among men (60% and 30% respectively). The rate of sharing equipment with sexual partners and friends in the previous month was high, especially among female IDUs. A high proportion of IDUs (57%) did not see the filling of the syringe that they subsequently used—hence making the previous statistic of 95.5 percent suspect. In addition, 59 percent of IDUs shared utensils involved in the preparation of drugs for injection, which also exposes them to risk. Accounting for all these risks, it is estimated that *81.5 percent* of IDUs still engaged in some form of risky injecting behavior, that indicating the need for continued prevention work. This is in major contrast to the optimism implied by the self-reported rate of sterile injecting behavior.

Medication-assisted treatment (MAT) or opioid substitution therapy: The number of IDUs receiving MAT was 7,353 in early 2013 across 148 sites [17]. Four times as many men were enrolled in the program as women. About 89 percent received methadone; the rest received buprenorphine. All individuals receiving MAT also received other counseling and support, provided by a network of NGOs. Based on survey data, about 82.5 percent of IDUs inject opioids either exclusively or along with stimulants [2]. The use of stimulants is increasing, though opioids are still dominant, especially among more experienced or older IDUs. The opioid percentage implies a range of 239,250–255,750 IDUs who would benefit from MAT, and actual coverage of 2.9–3.1 percent in 2013, depending on the range for the size of the active IDU population. The MAT program has shown many positive outcomes related to reintegration of patients into families and occupations. However, the total scale of the program has been small.

Other HIV prevention services for IDUs: It is important that IDUs test regularly and know their status. Based on 2011 survey data, only 35.7 percent of IDUs had tested for HIV in the previous 12 months, an improvement on the 2009 value of 26 percent [11]. About 48 percent of IDUs had used a condom during last sexual intercourse in 2011, the same proportion as in 2009.

Care and support for people living with HIV

As of April 2013, 43,446 patients were on ART in Ukraine [16], of whom approximately 2,870 were children. Based on the AIM projection developed by UCDC and its partners, in 2013, 101,220 persons above the age of 15 were eligible for ART, given the country's eligibility guidelines.[3] Thus, coverage of ART was approximately 40 percent among adults 15+ years in age—a low level by international standards. This estimated coverage is very different from the 2011 value in the UNGASS national report (about 70%) due to a different methodology for estimating need. Of the 43,446 patients on ART, 4,610 were IDUs (i.e., 11% of adults on ART). The lack of progress in getting HIV-positive IDUs into ART, despite the fact that many HIV-positive IDUs have advanced stages of the disease, is a major failing of the current program. Provision of MAT has not necessarily meant increased linkage to ART—only a third of HIV-positive patients in MAT were also receiving ART in 2012 [16]. Overall, the insufficient coverage of ART means that many individuals in need are unable to get life-saving drugs and suffer avoidable morbidity and mortality. It also means that the Ukrainian HIV/AIDS program is not fully capitalizing on the known preventive benefits of successful ART among adult HIV-positive patients.

[3] "The procedure of medical care for HIV", approved by the Order of Ministry of Health of Ukraine from 10.07.2013 № 585. This is based on WHO guidelines prior to 2013, i.e., eligibility for ART driven by the immunological criterion of CD4 count at or below 350 cells/mm,[3] or a qualifying clinical stage /opportunistic infection/co-morbidity. In June 2013, WHO updated its guidelines. These guidelines have not yet been approved in Ukraine.

New National HIV/AIDS program, 2014–2018

The 2012 assessment of the national AIDS program concludes that Ukraine will require a "more sustainable, efficient and effective approach" over the next NAP [6]. The assessment urges a focus on some of the key groups who experience avoidable HIV infections and that attention to be paid to the risk behaviors of youth. The 2012 assessment suggests building on the achievements of the current NAP, which is concluding. Our review above suggests that in addition to focusing existing resources on IDUs, MSM, FSWs, and their sexual and needle-sharing partners, interventions will also need to be scaled up.

Sustainability concerns: The 2012 assessment report envisages declining external funding in the future, which means that government allocations must be raised, continuing the increases of recent years. Over 2009–2010, the Global Fund provided 34–37 percent of the financial resources for the NAP, which is a case of over-reliance on a single source, especially given changes at the Global Fund and as Ukraine moves further into middle-income status. The dependency on external sources is very severe in the case of critical interventions, such as community-based support and outreach for key risk groups. Even with recent increases, government financing of the NAP 2009–2013 never reached the target of 91 percent of the total need, as originally identified [6]. For example, in 2010, the government allocated an amount 34 percent lower than what had been planned. However, even increased funding will not be effective unless it is targeted to where the epidemic currently resides and based on how it is changing—i.e., fully acknowledging the centrality of key groups and their needs.

Key objectives and orientation of the NAP 2014–2018

The final draft of the NAP 2014–2018 strategy has not yet been approved, though its main goals are known. There are seven key coverage targets:

1. Access to prevention programs for all most-at-risk population (MARP) groups
2. 100 percent coverage of students with HIV prevention programs in all educational institutions
3. 100 percent coverage of PLHIV with social and medical care and support services
4. Access to uninterrupted ART for *all PLHIV* in need of treatment
5. 50 percent reduction in tuberculosis mortality among patients with HIV/TB co-infection
6. Provision of uninterrupted MAT and rehabilitation programs to at least 35 percent of IDUs (opioid users) in need of MAT
7. Cultivating tolerant attitudes toward PLHIV and MARPs, and achieving a 50 percent reduction in HIV-related stigma and discrimination

In this report, we examine the costs of the components of the NAP 2014–2018. We also look at changes to this total cost under alternative scenarios of scale-up of prevention interventions.

Rationale and outline for this report

Ukraine needs to make urgent funding decisions regarding reducing HIV incidence below its current level, which, although lower than historical levels, still is unsupportable. Scale-up of key interventions can prevent infections, which thus reduces future costs for care and treatment. Improved care and support services at a higher scale of coverage can reduce sickness and save lives.

This report provides evidence from mathematical modeling and cost analysis for policy decisions regarding HIV prevention under the NAP 2014–2018. We examine different scenarios for the scale-up of key prevention interventions that focus on the groups most vulnerable to infection, under different assumptions about availability of financing and policy priorities. For each of these scenarios, we look at the effect on HIV incidence related to the number of new infections, using a mathematical model—known as the "Goals" model—of the HIV epidemic. The model estimates the effect of interventions on key sexual and injecting risk behaviors. This model is described in Chapter 2. We also compute the total cost of the scaled-up interventions and the cost per infection averted across scenarios.

Key research questions

1. What combination and coverage of HIV prevention interventions related to the NAP 2014–2018 lead to the largest reduction in HIV incidence over the period?
2. What is the total cost of the NAP 2014–2018, including all HIV prevention activities, and how do these costs change as scenarios with greater reduction in HIV incidence are considered?
3. What is the cost-effectiveness of implementing a programmatic scenario with increased coverage of key interventions for HIV prevention, expressed in Ukrainian hryvnias (UAH) per HIV infection averted?
4. Considering the additional costs and the cost-effectiveness of increasing coverage, what policy course is the most rational one for Ukraine? What additional resources should be mobilized for this purpose?

Outline for this report

In Chapter 2, we introduce the Goals mathematical modeling methodology and describe the alternative scenarios related to the scale-up of HIV prevention interventions. We present the unit costs used in the total cost analysis and discuss other data sources utilized in this study.

In Chapter 3, we present the results of the cost analysis, the estimates of total HIV infections under each of the alternative scenarios related to HIV prevention, and the cost-effectiveness analysis comparing the scenarios. Detailed results on the cost analysis, as well as other aspects of the impact on HIV/AIDS indicators, are shown in Annex B.

In Chapter 4, we conclude with a discussion of the results for the research questions above and their implications for HIV policy in Ukraine. We put the results in the context of the NAP 2014–2018 and relate them to key near-term decisions.

METHODOLOGY

This report utilizes two key methodologies: financial analysis of the costs of the HIV response, focusing on prevention in particular; and the mathematical modeling of the effect of key prevention interventions on the epidemic, especially in the resulting numbers of HIV infections. For the former methodology, we utilized an existing cost analysis conducted by the State Service for the NAP 2014–2018 and based the cost analysis of different scenarios of scaling up HIV prevention interventions on the same underlying unit costs. For the latter methodology, we utilized the Goals model, described in this chapter.

