

The Economic Impact of HIV and AIDS in Russia

Current Trends and Perspectives

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Accounting for some 70% of officially registered cases in Eastern Europe and Central Asia, the Russian Federation has witnessed one of the fastest growing HIV epidemics in the world in recent years (UNAIDS, 2004, p. 48). The purpose of this chapter is to provide an overview of current trends and perspectives in estimating the potential impact that HIV and AIDS may have on the Russian economy. Such analysis is crucial in framing public decision-making concerning resource allocation and policy interventions and placing HIV and AIDS as a national priority.

We approach this task beginning with a brief update on the status of the HIV and AIDS epidemic and key demographic and socio-economic contextual factors. We then review the state of knowledge of the links between HIV and AIDS and the economy. This is followed by a synthesis of existing research and modeling, including methodology and results, on postulated demographic and economic impacts of HIV and AIDS in the Russian Federation. Models from the World Bank, the United Nations Development Programme (UNDP), the International Labor Organisation (ILO), and the Imperial

College London, among others, are discussed. We end with conclusions drawn from existing research and current trends, and propose directions for future research.

HIV and Health in Russia

Other chapters in this volume will investigate the nature of HIV and AIDS in Eurasia in considerable detail. This section will therefore be limited to a brief discussion of concepts necessary for understanding the rest of this chapter.

Russia has experienced an explosive spread of HIV within its borders in less than a decade. Though official sources place the current number of registered HIV cases at 331,599 (Russia Federal AIDS Center, 2005), this statistic by definition represents only a minimum boundary with a significant majority of the population remaining untested (Ruhl, Pokrovsky and Vinogradov, 2002). Expert consensus estimates the actual total number of cases to be much higher, with the UNAIDS middle-range estimate from two years ago at over 860,000 adults infected with HIV (UNAIDS, 2004, p. 48). Holding true to global experience, the overwhelming majority of cases are found among adults aged 15-49, the segment most responsible for generating economic activity. Nearly 70% of registered cases are clustered in the ten regions that comprise Russia's most active economic centers (Russia Federal AIDS Center, 2004, pp. 20-21). Similar to epidemics in North America, Europe, Eastern Europe and the other CIS countries, HIV remains largely concentrated among "high-risk groups," primarily injecting drug users (IDU), who, despite a slowly declining share since 2000, may still account for up to 70% of new infections (Feshbach, 2005, p.16).

With an estimated adult (age 15-49) prevalence level exceeding 1%, Russia may have already passed this widely held “tipping point” beyond which it is believed generalization becomes ever more likely. Despite the continued spread among “high-risk” groups, there are indeed growing indications that the epidemic may be spreading to the general population through sexual contact with bridging populations, mainly IDUs and commercial sex workers (CSW). According to John Stover of The Futures Group in a personal communication to the author, a classic IDU epidemic begins at a female-to-male ratio around 0.1, reaching 0.4 only after some 25 years, while a classic generalized epidemic rises much faster from the same baseline, peaking at 1.2 to 1.4 (that is, more women than men newly infected) within 20 years. From the rapid rise in the share of women among new infections, nearly 40% of all new cases, to a nearly four-fold increase in the share of heterosexual transmission and a five-fold growth in the number of children born to HIV positive women from 2000 to 2003, a range of indicators are signaling the real threat of a generalization in Russia (Russia Federal AIDS Center, 2004, pp. 6-9).

Official data indicate that the level of annually reported new infections has decreased significantly since reaching a peak of 88,487 in 2001 (Russia Federal AIDS Center, 2005). Caution is warranted in drawing conclusions from this apparent trend, for a number of reasons. The head of the Federal AIDS Center noted in late 2003 for example, that “the number of newly registered cases of HIV infection may be associated merely with changes in the constitution of the tested group,” as the numbers of drug users tested has fallen considerably (Pokrovsky, 2003). The fall in the number of HIV antibody tests conducted from 2002 to 2003, some 2.5 million, may indeed have a role to play in the reported drop in new HIV cases of 12,650 over the same period (Feshbach, 2005, p.