The Goals Model

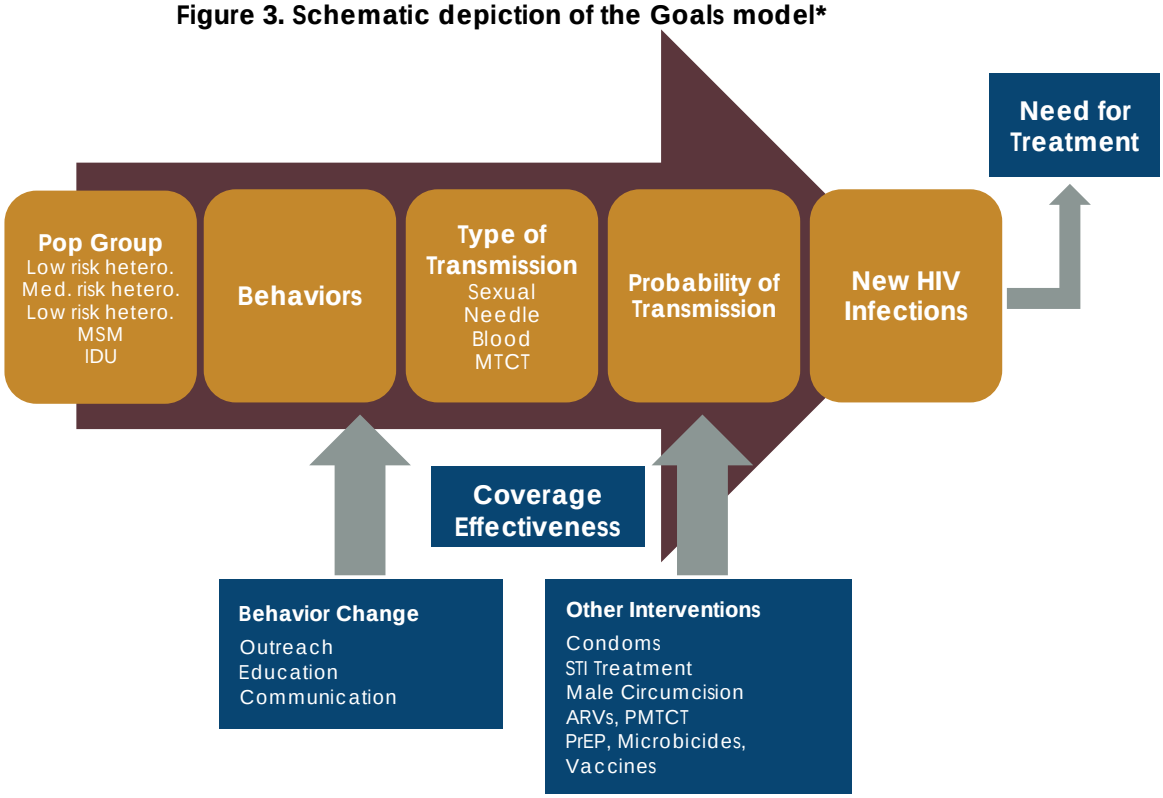
We used the Goals mathematical model to conduct the analysis. Goals has been utilized in multiple studies over the last decade, including for a recent World Bank book that examined Ukraine and three other countries with IDU-related HIV epidemics [18, 19]. Goals was first implemented in Ukraine in 2008, when the model was Excel based. Since 2012, Goals has been a module integrated within the Spectrum software suite of models [20]. Spectrum helps to rigorously specify demographic and epidemiological assumptions for each country. The Spectrum suite has been used widely in Asia, Africa, and Eastern Europe, as well as Ukraine. The demographic projection is calibrated routinely in-country by government and technical partners, and is a starting point for medium- and long-term projections of HIV epidemics, including reports from the United Nations Program on HIV/AIDS (UNAIDS). In its current form, Goals interacts with demographic and epidemiological data derived from other Spectrum modules, including AIM. This includes such data as demographic projections and the numbers of individuals in various age and gender groups relevant for the risk of HIV transmission, historical HIV prevalence, HIV-positive individuals in different groups based on CD4 t-cell count, and the numbers of adults needing and receiving ART based on country guidelines.

When fully populated with data, Goals simulates an HIV epidemic among adults ages 15–49 based on the likelihood and frequency of sexual and injecting risk behaviors, and the increase in the possibility of HIV transmission when individuals engage in these behaviors. Figure 3 shows the overall structure of the model. Goals does not directly estimate the HIV infections related to mother-to-child transmission, or the effect of prevention of mother-to-child transmission (PMTCT) on this channel of infection. When used in conjunction with AIM and with data on the scale-up of PMTCT, these additional infections can also be modeled. These infections among infants are not the focus of the current report, which considers infections among adults only.

In Goals, all data related to adult behavior are entered by the user and are context specific. The likelihood and magnitude of risk behaviors can be modified by key prevention interventions. The greater the coverage of these interventions in any given year, the greater the reduction in the likelihood and/or frequency of the risk behaviors and, consequently, the greater the reduction in the total number of instances of transmission of HIV infections. Coverage levels for interventions usually are based on national targets and can be modified to set different scenarios. Coverage is expressed as the percentage of the risk group that receives the intervention in a given year. In summary, Goals simulates an HIV epidemic by estimating the number of new HIV infections occurring in various population risk groups according to their behaviors and the coverage and effectiveness of interventions.

Goals recognizes that not all risk groups in the population have similar behaviors, and hence no population-wide averages should be used. The population groups are divided into: low-, medium-, and high-risk heterosexuals across both genders;[4] IDUs of both genders; and MSM. FSWs are considered to be the high-risk female heterosexual risk group. Male clients of FSWs are considered to be the high-risk male heterosexual risk group. Users of the model specify the population size for each group, by gender, and then specify the characteristics of the expected risk behavior for that group, again by gender.

Figure 3. Schematic depiction of the Goals model*



* Interventions shown are a subset of all interventions that can be modeled. In Ukraine, voluntary circumcision, pre-exposure prophylaxis (PrEP), microbicides, and vaccines were not modeled.

Estimating the effect of HIV prevention interventions in the Goals model

Goals can estimate the direct effect of reduced HIV incidence from expanding behavioral, biomedical, and harm reduction interventions. There are two main channels of effect. First, key behavioral and harm reduction interventions can reduce the probability and magnitude of risky sexual and injecting drug use behaviors. For example, outreach programs focusing on FSWs can reduce the probability that condoms will not be used in commercial sex. Similarly, a youth-focused behavior change and communication program can reduce the average number of sexual partners for at-risk youth. A harm reduction intervention can reduce the likelihood of unsafe injecting behavior and/or the number of sharing partners.

Second, a biomedical intervention, such as PrEP utilizing antiretrovirals, can reduce the biological possibility of acquiring HIV infection for uninfected individuals who engage in unprotected sexual intercourse. In the biomedical category, the most important and widespread effect globally is that of reduced infectiousness for HIV-positive patients who are on ART. This is based on established science

[4] Risk in the case of heterosexual contact is defined in Goals as the number of sexual partners, and, if data are available, in reported rates of consistent condom use or condom use at last sex. These factors are used to distinguish risk groups. Also see Annex A for assumptions related to this report.

that shows a reduction in infectiousness for patients responding to treatment as their viral load reduces [21]. Goals does not assume or involve parameters linked to a reduction in the possibility of parenteral transmission of HIV, i.e., related to unsafe injecting behavior, when IDUs receive ART.

As an additional biomedical effect, Goals can model the effect of male circumcision. Circumcision has been proven to offer some protection to the male uninfected partner in heterosexual relationships [22]; hence, many countries have programs for voluntary male medical circumcision. In Ukraine, male circumcision is not commonly practiced and there are no large public health programs for circumcision.

Impact of behavioral interventions on risk of infection

In Goals, an "impact matrix" translates the level of coverage of key behavioral and harm reduction interventions into reductions in risk behaviors from their baseline value for a specific risk group (e.g., FSWs, medium-risk heterosexuals, etc.). The default impact matrix provided with Goals contains effect parameters derived from a periodically updated and extensive literature review. A range of values for impact matrix parameters is possible, given that studies yield different estimates of effect. From this range, three variants of the parameters—average, lower quartile, and upper quartile—can be selected for the analysis and readily applied. The impact matrix commonly used for analysis is the 'average' variant, from which parameters are shown in Tables 1 and 2 below.

Table 1. Impact matrix of key harm reduction interventions for IDUs modeled in Goals

Intervention	Reduction in condom non-use	Reduction in number of sexual partners	Reduction in unsafe injecting behavior	Reduction in needle sharing
NESP & all IDU outreach*	-27%	-56%	-23.4%	-24%
MAT**	-	-46%	-42.4%	-63%

* Refers to comprehensive package of IDU services as used in Ukraine (excludes MAT, ART). NESP and IDU outreach can also be modeled separately, with distinct effects.
** These effects are only for those eligible for and receiving MAT, i.e., IDUs injecting opioids. Source: Goals default impact matrix.

Tables 1 and 2 describe the key values from the 'average' impact matrix supplied as a default within the Goals model. The interventions shown are those relevant to behaviors in a concentrated epidemic, as in Ukraine. The specific values are suggested by sources from the literature that draw from low- and middle-income countries' experience, as documented in reports and journal articles. The effects reflect standard, guidelines-based implementation of the intervention, though not at a level of the service delivery quality seen in developed country contexts. The model allows for uncertainty analysis related to the parameters in Tables 1 and 2. Such uncertainty analysis is very important in describing the possible range of the effects on HIV incidence, especially since the parameters in Tables 1 and 2 are not known with certainty and can be considered only as average values across a variety of countries and implementation contexts [18].

Table 2. Impact matrix of key prevention interventions for other risk groups in Goals

Intervention	Reduction in condom non-use*				Reduction in number of sexual partners			
	High- risk het.	Medium-risk het.	Low-risk het.	MSM	High-risk het.	Medium-risk het.	Low-risk het.	MSM
HCT**	-34%	-16%	-18.3%	-	-60.5%	-2.4%	-	-
Condom program	-76%#	-18.9%	-24.2%	-	-	-6.5%	-	-
FSW program	-36.5%	N/A	N/A	N/A	-38.1%	N/A	N/A	N/A
MSM program	N/A	N/A	N/A	-25.3	N/A	N/A	N/A	-

Note: "het." is an abbreviation for heterosexual. FSW and MSM programs refer to comprehensive prevention packages.
* Effect for those newly identified as HIV positive only.
** This is modeled as condom non-use to rule out mathematical inconsistency. # Clients of FSWs. Source: Goals default impact matrix.