14). Further, an 11% increase in newly registered HIV cases, from 32,147 in 2004 to 35,554 in 2005, after three years of steady decline gives an admittedly imperfect proxy statistic suggesting a possible increase in HIV incidence (Russia Federal AIDS Center, 2005). In any event, even if not at the world-beating rates of a few years ago, the fact that HIV continues to spread with alarming pace remains certain.

Perhaps the most critical contextual factor for considering the economic impact of HIV and AIDS, given that AIDS impacts the economy largely through effects on its human resources, is the dramatic population decline facing Russia even without AIDS. Due to the combined ill effects of crisis levels of mortality and fertility rates that have plunged far below replacement rates, Russia is already losing nearly one million people per year (Eberstadt, 2004, annexure). Population projections from both the UN Population Division and U.S. Bureau of the Census foresee a sustained population loss over the long term (Figure 1). Indeed, President Putin linked the dual threats of population decline and AIDS for the first time in his 2002 address to the Federal Assembly.

The situation with the working age population is even more stark. The number of males aged 15-24 is set to decline by nearly half over the next 20 years in Russia, while the average 20 year old male has only a 46% chance of reaching retirement (Eberstadt, 2004, pp. 26-27). A sense of the economic context is key to understanding the relationship between working age life expectancies and economic growth.

Russia has enjoyed robust economic growth since the financial crisis of 1998, giving way to significant optimism concerning Russia's economic prospects. The President has declared that Russia will double its GDP by 2010 (Gorshkov, 2003). While

poverty levels have begun to decline since 2000, economic growth has yet to reverse major declines in health attainment and life expectancies since the end of the Soviet Union. Moreover, extreme inequality continues to push the boundaries of social cohesion.

This recent growth, initially driven by export competitiveness of the devalued ruble, has given way to significant dependence on high market prices for the dominant extractive natural resource sector. The World Bank estimates, for example, that approximately 30% to 60% of Russia's GDP growth in 2003 was due to "high" oil prices, while oil and gas alone accounted for 55% of total export revenues that year (World Bank, 2004, p.11). More recent economic data indicate that long-term economic growth expectations may be declining.

The Economics of AIDS

Analysis of the relationship between infectious disease-induced demographic shock and the economy has been applied to events dating back to the 14th century bubonic plague, where a dramatic increase in mortality rates reduced Europe's population by a third in just fifteen years (Over, 1992). The study of the economic implications of HIV and AIDS, based largely on the premise of a 'long wave' demographic shock, has evolved considerably since first gaining attention in the early 1990s. Figure 2 provides an overview of the range of variegated impact across economic unit, time and the severity of consequences, bearing in mind that all levels are part of one economic system and are therefore mutually reinforcing.

Macro, meso (sectoral) and micro-economic modeling of the implications of HIV and AIDS has been carried out for a number of countries on several continents in the past

twenty years. More recently, a handful of models addressing macro and meso impacts have been customized to the Russian Federation.

There is a growing body of research demonstrating that socio-economic factors, such as poverty, social exclusion, and broader “environmental” conditions, including social cohesion and inequality, increase the susceptibility and vulnerability of populations to HIV and AIDS (Barnett and Whiteside, 2002). The rapid socio-economic change following the collapse of communism introduced a greatly increased “risk environment” vis-à-vis the spread of HIV comprising a number of drivers including a loss in livelihoods, changes in sexual behavior and drug-taking, and dramatic increases in population mobility (UNDP, 2004a, p. 37).

A correlation between proxy variables for social cohesion and mortality has been demonstrated in attempting to explain the Russian “mortality crisis” of the 1990s (Kennedy, Kawachi and Brainerd, 1998). This dynamic may also shift relative to the age and severity of the epidemic. The inverse relationship between educational attainment and susceptibility to HIV infection, for example, becomes increasingly prevalent as an epidemic progresses.. Those without access to information and knowledge are soon left to face “exponential growth” in HIV spread (Vandemoortele and Delamonica, 2000). With severe inequality, diverging educational attainment and growing social exclusion of particular population groups in Russia, it is instructive to consider the relationship between socio-economic factors and the spread of HIV and AIDS. It is well established, for example, that conditions such as unemployment, poverty and income disparity build the foundations for rapid HIV spread through increased migration, commercial sex work and drug trafficking (Renton et al. 2004, p.13).