Data Collection and Model Fitting

Goals-related demographic, behavioral, and epidemiological data

The sources we used for behavioral and epidemiological inputs were specific to Ukraine. These included the Multiple Indicator Cluster Survey 2012 (MICS); the most recent integrated bio-behavioral surveillance reports for FSWs, MSM, and IDUs; and other primary data [2–4, 7, 8]. Some of the inputs are shown in Annex A.

The sizes of key risk groups in Ukraine were based on consensus figures adopted by stakeholders in Ukraine and approved by the National TB/HIV Council in July 2013. These are shown in Table 3 below. The proportion of adult males who are clients of commercial sex work was based on the percentage of male respondents who answered yes (4.3%) to a question on utilizing commercial sex in the "Sex and Marriage" survey implemented in July 2012 in 24 regions of Ukraine (N=1,011) [23]. The survey primarily reached younger respondents (18–25 years), whereas clients of sex work are known to be mostly older. Below the age of 18, few men are clients of commercial sex workers (CSWs). Thus, the percentage for the entire group of 15–49 year olds was adjusted slightly upward, to 4.6 percent.

Table 3. Consensus size estimates for key risk groups in Ukraine, 2013

Risk group	Estimated size	% of adult 15–49 population by gender*
IDUs	310,000	-
Male IDUs	232,500 (75%)	2%
Female IDUs	77,500 (25%)	0.68%
FSWs	80,000	0.71%
MSM	176,000	1.54%

* Authors' estimates. Source: Consensus estimates approved by National TB/HIV Council, Ukraine, 2013. Split of IDUs by gender based on Ukraine data in the *Global State of Harm Reduction* 2012 [24].

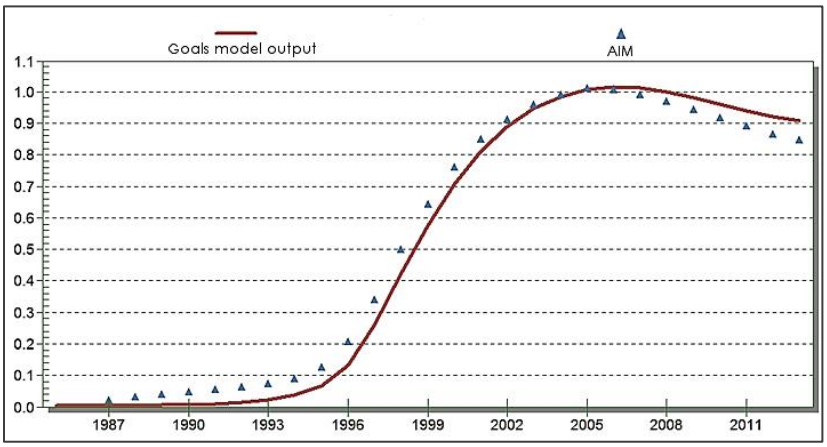
Model fitting for Goals

A common step in Goals analysis is to 'fit' the model by varying its key parameters related to behavior and certain epidemiological aspects until the model predicts the historical epidemic as well as another model or other external source of HIV incidence and prevalence data. This step is important for two reasons. First, it helps to improve the Goals model's structure so that it reflects the underlying patterns of the country's epidemic and can better predict the future course of the epidemic, against which the effects of prevention interventions will be assessed. Second, this process usually helps to identify key differences

between various mathematical models, which can help to better interpret the findings and identify potential behavioral and epidemiological parameters of importance that should be monitored when developing the Goals model for future years. In this context, the 'historical epidemic' refers to the HIV epidemic in the years prior to the year from which the Goals model begins its prediction. In the current Goals analysis for Ukraine, this means the period from the start of the country's epidemic, when sustained transmission among key population groups began (about 1986), to the year prior to the period of interest—2014–2018. We thus conducted a model-fitting exercise for Goals for the period 1986–2013. We took the following steps:

- Comparison of Goals model output to AIM, and revision of Goals model inputs to better approximate the AIM pattern of incidence and prevalence for the overall epidemic in the adult population, as well as for key risk groups. Figure 4 shows the overall result of model fitting.
- Discussion of the comparison of Goals model output to the AIM output with key stakeholders and incorporating their feedback in refining the Goals inputs.

Figure 4. Model fitting—HIV prevalence (%), adults 15−49 in Ukraine, 1986–2013



Note: Horizontal axis does not label all years. Source: Authors' estimates (Goals model output) [9].

The overall fit is appropriate, as shown in Figure 4. Some critical differences between the Goals and the AIM projections emerged when considering key risk groups. One such critical difference is in the influence of FSWs, clients, and MSM in incidence in the current epidemic. The results from Goals and AIM can also be compared with the AIDS Epidemic Model as another external source of estimates on the historical epidemic. Details of these aspects are presented in Annex A.

Unit Cost Data

Unit costs for the cost analysis were derived from official costs for the NAP 2014–2018, as calculated by the State Service. These unit costs are shown in Table 4. An efficient cost curve for service delivery may show decreasing unit cost over time as the scale of the program increases. While this is a relevant consideration, increasing returns to scale were not analyzed for this report due to a lack of data.

Table 4. Unit costs for key interventions

Intervention	UAH per person reached/year	US$ per person reached/year
In-school HIV prevention	265	$32.2
Services for youth at risk (street children)	488	$59.4
IDU basic HIV prevention package	275	$33.5
IDU comprehensive HIV prevention package*	495	$60.2
MAT for opioid-injecting IDUs	2,155	$262.2
FSW basic HIV prevention package	708	$86.1
FSW comprehensive HIV and STI prevention package*	830	$101
MSM basic HIV prevention package	229	$27.9
MSM comprehensive HIV and STI prevention package*	488	$59.4
Voluntary HIV counseling and testing	10	$1.2
Blood safety screening	9	$1.1
PMTCT	7,720	$939
ART (average cost per patient)	4,907	$597
Laboratory support for HIV+ patients in care	2,654	$323
Social services for HIV+ or HIV-affected children, HIV-positive adults	500	$60.8
Opportunistic Infection treatment and diagnosis	2,532	$308

UAH: Ukrainian hryvnias. UAH per US$: 8.22. * Basic + additional services: see Table 5. Source: [25].

Some of the interventions in Table 4 are related to biomedical and behavioral interventions that have a modeled effect on risk of HIV transmission in Goals. Others, such as PMTCT or social services for children and adults, are not modeled within Goals, yet are relevant to calculating the total cost of the NAP 2014–2018. The unit cost of PMTCT in Table 4 incorporates the costs for a comprehensive set of services, from the screening of pregnant women to early infant diagnosis using DNA PCR tests for HIV-exposed infants born to HIV-positive mothers. The cost of ART is the average cost for a patient across various lines of ART, with Ukraine-specific prices of antiretroviral drugs.

Table 5. Services included in IDU, FSW, and MSM comprehensive prevention packages

Group	Basic package	Additional services
IDU	NESP; Alcohol wipes for injecting equipment; Information, education, and communication (IEC) materials; Peer-to-peer counseling; Overdose prevention; Referrals; Psychological support; Social support; Motivational kit; HIV counseling and testing (HCT)	Condoms; Lubricants; STI testing and counseling; Hepatitis B and C testing and counseling; Hepatitis B vaccination; Counseling groups; Psychosocial re-socialization; Clinical examination and prevention
FSW	Condoms; Lubricants; IEC materials; Peer-to-peer counseling; Specialist referrals; Psychological support; Social support; Legal support; Motivational kit; HCT	STI testing and counseling
MSM		STI testing and counseling; Hepatitis B and C testing and counseling; Hepatitis B vaccination; Information sessions; Psychosocial support

Coverage Scenarios Considered for the Analysis

We analyzed four alternative scenarios that differ in their coverage assumptions for key prevention and treatment interventions in Ukraine for the period 2014–2018. These scenarios are designed to put into context the key policy decisions related to the NAP 2014–2018, as well as risks to HIV-related funding in Ukraine. The differences between the four alternative scenarios are summarized in Table 6, focusing on the key prevention and treatment interventions. The scenarios are distinguished by comparing the baseline coverage in year 2014 and the desired endpoint coverage in year 2018. The coverage for all of the years in between was calculated and used in the model. Table 6 focuses on only a few interventions. However, other services also vary across the scenarios but do not have a direct effect on the risk of HIV infection in the population. They are necessary to prevent infections on their own merit, as supports for the individuals at risk of infection, or to provide additional support to HIV-positive or HIV-affected individuals. These include social services, opportunistic infection diagnosis and treatment for patients in care, screening of donated blood, post-exposure prophylaxis (PEP) and, as previously discussed, PMTCT.

Table 6. Coverage of selected HIV interventions in 2014 and 2018 under four scenarios

Intervention	Coverage in year 2014				Coverage in year 2018			
	1.Constant	2. NAP	3. NAP with UA	4. GF Risk	1.Constant	2. NAP	3. NAP with UA	4. GF Risk
HCT*	12%	7.5%	7.5%	7.5%	12.6%	7.9%	7.9%	7.9%
ART	39%	56%	56%	56%	32%	83%	83%	83%
Youth at risk	23%	34%	34%	34%	25%	42%	80%	5%
School-based	0%	100%	0%	100%	0%	100%	100%	100%
FSW package	36%	39%	40%	39%	38%	47%	60%	**0%**
MSM package	11%	14%	20%	14%	12%	28%	60%	**0%**
IDU MAT	3%	5%	14%	5%	3%	9%	60%	5%
IDU package	57%	58%	57%	58%	60%	53%	60%	**0%**

* Coverage for the general population only. Due to specific assumptions, coverage for HCT is higher in scenario 1's "constant" than other scenarios, which have higher coverage for other interventions.

Scenario 1: Constant 2012 Coverage

Scenario 1 is considered to be the baseline scenario and aims to reflect unchanged funding for key interventions from the last fiscal year (2012). Under this scenario, the absolute numbers of individuals receiving services provided in fiscal year 2012 will be maintained over 2014–2018, except for the case of HCT. Even as the number of individuals is maintained, due to year-on-year changes in the size of the base populations, the relative coverage (%) will vary slightly. As of January 1, 2013, 40,350 adults and children in Ukraine were receiving ART, which amounts to 39 percent of the total number of patients in need of ART in 2014 and 32 percent in 2018. Baseline coverage of interventions aimed at key risk groups was based on a combination of data from sources such as the 2012 assessment of the NAP 2009–2013, the UNGASS report, and targets from the State Service for costing the draft NAP 2014–2018 [6, 11]. The coverage for IDUs reached at least twice during a year with the comprehensive prevention package was estimated at 42 percent in 2013, based on the programmatic data collected by the International HIV/AIDS Alliance in Ukraine [26]. This implies that 129,026 IDUs were reached in 2013, based on the estimated size of the population. This number was maintained for the future years under this scenario. Overall, under the *Constant 2012 Coverage* scenario, about 29,000 FSWs, 20,000 MSM, 129,000 IDUs, and 18,000 youth at risk (street children) will receive a package of HIV prevention services every year over 2014–2018. This amounts to coverage below 50 percent of each key risk group.

Scenario 2: NAP 2014–2018 Targets (NAP)

As discussed in Chapter 1, the NAP 2014–2018 will build upon the achievements of NAP 2009–2013, with a focus on prevention among key risk groups. In practice, this means a moderate scale-up of prevention services for youth at risk, FSWs, and MSM over the program period, ranging from 8 to 14 percentage points. Currently, funding for FSW, MSM, and IDU prevention packages of interventions comes primarily from Global Fund grants. During the period Global Fund grants are active, i.e., up to 2016, a combination of basic and additional services will be delivered, together comprising a "comprehensive package" for IDUs, FSWs, and MSM, as referred to in Table 5. After 2016, Ukraine will face funding constraints, and hence the services in the package will become more limited, comprising the services under the "basic package" only, as in Table 5.[5] Even as the content of the package changes, so do assumptions for changes in the coverage. In this scenario, the number of IDU and coverage for the IDU package of services declines from 2014 to 2018. This is based on an assumption made by the State Service that IDU population during this period will decrease and some IDUs "graduating" from requiring the package. However, each IDU covered by the program will be reached at least twice during each year with the services.

MAT for opioid-injecting IDUs and ART for adults and children will be scaled up rapidly under the NAP scenario. The number of IDUs receiving MAT will nearly triple by 2018 compared to 2013. Even with this increase, by 2018 the reach will be only 9 percent of the opioid-injecting IDUs. The NAP scenario also aims to increase the coverage of HIV-positive adults in need of ART (based on AIM estimates), with services to achieve 83 percent coverage by 2018 as per current eligibility guidelines.

Scenario 3: Universal access/NAP 2014–2018 (NAP with UA)

In the 2006 Political Declaration on HIV/AIDS, WHO member states committed to scale up toward universal access to HIV prevention, treatment, and care. United Nations technical agencies since have advised countries to develop "ambitious, but achievable" scale-up targets [27]. In Ukraine, such ambitious targets are defined as 60 percent coverage of a comprehensive package of prevention services, as in Table 5 (basic plus additional services), among the key risk groups: FSWs, MSM, and IDUs. This is a departure from Scenario 2 (NAP), in which only a basic set of services continues after 2016. The same percentage also is applied for coverage of MAT among opioid-injecting IDUs. The target for youth at risk/street children is even more ambitious, at 80 percent coverage. Ukraine's universal access targets involve 80 percent coverage for all HIV, STI, and opportunistic infection care and treatment. Together, these targets imply a large scale-up of comprehensive services, as compared to the previous scenarios—a scale-up that leads to eventual universal access.

Where the previous scenario (i.e., Scenario 2: NAP targets) had surpassed the 60 percent prevention services threshold or 80 percent care and treatment threshold, the target was incorporated into the current Scenario 3. Therefore, this scenario is a combination of "leading to universal access" and "NAP 2014–2018" or UA/NAP. To implement this scenario in Goals, we scaled up the baseline 2012/13 coverage linearly to reach the desired level of coverage in 2018 for all interventions.

Scenario 4: Global Fund Risk Assessment (GF risk)

This scenario was designed specifically to examine the potential risks of losing future Global Fund support for key prevention and support interventions that serve key risk groups. The Phase II renewal period of Ukraine's Global Fund Round 10 HIV/AIDS grant will end in December 2016. The NAP 2014–2018 scenario (Scenario 2 above) assumes that the Government of Ukraine will fund these services in the absence of Global Fund grant support. Such services include critical comprehensive prevention packages

[5] For this reason, we adjusted the impact matrix for the IDU prevention package, other than MAT, to draw from the lower quartile of impact matrix effects (as discussed in section 2.A) for the period for the NAP 2014–2018.

for FSWs, IDUs, and MSM, in addition to a proportion of the MAT recipients. In the years 2014–2016, about 21–23 percent of all ART services will be funded through the Global Fund grant. Current plans under the NAP envisage shifting of these patients to the government budget in 2017 to keep the coverage constant as a percentage, as shown in Table 6. This implies that, comparing 2017 to 2016, the government-funded program will gain 33,185 ART patients in a year and an additional expenditure of UAH 155.1 million (US$18.9 million).

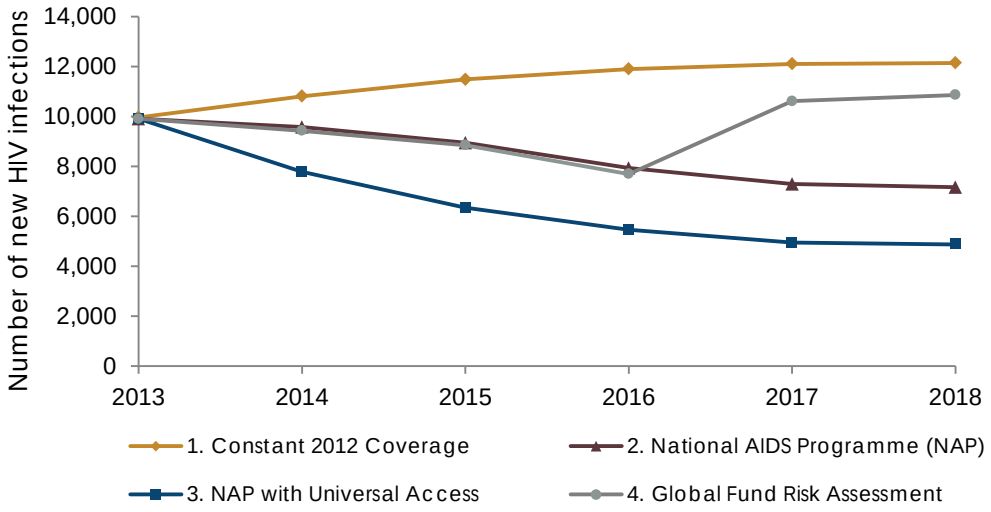
In summary, under Scenario 4, termed "Global Fund Risk Assessment" or *GF Risk*, we set coverage targets of interventions after assuming that the following will occur: Global Fund grants do not continue after December 2016 and additional support from the Government of Ukraine for certain prevention interventions for key risk groups is not available in 2017 and 2018. We thus set coverage of certain prevention interventions for key risk groups to zero for 2016 and 2017 (see Table 6 for the specific interventions).

RESULTS

New HIV Infections

New HIV infections for the scenarios as modeled in Goals are shown in Figure 5. Annex B discusses the results for prevalence. All four scenarios begin from 9,900 new adult HIV infections in 2013. By 2018, the number of HIV infections among adults in Ukraine is estimated to lie in the range 4,872 to 12,202.

Figure 5. New HIV infections among adults 15–49 years, 2014–2018, by scenario



Source: Authors' estimates.

Worst-case scenario: The scenario *Constant 2012 Coverage* will result in the highest number of new infections per year and is the only scenario in which the annual incidence increases every year over 2014–2018. Under this scenario, coverage is stagnant for key prevention interventions for the crucial risk groups. Importantly, the percent coverage for ART declines by 2018. This is because the program serves the same number of patients as in fiscal year 2012—a lower percentage of the growing need. The number of new HIV infections under this scenario is the baseline to calculate net HIV infections averted for the other three scenarios and the incremental cost-effectiveness later in this chapter.

The *GF Risk* scenario shows a sharp increase in incidence over the years 2016–2018, due to a cessation of prevention interventions for key risk groups. Other than *Constant 2012*, it is the only scenario with higher incidence in 2018 compared to 2013.

Best-case scenario: The greatest reduction in new HIV infections occurs in the *NAP with UA* scenario, which aims to achieve ambitious coverage of prevention services for key risk groups. In Figure 5, the scenario shows a steep decline in new adult HIV infections over 2013–2018. This scenario will achieve the lowest number of new infections by 2018.