In addition to overwhelming health care resources, AIDS attacks the social, economic and demographic underpinnings of human development. With over 80% of people living with HIV (PLWHA) in Russia under the age of 30 (Russian Federal AIDS Center, 2004, p. 27), HIV and AIDS targets those age cohorts that would otherwise comprise an important share of economic production and demographic reproduction. Figure 3 depicts the age density of HIV distribution, showing the disturbing concentration of HIV among young people even under the age of 25. The following transmission mechanisms spell out how the economy may be affected, with the likelihood of macro effects increasing with prevalence rates and epidemic generalization:

- *Reduction in human capital formation within, and across, generations.* Generations affected by HIV and AIDS may not be able to acquire and transfer a broad or deep human capital base, providing less skill and knowledge to the firm-level and national production function, and reducing returns to investment in human capital over time (Bell, Devarajan, and Gersbach 2003, p. 95).
- *Reduction in labor force numbers.* The firm, sector and overall economy may suffer from a decrease in the number of workers with appropriate skill sets. This both reduces national growth potential and induces firms to shift towards capital intensive production in the face a reduced supply of skilled workers.
- *Changes in population age composition.* The dependency ratio of the economy will increase, and fewer workers will have to support a relatively greater number of very young and retired persons. This harms the integrity of pension systems.

- *Reduction in labor force productivity.* As workers progress from HIV to AIDS, they become increasingly sick and unable to perform duties if not treated. Absenteeism and other effects on labor productivity make production more costly both for the firm and the overall economy. Previous research has demonstrated that a 50% loss in productivity averaged over the life-cycle from the point of developing AIDS is a reasonable estimate (Over, 1992, p. 1).
- *Increase in wages and costs.* As qualified labor becomes more scarce, wages and other costs may rise, which in turn can lead to losses in firm, sector, and national competitiveness.
- *Lower public revenues and reduced national savings (private & public).* These reductions result from decreased labor force levels and productivity, lower capital accumulation, and slower formal sector employment creation.
- *Increased public health and social protection sector financing.* Direct and indirect costs of care, treatment, and disability payments reduce public savings and places pressures on government budgets at national, regional and local levels.

Modeling the Implications of HIV and AIDS: A Russian Federation Case Study

As inaccessible as the inner mechanics may be to the layperson, models are simply a mathematical description of relationships among variables, integrating observation and theory in a proposed framework. Modeling can be applied to help our understanding of a number of complex behavioral relationships related to HIV and AIDS, from determining how the epidemic will spread, to assessing effectiveness of different interventions and the

economic implications of the epidemic. Models can be a powerful tool for advocacy (Nicholls et al., 2000, p. 25).

In response to the growing epidemic in Russia, at least three models have been developed since 2002 to help investigate the potential economic impact. We review and compare them to provide a better overall understanding of current trends and perspectives, with a fourth model currently under development introduced later. Figure 4 presents a brief description of each.

Of the many ways in which HIV and AIDS can affect the economy, demographic change is considered the principal impact channel. Analysis of economic effects therefore necessarily begins with an examination of demographic changes. This, in turn, centers on estimates of HIV incidence, prevalence and distribution within the population.

Most attempts to model these dynamics begin with a range of scenarios comprising different assumptions about the nature of the epidemic. The relative immaturity of the epidemic in Russia, coupled with a lack of knowledge about transmission dynamics, makes confident projection difficult. This is immediately obvious when considering the range of estimates produced and quoted over the last couple of years (Figure 5).

Given the discussion in preceding paragraphs, the higher-end estimates, largely derived several years ago when the rapid annual growth in reported incidence seemed likely to continue, now appear implausible. Nonetheless, as we will see below, even low to medium scenarios are sufficient to threaten demographic and economic prospects in Russia. In the interest of plausibility, we therefore exclude high-end scenarios in our comparative examination of existing economic models. Figure 6 presents the three

models with stipulated scenarios. The resulting demographic profiles, upon which economic calculations are derived, are briefly outlined in Figure 7.

We observe that these models diverge significantly in terms of prevalence projections. The World Bank “optimistic” scenario (Figure 8) yields a slightly more severe outcome than the UNDP “low” scenario. All five scenarios in the ILO model (Figure 9), however, foresee milder implications. This appears largely due to the fact that the ILO model is the most recently developed, incorporating more conservative assumptions based on the decline in growth in registered new infections observed annually from 2002.

Further, while the World Bank model employs a multiplier of four to calculate estimated total number of HIV infections as a function of registered cases, the ILO model uses three, based on the ratio of new cases overall to new cases among pregnant women. While this arguably brings greater confidence to modeling outcomes, the ILO assumptions appear exceptionally conservative as only the most extreme scenario, the “risk group saturation” scenario, corresponds to the most recent estimates of prevalence by UNAIDS: 860,000 in 2003 (UNAIDS, 2004, p. 48).

While the impact channels discussed above may be relatively straightforward, understanding the impact that HIV and AIDS may have on the economy’s dependency ratios requires a more nuanced investigation. As the ratio of pensioners or children to the number of workers in the economy increases, captured as an increase in youth or elderly dependency ratio, national savings decreases and social protection schemes are strained.

We now turn to the main focus of this chapter, estimating the potential economic implications of the HIV and AIDS epidemic in Russia. It is important to reiterate that

these are projections based in each case on a range of different, yet strict, assumptions. It is much too early in the epidemic life cycle, and the tools currently available to researchers are too limited, to speak of measuring actual impact.

The following sections examine implications across three levels: macro-economic, meso (or sectoral), and micro (or business and household), integrating the results of modeling discussed above as appropriate. We conclude with a synthesis of these issues vis-à-vis the broader concept of human development in the Russian Federation. This stratified approach is necessary to capture the full scope and depth of potential consequences. While macro-economic modeling requires the greatest number of assumptions, and therefore faith in the process, it is crucial for demonstrating effects beyond the more narrow fiscal impacts on health and social systems that are more commonly discussed. Meso and micro modeling are likewise important to provide solid foundations of knowledge both to feed macro investigations and design effective sector level responses.

Macro-economic implications: As noted earlier, the demographic underpinnings of the models considered here are very different. Furthermore, the range of assumptions and parameters linking the demographic and economic spheres provide an additional dimension of individuality in each modeling approach. We therefore expect, and indeed observe, a divergence of impact profiles resulting from this process. The impact on GDP levels projected over time, however, is considerably more coherent across the three models than might be expected.

Following the logic outlined earlier, we have selected the World Bank “Optimistic” scenario, the UNDP “Low” scenario and the ILO “Risk Group Saturation” scenario for

similar reasonability. In the very long term, the ILO model calculates an overall loss in GDP levels of approximately 5.3%, the UNDP model 6%, and the World Bank model 10% (Figure 10).

The World Bank model further projects that investment declines of over 2% by 2010 and over 9% by 2020 would exceed those of production, predicting slower growth in the long term. Indeed, both the World Bank and UNDP models find long-term annual growth rates reduced significantly by 2020, up to 1% and 0.5% respectively, as the economy's productive potential is curtailed.¹ For perspective, the average annual growth rate of Russia's fellow G8 countries, to which it would theoretically converge over the long term, was only 1.5% in 2003 (World Bank, 2005c).

Thus, all three studies bear out the central thesis of HIV and AIDS impact channels: by increasing morbidity and mortality among the economy's most productive age groups, while at the same time driving up health and social protection costs associated with treatment and care, HIV and AIDS can lower economic growth and exacerbate existing challenges to national health provision and social protection.

A rigorous analysis must, of course, consider a number of additional dimensions. For example, per-capita effects are less clear and depend on a number of modeling assumptions, including the relative prevalence among skilled and non-skilled labor and the share of HIV and AIDS financing from public and private savings (World Bank, 2003, p. 61). Further, calibration of the Bank model shows that results are most sensitive to four key parameters: population growth, growth in the population of drug users, HIV transmission rates and the estimated multiplier of registered to non-registered HIV cases (Ruhl et al., 2002, p. 4).