Other scenarios: The *NAP* scenario results in a modest but steady decline in annual new HIV infections. This scenario shares the same ART coverage targets as *NAP with UA*. Otherwise, it has lower coverage of key prevention interventions for crucial risk groups over the entire period. The *GF Risk* scenario follows the same trajectory as the *NAP* scenario through 2016, as the coverage for most interventions is identical between the two scenarios up to that point. When the key prevention services for FSWs, MSM, and IDUs funded by the Phase II Global Fund HIV Round 10 grant cease at the end of 2016, the number of adult HIV infections predicted under the scenario rises sharply, to above 2013 levels.

The *GF Risk* scenario also involves the early phase-out of partial funding for the MAT program for opioid-injecting IDUs. For the years 2017–2018, the *GF Risk* scenario will be the worst performing scenario after *Constant 2012 Coverage*.

Table 7 summarizes the results, comparing the infections under the *Constant 2012 Coverage* scenario with the other three scenarios to yield the number of averted infections. The *NAP with UA* scenario performs the best, showing the greatest reductions in infections, and hence in future needs related to caring and treating those potential patients. The question that follows is—at what additional cost?

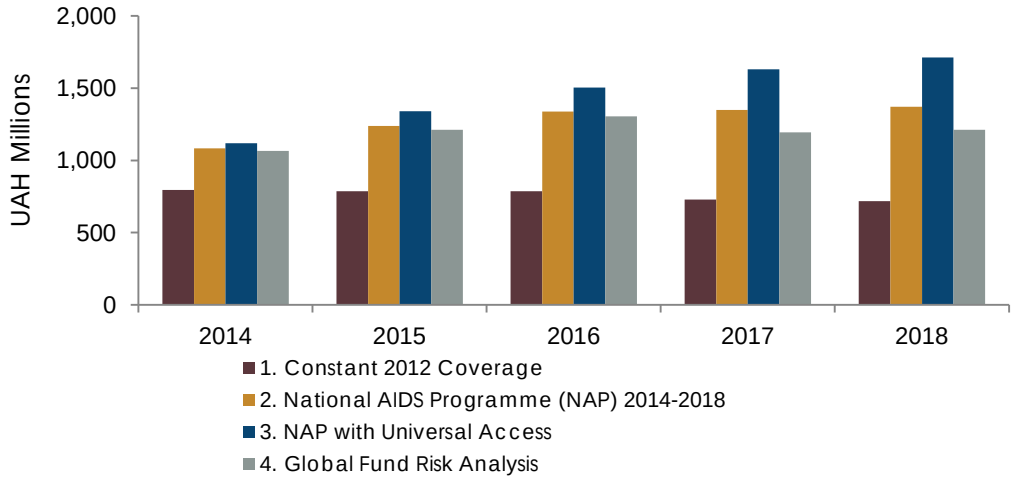
Table 7. Averted new HIV infections among adults 15–49 years, by scenario

Year	Averted compared to *Constant 2012 Coverage* scenario		
	2. National AIDS Programme (NAP)	3. NAP with Universal Access	4. Global Fund Risk Assessment
2014	1,240	3,034	1,382
2015	2,538	5,133	2,636
2016	3,967	6,436	4,206
2017	4,819	7,164	1,496
2018	4,977	7,265	1,279
Total	**17,541**	**29,032**	**10,999**

Total Costs

We calculated the total cost of the HIV program in Ukraine, given the service delivery targets under each of the four scenarios, and applied additional costs for management of the HIV program, including costs that do not vary across scenarios.

Figure 6. Total costs of the Ukraine HIV program, 2014–2018, by scenario



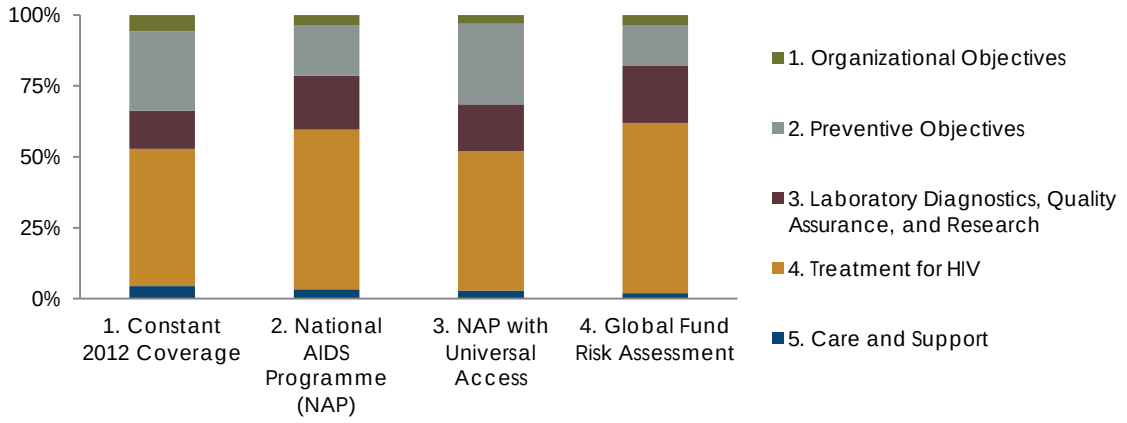
Source: Authors' estimates, using official unit costs and based on scenario targets.

Lowest cost scenario: The *Constant 2012 Coverage* scenario will cost the least over 2014–2018—UAH 3,816 million (US$464 million). Under this scenario, the numbers of people reached for key prevention interventions remains flat. However, due to fluctuations in the anticipated number of blood transfusions and changes in the investments in other support functions, there will be a decrease in annual costs of about 10 percent between 2014 and 2018 (Figure 6).

Highest cost scenario: The *NAP with UA* scenario will be the most costly of the four scenarios. Over 2014–2018, this scenario has costs of UAH 7,308 million (US$ 889 million). The rapid scale-up of HIV prevention for key risk groups drives these costs, as can be seen in Figure 7, in which the prevention objective contributes 28 percent of the total cost for this scenario, while treatment for HIV-positive individuals makes up less than half.

Other scenarios: The *NAP 2014–2018* scenario reflects the actual targets of the NAP as proposed by the State Service and other stakeholders. After considering the additional program management costs, the total cost amounts to UAH 6,380 million (US$776 million). More than 50 percent of the costs will derive from ART and opportunistic infection (OI) treatment for HIV-positive adults and children (Figure 7). Laboratory support for HIV and OI-related care—including quality control, research, and surveillance—makes up 19 percent of the total costs. Approximately the same proportion of the total costs is related to the prevention objective. As per the NAP definition, the prevention objective also includes general behavior change communication and certain other activities that do not have a modeled impact on HIV infection within Goals due to a lack of evidence. Additional care and support for HIV-positive individuals in care constitute 3 percent of the total costs, and organizational objectives, such as human resources and coordination, constitute the remaining 4 percent of the total costs to implement the NAP 2014–2018.

Figure 7. Composition of total costs for the period 2014–2018, by scenario



Source: Authors' estimates, using official unit costs and based on scenario targets.

The *GF Risk* scenario is the third most costly scenario, with a total cost of UAH 5,988 million (US$728.5 million). As in the previous section, the annual total costs for this scenario do not diverge significantly from *NAP 2014–2018* until after 2016, when Global Fund grants terminate. Due to the phase-out of HIV prevention for key risk groups after 2016 in this scenario, a smaller proportion (14%) of the overall five-year costs relates to the prevention objective (Figure 7). Table 8 compares the costs of the scenarios.

Table 8. Additional costs compared to *Constant 2012 Coverage* scenario (UAH millions)

Year	All costs			Goals impact interventions costs only*		
	2. NAP	3. NAP/UA	4. GF Risk	2. NAP	3. NAP/UA	4. GF Risk
2014	289	323	270	182	216	162
2015	452	553	426	312	414	287
2016	551	719	518	448	615	415
2017	620	902	465	574	806	414
2018	652	995	493	598	889	436
Total	**2,564**	**3,492**	**2,172**	**2,113**	**2,940**	**1,714**

Source: Authors' estimates. * These costs are used for the cost-effectiveness calculations below.

Cost-effectiveness

We calculated the costs for the biomedical and behavioral interventions that have an effect on HIV infections in Goals to compare the scenarios on the basis of cost-effectiveness, with the results expressed in UAH per HIV infection averted. As previously stated, we use the *Constant 2012 Coverage* scenario as the baseline for comparisons, and the interventions with an impact on new infections as a basis for the costs, as per Table 8. Table 9 shows the results of the cost-effectiveness analysis. The *NAP with UA* scenario emerges as the most cost-effective of the scenarios.