Given the long-term horizon required for macro-economic modeling, from 15 to 50 years, it is often difficult to compete with short-term challenges vying for the attention of decision makers. It is therefore useful to complement these efforts with meso and micro-economic analysis that bring a shorter horizon into focus.

Meso-economic/sectoral implications: Though HIV and AIDS impacts cut across all sectors, the most immediately visible sectoral impacts are in the health and social protection sectors. Growing evidence also points towards the potential for industry-level implications in Russia.

The full impact of an HIV and AIDS epidemic on the health sector in Russia is difficult to overestimate as the very system itself is strained to provide adequate testing, counseling, treatment, and care to a rapidly growing population of PLWHA. An investigation of the systemic ramifications is beyond the scope of this chapter.

Calculating direct costs associated with basic care, treatment of co-infections and antiretroviral therapy (ART) is readily modeled and provides a basis for analysis. In the World Bank author-derived scenarios, for example, annual ART per patient cost is estimated at \$9,000. While efforts to reduce prices in Russia are well underway, a recent study by the Clinton Foundation found that the Russian government still pays over \$7,000 per patient, per year to procure combination ARVs (World Bank, 2005a , p. 14).

While it is likely that prices will fall considerably in the coming years, this has yet to be achieved in practice and must go much further to optimize the cost-benefit ratio of treatment provision. Leaving human cost aside for the moment, the World Bank model argues that budgetary impacts are so severe that only “hypothetically low” cost levels of under \$500 per patient per year (already attained for many developing countries) will

bring the economic benefits derived from ARV provision in balance with the fiscal resources consumed, assuming broad coverage. The importance of securing affordable prices and ensuring capable delivery systems as the number of people in need of ART rises dramatically each year in Russia, from an estimated 100,000 people today to nearly 500,000 by 2010, cannot be overestimated (WHO, 2004). The urgency becomes clear when considering that only 3,000 people at most are currently receiving ART through the public health service (Federal AIDS Center, 2004).

The ILO model, again based on far more conservative assumptions, confirms the potential for serious budgetary consequences (Figure 11). HIV and AIDS medical care alone would consume from a quarter to nearly one half of a percent of GDP annually for many years, while total annual health budget for the country is approximately five percent of GDP (WHO, 2001).

There are a range of additional fiscal considerations directly related to HIV and AIDS. Most notable is the financing of social disability benefits and additional strains on the pension system. While all three models incorporate some aspect of social disability financing, the ILO model was designed as a policy tool specifically for evaluating the impact of HIV and AIDS on social policy. We therefore take advantage of this enhanced sensitivity, combining several perspectives in one frame. Figure 12 takes the “risk group saturation” scenario, as discussed above, comparing changes in three key indicators: short-term disability benefit costs; the pension dependency ratio; and the affordable replacement ratio.² From this graph, it is possible to discern significant and sustained AIDS-induced strains on Russia’s social policy mechanisms. Short-term disability benefit costs rise from an immediate 7% increase to nearly 13% additional burden for over five

years from 2005 through 2010 and remaining over 10% higher for decades. The pension system is equally stressed, with the dependency ratio and affordable replacement ratio moving inversely, reflecting a significant weakening of pension system viability. Even within the next decade, Russia will employ only four workers for every three dependents (World Bank, 2003, p. 70).

It is instructive at this point to take an even closer look, disaggregating the dependency ratio into its two constituent age groups: youth and elderly dependency. Figure 13, from the UNDP model, demonstrates the stylized nature of Russian demographic dynamics. In the “Medium AIDS” scenario, youth dependency is falling and remains relatively low due to sub-replacement fertility rates. Elderly dependency rates, however, move in the opposite direction. This dynamic is exacerbated once the effects of the stipulated AIDS epidemic begin to thin out the working population.

When examining industry-level impact, one must first observe that Russia remains heavily dependent on oil and gas extraction, accounting for 21.4% of GDP and exports equaling a fifth of GDP (World Bank, 2004a, p. 1). Some studies have suggested that lower and middle-income countries dependent on extractive industries are especially vulnerable to the stylized threat of HIV and AIDS (Futures Group, 1999, p. 6). Labor associated with these industries tends to have a relatively high risk profile, with commercial sex work playing a key bridging function.

Indeed, disaggregating data to the regional level demonstrates that high HIV prevalence and intensive natural resource extraction activity often co-exist. Take, for example, Khanty-Mansi and Irkutsk, two regions with major oil, gas and gold industries. Both feature prevalence rates more than three times the national average (Mikkelsen,

2003) with more than half of all newly registered cases of HIV arising from heterosexual transmission (Pokrovsky, 2003). Extreme adult prevalence rates of 5% to 8% are reported in multiple mining and heavy industrial cities due largely to “a high rate of IDU among young industrial workers” (Feshbach, 2005, p. 39).

Of the models under consideration, only the UNDP model analyzes potential effects at the industry level, employing a computable general equilibrium model with 35 productive sectors. Results indicate that the extractive industries may be especially sensitive to the AIDS induced shock to human capital supply. This is especially evident in the long run as parameters are adjusted to simulate greater capital mobility in an “open economy” scenario (Sharp, 2004a, p. 89). This finding comes as Russia seeks WTO accession and further opening of its economy. The effects of HIV and AIDS on Russia’s labor force and health care budgets may present “serious counter-weights to energy-driven economic growth” (National Intelligence Council, 2002, p. 24).

Micro-economic implications: As outlined above, it is increasingly clear that HIV and AIDS is a serious issue for both policy makers and business managers alike. The response, however, is mixed. A recent survey conducted among human resource managers at 137 Russian and international companies operating in Russia found that nearly 60% of all respondents were not concerned about potential impact on their company’s profit through 2010, with only 7% reporting HIV and AIDS workplace programs and only one company with a policy concerning employees living with HIV (TPAA, 2005a, p. 5). Due to the slow-onset nature of the epidemic, the timing of AIDS cost realization helps explain why, unless properly discounting the sums of all future HIV and AIDS associated costs, managers may not be aware of the problem until AIDS-

induced absenteeism, disability and deaths are experienced – at which point the opportunity for optimal prevention has long passed (Rosen et al., 2003, p. 9). Considering that the vast majority of HIV cases in Russia have been registered only within the past five years, Russian companies may in fact employ many people in the asymptomatic stages without even being aware of the AIDS crisis that looms just around the corner.

There are indications, however, that the business community is beginning to wake up to the threat of HIV and AIDS. A handful of large Russian companies, including AvtoVaz and Wimm-Bill-Dann, and industry groups such as the Russian Union of Industrialists and Entrepreneurs (RSPP) have joined the effort to introduce comprehensive workplace policies and programs and to promote corporate social responsibility approaches to HIV and AIDS. The second annual “Russian Business Summit on AIDS” featured unprecedented levels of representation from government and business leaders. Alexander Zhukov, Deputy Prime Minister of the Russian Federation, emphasized that in the face of demographic decline, HIV and AIDS “has become an issue of strategic, social and economic security of the country” (TPAA, 2005b).

Other than the individual, the household is the economic unit most directly affected by HIV and AIDS. At the same time, households are relatively difficult to model. Evidence from other countries suggests significant impacts. AIDS-affected households in Thailand consume on average approximately six months of total household income on out-of-pocket HIV and AIDS medical care (Pitayanon, Kongsin, and Janjareon, 1997, p.11). Foregone earnings, however, constitute the greatest loss to households as wage earners are struck down in their prime productive years (World Bank, 2003, p. 73).

There is to date a lack of evidence addressing household impacts in Russia. Nonetheless, this level is particularly relevant in a country where a male mortality crisis and ballooning divorce rates have been straining the Russian household “even before the AIDS epidemic gathers force” (UNDP, 2004a, p. 43). A study currently under way by the Imperial College of London will seek to help fill this gap through economic modeling based on household surveys.

Implications for Human Development

“The basic purpose of development is to enlarge people's choices...People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more secure livelihoods...The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives.”

Mahbub ul Haq

As eloquently stated by the economist Dr. Mahbub ul Haq, founder of the Human Development Index (HDI), human development proposes a holistic understanding of development that defies narrow metrics. A composite index, the HDI was developed therefore not to define human development, but to provide a “powerful alternative to income as the summary measure of human well-being.” Three fundamental dimensions of human development are constructed through proxy constituents: a “long and healthy life” described by life expectancy, “knowledge” described by literacy rates and school

enrollment ratios, and a “decent standard of living,” described by GDP per capita (UNDP, 2004b, p. 137).