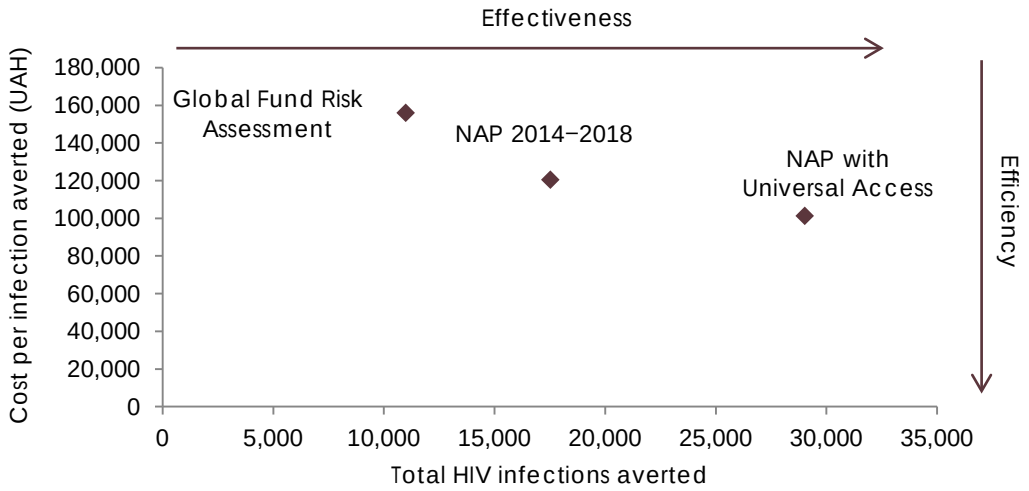
Table 9. Incremental cost-effectiveness ratios (ICER) UAH/US$ adult HIV infection averted, all scenarios compared to the *Constant 2012 Coverage* scenario

Scenario	2014–2018		
	Total HIV infections averted	ICER, UAH per HIV infection averted	ICER, US$ per HIV infection averted
1. Constant 2012 Coverage	N/A	N/A	N/A
2. NAP 2014–2018	17,541	120,475	$14,656
3. NAP with UA	29,032	**101,252**	**$12,318**
4. GF Risk	10,999	155,843	$18,959

Note: Only the costs of interventions with effects on HIV infection in Goals were included for the cost analysis. See Table 8. Source: Authors' estimates.

Figure 8 presents the results in graphical form. Moving from the scenario with the greatest risk applying to coverage (*GF Risk*), to the *NAP 2014–2018* targets scenario, and then to the *NAP with UA* scenario, we see increasing effectiveness as well as allocative efficiency. Previous studies have examined the cost-effectiveness of scaling up key prevention interventions in the Ukrainian context [18, 28]. Of these, a previous Goals model analysis in 2012 based the results on the scale-up of harm reduction interventions for IDUs, including ART. This analysis estimated an incremental cost-effectiveness ratio of expanding MAT, NESP, HCT, and ART of US$5,105 per HIV infection averted, compared to a status quo scenario maintaining 2011 levels of coverage [18]. This previous study used different assumptions and starting points, and had differences in the Goals impact matrix applied. In contrast, the current analysis is focused on scale-up of all key prevention interventions for all crucial risk groups, which changes the interpretation of findings.

Figure 8. Comparing scenarios on cost-effectiveness and impact



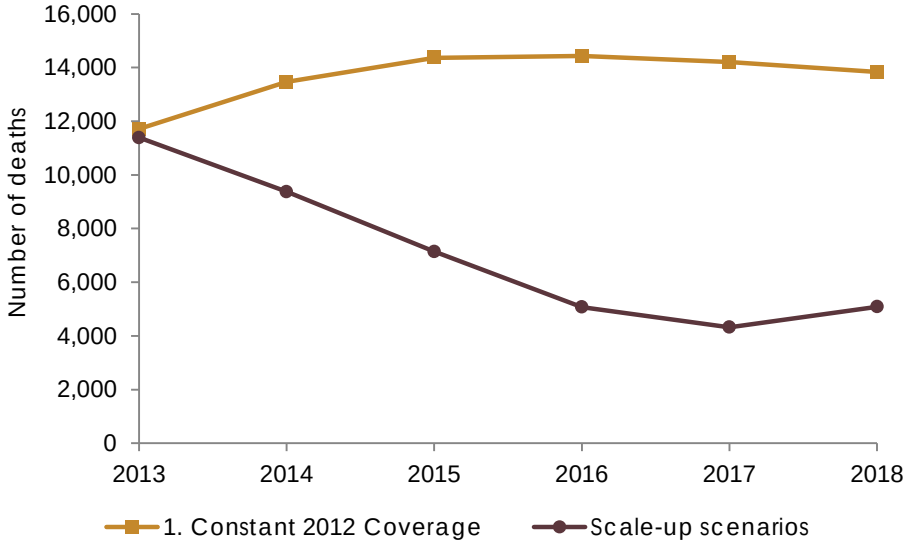
Source: Authors' estimates.

Deaths Averted

Mortality across the scenarios over the short time period of 2014–2018—"short" in the course of an epidemic—is affected most significantly by the level of provision of ART. In the long term, HIV prevention also affects mortality, as HIV infections are averted that otherwise would develop into HIV/AIDS disease and lead to morbidity and mortality.

We have focused on the adult epidemic in this report. Thus, in this section, we compare the scenario of *Constant 2012 Coverage* with the three scale-up scenarios that involve an increase in coverage of adult ART. We treat these three scenarios as one in Figure 9, as they do not differ from each other in the coverage of ART by year (see Table 6). In the chart below, we refer collectively to these three scenarios, which show very similar results for deaths due to AIDS per year over this period, as 'scale-up scenarios.' All three achieve 83 percent coverage of ART by 2018 (Table 6). Figure 9 shows the predicted mortality under the two types of scenarios.

Figure 9. Comparing scenarios on adult mortality due to AIDS, 2014−2018



Source: Authors' estimates [9].

Scale-up of care and treatment can significantly reduce adult mortality due to severe HIV illness and AIDS in the short term. This reduction in mortality amounts to approximately 39,445 deaths averted over 2014—2018.

DISCUSSION

Implications of Results

Even though total HIV incidence in Ukraine has declined since the early 2000s, there is still a significant concentrated epidemic in the country. Without the scale-up envisioned in the NAP 2014–2018, at least an additional 17,541 HIV infections could occur if coverage remains at current levels, based on our modeling estimates. An additional 39,445 deaths could occur in the HIV-positive population.

Implementing the NAP 2014–2018 involves a total cost of UAH 6,380 million, or US$776 million. Ukraine can afford to do more. If more resources are invested in key prevention interventions and treatment, care, and support, further reductions in HIV infections are possible. Each HIV infection prevented can help to reduce the total burden of avoidable sickness and death in the future. In this context, a program with ambitious yet achievable targets up to 2018, which lays the foundation for eventual universal access to key prevention and treatment interventions, can yield an additional 11,491 averted new infections compared to implementing the targets under NAP 2014–2018, and 29,032 averted infections compared to maintaining coverage at current levels over the period. Based on the latter result, the incremental cost per HIV infection averted will be $12,318 compared to the status quo.

The HIV program in Ukraine faces some risks, especially related to funding. With the likely cessation of current Global Fund grants at the end of 2016, funding will be lost for several key interventions that provide much-needed prevention services for risk groups vulnerable to HIV infection. The NAP 2014–2018 partially addresses this loss for IDUs, MSM, and FSWs with planned funding from local sources. For IDUs, the NAP 2014–2018 provides for continuing basic services for the period 2017–2018 only; that is, the additional services for IDUs as discussed in this report will be lost. If the services do not continue at all in the years 2017–2018, an additional 6,542 HIV infections will occur compared to a future in which the NAP 2014–2018 is implemented successfully with its scale-up of services. Thus, continued advocacy with all stakeholders is required to ensure that funding is available to replace the loss of Global Fund grant financing.

The policy challenge for Ukraine can be stated in two steps. First, stakeholders must work to avoid a situation in which a lack of funding after 2016 for key prevention interventions leads to many unnecessary and avoidable HIV infections. Funds should be secured and coverage targets achieved to prevent this scenario. Second, to capitalize fully on the effectiveness of the interventions currently designed for Ukraine and actively implemented in the relevant communities, additional resources should be mobilized that can increase the scale-up beyond what is planned in the NAP 2014–2018. Such a scale-up to ambitious yet achievable targets would prevent at least 11,491 HIV infections, compared to implementing the NAP 2014–2018 targets.

Limitations and need for further analysis

Any modeling analysis is subject to uncertainties and limitations in data availability. The Goals model is not exempt from these issues. The current report is based on a particular set of behavioral, epidemiological, and impact parameters. These parameters are not known with certainty; hence, the results discussed above are also subject to uncertainty. In addition, the results are subject to the structure of the Goals model and its underlying assumptions. Thus, a rigorous uncertainty analysis should be conducted that can explore the range in the results presented in this report. This analysis has not been attempted here due to constraints of time and resources.

The results presented here for new infections averted with the scale-up of services across scenarios, and deaths averted, could be improved and supplemented with a benefit-cost analysis. This form of analysis

can assess the future costs averted due to sickness and deaths averted due to a scale-up of prevention, care, and treatment services in the near term. Again, such an analysis could not be conducted due to the constraints cited above.

Finally, the Goals model deviates in several aspects from other models that simulate the historical epidemic. It would be useful to compare the results of modeling these scenarios in the other models to yield a range of possible results that then could be presented to policymakers as an overall range of effect.

ANNEX A

A.1 Spectrum and the AIDS Impact Model (AIM)

Spectrum is a Windows-based software system incorporating different modules that are used to analyze health policy issues in a variety of country contexts. The software and its modules have been described in previous peer-reviewed journal articles, to which we referred in developing the descriptions here [29]. Detailed guides and technical manuals are available online at www.futuresinstitute.org. A summary description of three models used in this report is provided below.

The Spectrum Policy Modeling System consolidates previous models into an integrated package. The key components of interest in the context of Goals are the following:

- *DemProj*—A program to make population projections based on (1) the current population; and (2) fertility, mortality, and migration rates for a country or region.
- *AIDS Impact Model (AIM)*—A program to project the consequences of the AIDS epidemic, including the number of people infected with HIV, AIDS deaths, the number of people needing treatment, and the number of orphans.
- *Goals* estimates the cost of behavioral and biomedical HIV prevention interventions and their impact on new HIV infections, and hence on prevalence, over a period of years.

DemProj is a full-featured cohort component demographic projection model. The inputs are the population by age and sex in the base year and, for all years in the projection, the total fertility rate, the age distribution of fertility, the sex ratio at birth, the life expectancy at birth in the absence of AIDS, the age pattern of mortality, and the number and distribution by age and sex of international migrants. A standard demographic projection using DemProj includes a model life table that provides information on mortality by single age for any value of life expectancy at birth.

AIM—based on HIV prevalence and other epidemiological parameters, AIM projects the consequences of the HIV epidemic, including the number of people living with HIV, new infections, and AIDS deaths by age and sex. AIM also calculates the impact of PMTCT, ART, and Cotrimoxazole on child deaths and the impacts of ART on adult mortality.[6]

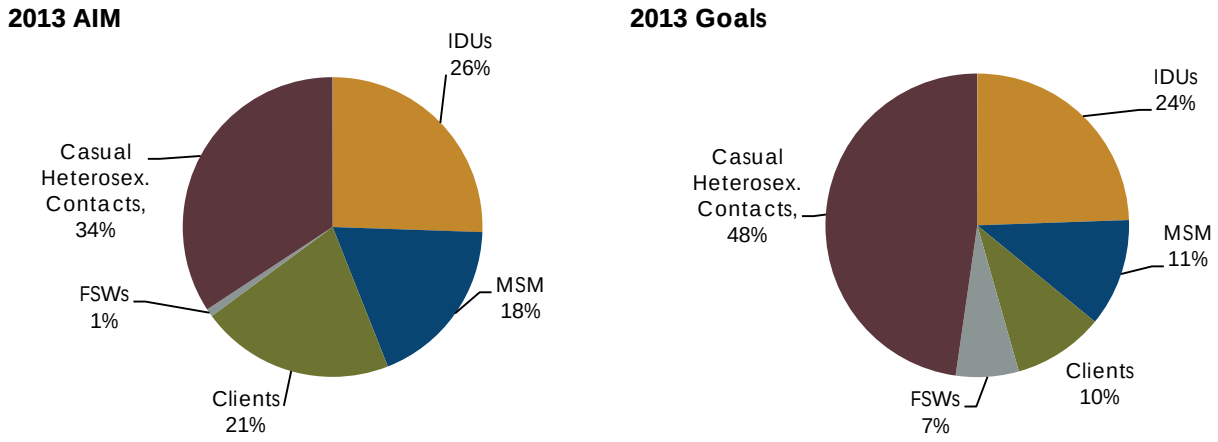
A.2 Further details on model fitting

As per the AIM estimate, FSWs will account for only 1 percent of the total adult infections in 2013, whereas MSM will account for 18 percent [9]. Figure A.1 shows the modes of transmission for the year. Interpreting the AIM estimate suggests that new infections related to sex work primarily occur among the clients of FSWs. In contrast, the MSM-related proportion of new infections in AIM is significant. The Goals estimate, which is derived from risk behaviors and recent HIV prevalence in the group, and other factors, suggests that the total incidence due to sex work is not as large, and some of the infections do occur among FSWs—potentially those who have recently entered this group. The Goals estimate also suggests a less significant role for infections among MSM in 2013. The Goals estimate of HIV incidence in the "casual heterosexual" group in Figure A.1 comprises both low-risk couples exposed to risk through a spouse or stable sexual partner, as well as individuals with two or more sexual partners (considered medium risk). Compared to AIM, the total incidence in this group is a higher proportion of the total.

[6] A manual is available online at http://futuresinstitute.org/Download/Spectrum/Manuals/AimmanE.pdf.

The AIDS Epidemic Model provides a similar prediction of the proportion of HIV incidence that occurs among MSM as the AIM, but a much higher prediction of the proportion occurring among IDUs (47%) [15]. The AEM prediction of infections among clients of CSWs is much lower than AIM, at 9 percent.

Figure A.1. Comparing HIV modes of transmission across Goals and AIM for 2013



Source: Authors' estimates [9].

A.3 Behavioral assumptions used in Goals modeling

Table A.1 Behavioral assumptions used in Goals modeling

Heterosexual Behavior	Range (lowest to highest over time, 1985–2018)	Source
Low risk: consistent condom use	<5–24%	Goals 2013 preset for Ukraine
Med. risk: consistent condom use	<5–61%	Goals 2013 preset for Ukraine
Clients: consistent condom use	<5–88%	Goals 2013 preset for Ukraine
MSM: consistent condom use	<5–64%	Goals 2013 preset for Ukraine
Male Low risk: # of partners per year	1 (set)	Assumed
Male Med. risk: # of partners per year	3–5	Typical Goals/E. Europe
Clients: # of partners per year	5–10	Typical Goals/E. Europe
MSM: # of partners per year	5–10	Typical Goals/E. Europe
Female Low risk: # of partners/year	1 (set)	Assumed
Female Med. Risk: # of partners/year	3–4	Typical Goals/E. Europe
CSWs: # of partners/year	190–210	Typical Goals/E. Europe
IDU needle-sharing behavior (%)	35–60%	Higher values earlier; lower values recently. 2010: 40%
Force of infection (IDUs): modeled from index of frequency of injection, sharing of equipment, # of sharing partners, etc.	0.35–1	Models other IDU risk behavior; higher in earlier parts of epidemic

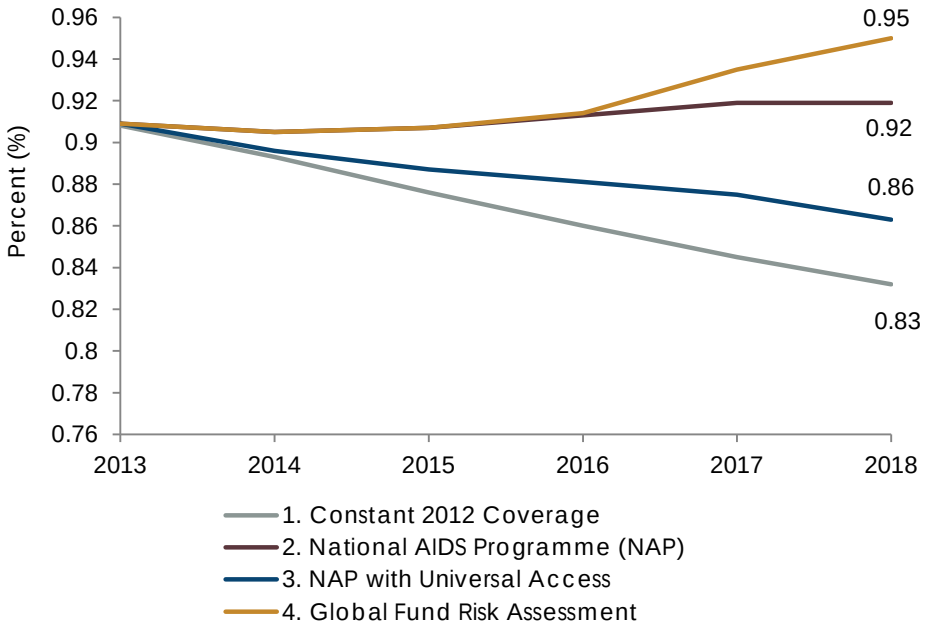
Note: E. Europe: Eastern Europe.

ANNEX B

B.1 HIV Prevalence Across Scenarios

Adult HIV prevalence across the scenarios for the period 2013–2018, as modeled in Goals, is shown in Figure B.1. All four scenarios begin from an adult prevalence of 0.91 in 2013. By 2018, the adult HIV prevalence in Ukraine is estimated to fall in the range 0.83 to 0.95.

Figure B.1. Adult (15–49 years) HIV prevalence (%), 2013–2018, by scenario



Source: Authors' estimates.

The implementation of the scenario of *NAP 2014–2018* (see Chapter 2 for a description of scenarios) yields a higher prevalence than the *NAP with UA* scenario. Maintaining coverage at the 2012 level (*Constant 2012 Coverage* scenario) results in the lowest estimated adult prevalence by 2018. These results may seem counterintuitive, unless we consider the effect of increased mortality in the *Constant 2012 Coverage* scenario, which means fewer individuals with HIV are alive in the subsequent years, hence reducing adult HIV prevalence through this channel.

Across the three scale-up scenarios, increases in new HIV infections play a significant role in explaining their relative differences. The *GF Risk* scenario incurs the largest number of annual new infections among the three scale-up scenarios, and hence has the highest prevalence by 2018.

B.2 Detailed Cost Results Across Scenarios

Table B.1 presents detailed costs for the interventions under the NAP, by scenario. The column titled "National AIDS Programme" presents the costs of the proposed NAP 2014–2018, with the official targets. Costs are based on the official unit costs.