It therefore follows that we come to human development last, as an aggregate of all levels of impact considered to this point. Our modeling offers insights into two of the three impact channels comprising the HDI: life expectancy and GDP per capita. We have already examined the potential economic impact in Russia, but a generalized HIV and AIDS epidemic could significantly alter life expectancy profiles as well. Figure 14 demonstrates that, under the UNDP “medium AIDS” scenario, life expectancy could be reduced by nearly a decade. Even with a stipulated adult HIV prevalence of 2%, nearly all projected improvements in life expectancy for Russia through 2025 would be lost (Eberstadt, 2004, p. 24). What sort of impact might this have on HDI attainment?

Figure 15 demonstrates that hard-earned HDI gains might be rapidly eroded through falling life expectancy alone. A ten-year loss, in line with the “medium scenario,” could shrink Russia’s HDI by over 7%, all else equal. To place this in perspective, the HDI in Russia fell 5.8% from 1985 to 1995 during a period that witnessed both the collapse of Soviet economy and political system and the astonishing “Russian mortality crisis” of the early to mid 1990s (UNDP 2001, p. 146). Given the demonstrated association of approximately 8% between each additional year of male life expectancy and gross national income, falling life expectancy could also diminish economic growth, reducing the HDI even further (Eberstadt, 2004, p. 25). Indeed, the “long wave event of transition is now superimposed by another long wave event – an HIV/AIDS epidemic” (Barnett, 2003, p. 417).

Conclusion

We have examined in the preceding pages a range of issues related to the potential economic impact of HIV and AIDS in Russia. From households, to firms, industries and the macro-economy, no level will be spared if urgent and effective responses are not taken. We must keep in mind that while mathematical modeling is an imperfect exercise in which the value of outcomes depends greatly on the quality of inputs and assumptions made, policy decisions benefit greatly from the discipline imposed by the modeling process. In Russia, models have helped gain the attention of decision-makers, free the discussion of HIV and AIDS from emotive, value-laden language in favor of objective and disciplined analysis, and demonstrate that HIV and AIDS is a cross-cutting development issue that cannot be limited only to concerns of health policy (Sharp, 2004b p. 1).

It is often said that Russia still enjoys a “window of opportunity,” given the long-wave nature of HIV and AIDS. While prevalence is low relative to potential, preventive action can alter the course of the future epidemic and avoid the large scale disaster currently experienced in a number of countries. While it is now too late to speak of avoiding a crisis entirely, our investigation demonstrates that the case for decisive action remains as clear and urgent as ever. Figure 16 demonstrates just how profitable early preventive action could still be, applying a standard cost-benefit analysis. Evidence-based approaches, including “harm-reduction” programs, provide high returns on resource investment. A comprehensive study of needle and syringe exchange programs in Russia suggests that such approaches require just \$564 per HIV case averted (Rhodes, et al., 2004, p. 11) as opposed to \$7,000 per patient, per year, for ART alone.

But with each year that passes, this window of opportunity fades and the terms become more stark. Had Russia made, for example, a \$90 million one-time investment in the early 1990s, followed by annual expenditures of some \$9-10 million, HIV incidence may have been reduced by up to 70%, with ART available to all those in need (ILO, 2004, p. 12). There is a Russian proverb that gives straightforward advice in such a situation: 'strike while the iron is hot.' Clearly the time to strike is now.¹

Future Research

The modeling efforts discussed in this chapter have made important contributions in establishing a framework for understanding the potential implications of HIV and AIDS in Russia and placing the issue in perspective among other competing policy objectives. Nonetheless, this generation of modeling has relied to a great extent on assumptions rather than empirical evidence for parameter construction. Further, linkages between behavior, epidemiology and economic implications at micro-levels have been stipulated exogenously due to a lack of data on these complex relationships.