Table B.1 Total cost of the HIV program, 2014–2018, by scenario, in UAH

	1. Constant 2012 Coverage	2. National AIDS Programme	3. NAP with Universal Access	4. Global Fund Risk Assessment
Organizational Objectives				
Coordination	1,552,184	1,552,184	1,552,184	1,552,184
Sustainability	588,499	588,499	588,499	588,499
Regulations	1,337,935	1,337,935	1,337,935	1,337,935
HR & Logistics	119,227,272	119,227,272	119,227,272	119,227,272
M & E	40,076,653	40,076,653	40,076,653	40,076,653
Research	0	0	0	0
Training	61,652,665	61,652,665	61,652,665	61,652,665
Stigma Reduction	2,969,664	2,969,664	2,969,664	2,969,664
Subtotal	**227,404,872**	**227,404,872**	**227,404,872**	**227,404,872**
Prevention Objectives				
BCC	18,550,780	18,550,780	18,550,780	18,550,780
In-school	0	3,975,000	2,385,000	3,975,000
Risk Groups: Youth	44,969,643	72,831,269	106,669,546	46,201,896
Risk Groups: IDU	319,538,494	337,569,862	353,409,581	208,677,262
Risk Groups: MAT	79,078,572	177,003,485	971,182,751	122,911,742
Risk Groups: FSW	113,067,338	129,783,536	154,049,516	74,890,809
Risk Groups: MSM	36,007,845	66,418,579	127,792,419	33,388,799
Risk Groups: All other	36,885,600	36,885,600	36,885,600	36,885,600
PMTCT	160,190,133	163,586,936	163,586,936	163,586,936
PEP	5,000	5,000	5,000	5,000
VCT	128,224,333	80,402,407	80,402,409	80,402,409
Blood Donation	35,868,353	37,272,269	37,272,269	37,272,269
STI Prevention	19,867,474	19,867,474	19,867,474	19,867,474
Subtotal	**992,253,565**	**1,144,152,197**	**2,072,059,281**	**846,615,976**
Laboratory Diagnostics, Quality Assurance, and Research				
Laboratory QC	5,434,200	5,434,200	5,434,200	5,434,200
Lab. Support: ART	454,417,493	1,126,976,602	1,126,976,602	1,126,976,602
Lab. Support: OI	10,225,332	17,276,257	17,276,257	17,276,257
Lab. Research	44,550,919	44,550,919	44,550,919	44,550,919
Surveillance	10,010,726	10,010,726	10,010,726	10,010,726
Subtotal	**524,638,670**	**1,204,248,704**	**1,204,248,704**	**1,204,248,704**

	1. Constant 2012 Coverage	2. National AIDS Programme	3. NAP with Universal Access	4. Global Fund Risk Assessment
Treatment for HIV				
ART, adults & children	990,022,107	2,308,010,198	2,308,010,198	2,308,010,198
OI Treatment	909,406,811	1,286,212,441	1,286,212,441	1,286,212,441
Subtotal	**1,899,428,918**	**3,594,222,639**	**3,594,222,639**	**3,594,222,639**
Care and Support				
Oversight	2,160,000	2,160,000	2,160,000	2,160,000
Social Services, children	15,489,554	18,194,976	18,194,976	10,120,709
Social Services, adults	154,490,551	189,770,034	189,770,034	103,692,014
Subtotal	***172,140,105***	***210,125,010***	***210,125,010***	***115,972,723***
TOTAL	**3,815,866,130**	**6,380,153,423**	**7,308,060,507**	**5,988,464,915**

REFERENCES

1. UAS. 2011. "HIV in Ukraine: Information Bulletin No. 37." Kiev: Ukrainian Center for Socially Dangerous Disease Control, The L.V. Gromashevskyi Institute of Epidemiology and Infectious Diseases. Ukraine, and Ministry of Health, Ukraine.

2. Balakiryeva, O.M., T.V. Bondar, Y.V. Sereda, Y.O. Sazonova. 2012. "Analytical Report: Behavior Monitoring and HIV Prevalence among Injecting Drug Users as a Component of Second Generation Sentinel Surveillance." Kiev: Olexander Yaremenko Ukrainian Institute for Social Research and International HIV/AIDS Alliance in Ukraine.

3. Bolshov, Y.G., M.G. Kasianchuk, Y.B. Leshchynskyi, L.V. Trofymenko, I.A. Shvab. 2012. "Analytical Report: Behavior Monitoring and HIV Prevalence among Men Who Have Sex with Men as a Component of Second Generation Sentinel Surveillance." Kiev: Centre for Social Expertise, Institute of Sociology, Ukrainian National Academy of Sciences, and International HIV/AIDS Alliance in Ukraine.

4. Grushetsky, A. 2012. "Analytical Report: Behavior Monitoring and HIV Prevalence among Commercial Sex Workers as a Component of Second Generation Sentinel Surveillance." Kiev: Kyiv International Institute of Sociology and International HIV/AIDS Alliance in Ukraine.

5. UNAIDS. 2009. "Comprehensive External Evaluation of the National AIDS Response in Ukraine: Consolidated Report." Kyiv: UNAIDS Ukraine Evaluation Team.

6. UNAIDS. 2012. "Assessment of the Implementation of the National AIDS Programme (NAP) in Ukraine: Synthesis Report." Kyiv: UNAIDS Ukraine.

7. SSSU. 2013. "Multiple Indicator Cluster Survey 2012: Preliminary Report (in Ukrainian)." Kyiv: State Statistics Service of Ukraine, UNICEF, USAID, Swiss Agency for Development and Cooperation.

8. Pohorila, N., Y. Taran, I. Kolidiy, and T. Diyeva. 2010. "Analytical Report Based on Results of Linked Survey: Behavior Monitoring and HIV-infection Prevalence among Injection Drug Users." Kyiv: International HIV/AIDS Alliance in Ukraine.

9. UCDC. 2013. "National AIDS Impact Model Projection File." Kiev: Ukrainian Center for Socially Dangerous Disease Control (UCDC), Ministry of Health, Ukraine.

10. Bochkova, L.V. 2013. "Trends in the HIV Epidemic in Ukraine (Presentation)." Kiev: Ukrainian Center for HIV/AIDS Prevention, Ministry of Health, Ukraine.

11. UAS. 2012. "Ukraine Harmonized AIDS Response Progress Report: January 2010–December 2011." Kiev: Ukrainian AIDS Centre and National UNGASS Report Working Group.

12. UAS. 2013. "HIV in Ukraine: Information Bulletin No. 40." Kiev: Ukrainian Center for Socially Dangerous Disease Control, The L.V. Gromashevskyi Institute of Epidemiology and Infectious Diseases Ukraine, and Ministry of Health, Ukraine.

13. Vitek, C.X. 2013. "Data Triangulation Study (forthcoming)." Personal communication, December 14, 2013. In. Kyiv.

14. Vitek, C.X. 2013. Personal communication, September 26, 2013. In. Kyiv.

15. Salyuk, T. 2013. Результаты моделирование эпидемии при помощи пакета AEM (Simulation Results Using the Epidemic Package AEM), Presentation. In: *Technical Working Group Meeting, September 2013*. Kiev: International HIV/AIDS Alliance in Ukraine.

16. Smyrnov, P. 2013. "Scaling Up Access to HIV Treatment for Drug Users in Ukraine." In: *International Harm Reduction Conference 2013*. Vilnius, Lithuania.

17. UCDC. 2013. "Operational Information about Substitution Maintenance Therapy (SMT) Patients." Kiev: Ukrainian AIDS Centre.

18. Dutta, A., A. Wirtz, A. Stanciole, R. Oelrichs, I. Semini, and S. Baral, et al. 2013. "The Global HIV Epidemics among People Who Inject Drugs." Washington, DC: The World Bank. doi: 10.1596/978-0-8213-9776-3. License: Creative Commons Attribution CC BY 3.0.

19. Stover, J., L. Bollinger, K. Cooper-Arnold. 2001. "Goals Model for Estimating the Effects of Resource Allocation Decisions on the Achievement of Goals of the HIV/AIDS Strategic Plan." Washington DC: Futures Group.

20. Futures Institute. 2012. Spectrum - Policy projection modeling tool. Version 4.47 Beta 19.

21. Donnell D., J. M. Baeten, J. Kiarie, K. K. Thomas, W. Stevens, C. R. Cohen , et al. 2010. "Heterosexual HIV-1 Transmission After Initiation of Antiretroviral Therapy: A Prospective Cohort Analysis." *The Lancet* 375:2092-2098.

22. Auvert B., D. Taljaard, E. Lagarde, J. Sobngwi-Tambekou, R. Sitta, A. Puren. 2005. "Randomized, Controlled Intervention Trial of Male Circumcision for Reduction of HIV Infection Risk: The ANRS 1265 Trial." *PLoS Medicine* 2:e298.

23. Interregional Academy of Personnel Management. 2012. "Value Orientations of Modern Ukrainian Young People in the Area of Sexual and Family and Marital Relations." Kyiv: Social Monitoring Centre, Interregional Academy of Personnel Management.

24. IHRA. 2012. *The Global State of Harm Reduction 2012: Towards an Integrated Response*. London, UK: International Harm Reduction Association (IHRA).

25. State Service. 2013. National AIDS Program 2014–2018 Costing Data. Kiev: State Service for Socially Dangerous Diseases (UCDC), Ministry of Health, Ukraine.

26. Salyuk T. 2013. Personal communication, December 2013. International HIV/AIDS Alliance Ukraine. Kyiv.

27. WHO, UNODC, UNAIDS. 2013. *Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users*, 2012 revision. Geneva: World Health Organization, UNODC, UNAIDS.

28. Alistar S. S., D. K. Owens, M. L. Brandeau. 2011. "Effectiveness and Cost Effectiveness of Expanding Harm Reduction and Antiretroviral Therapy in a Mixed HIV Epidemic: A Modeling Analysis for Ukraine." *PLoS Medicine*, 8:e1000423.

29. Stover J., R. McKinnon, B. Winfrey. 2010. "Spectrum: A Model Platform for Linking Maternal and Child Survival Interventions with AIDS, Family Planning and Demographic Projections." *International Journal of Epidemiology*, 39:i7-i10.

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