One effort underway to address this gap is the Knowledge for Action in HIV/AIDS in the Russian Federation project. The Imperial College London is developing a system of models that will bring a new level of rigor to the advocacy potential of modeling. A survey-based behavioral model, epidemiological HIV transmission model, and micro-economic model will be linked to capture a more realistic expression of endogeneity and inferences about the effectiveness of policy interventions for advocacy. The Knowledge

¹ Authors note: since the time of this writing, the Russian government has announced welcome plans for dramatic growth in federal HIV/AIDS budgets, beginning with a twenty-fold rise in 2006 to \$104 million from some \$4.5 million in 2005 (RIA Novosti, 2005). Efforts to reduce ARV prices and promote evidence-based public health approaches will remain critical to ensure effective outreach and efficient use of these additional resources.

Program aims to bring these components together to form the first comprehensive integrated modeling system to inform policy and advocacy efforts in Russia (Imperial College, 2005). With these and similar efforts, Russia can take advantage of a rigorous evidence base sufficient to identify and communicate the most effective policy responses to HIV and AIDS.

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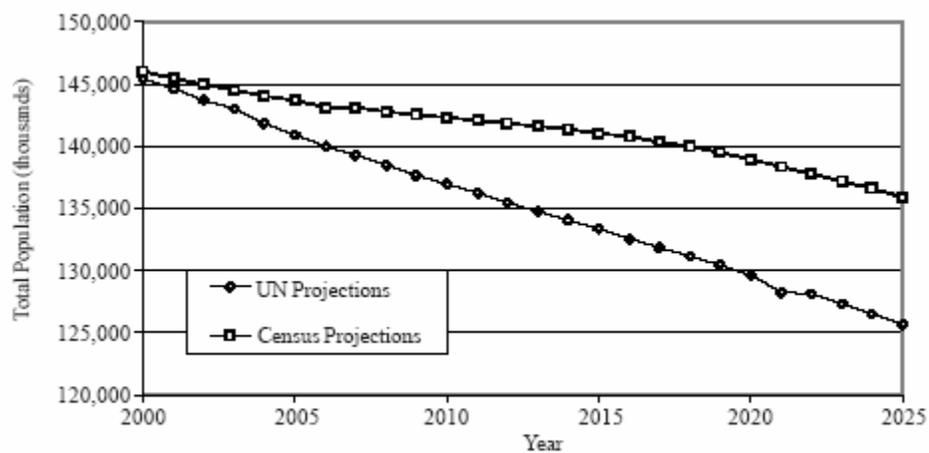
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Figure 1

Russian Population Projections in the Absence of HIV/AIDS

Source: Eberstadt N. 2004 p.35



Sources: U.S. Bureau of the Census, International Database; United Nations Population Division, *World Population Prospects: The 2002 Revision*.

Figure 2

Levels of Impact of Infectious Disease

Source: Barnett and Whiteside, 2002

Table 2: Understanding economic and social impact by level, time and degree			
Level of impact	Time of impact	Degree of impact	Does evidence exist that it happens?
Individual	Early (immediate)	Always severe; variation by age and gender; physical and social (stigma and discrimination).	Yes: death and illness.
Household	Early, middle (1-5 years) and late (10 years and beyond/ intergenerational for households)	Severe emotional, variable financial depending on socio-economic status, gender, ethnicity and other social variables.	Yes: household studies. Orphans and the elderly especially affected.
Community	Early, middle and late	Variable: dependent on scale, and resource base of community. Likely to be long term and profound but not necessarily readily visible.	Yes: services for orphans and the elderly, and local service provision, affected.
Production unit/ Institution	Middle and late	Variable: dependent on the nature of an organisation or institution's activities, or type of production, labour mix.	Yes: firm/ organisational surveys.
Sector	Late	Variable: dependent on location, production, use of labour, and sensitivity to investor sentiment	Yes, some evidence but limited.
National/ Macro	Late	Economic and demographic projections indicate possibility of significant aggregate impact in a generalised epidemic scenario.	Not yet: analysis based on economic and demographic models, with anecdotal evidence about the effects on government infrastructure.

Source: Barnett and Whiteside, 2002.

Figure 3

Age Density of HIV Infection in Russia at the end of 2002

Source: ILO, 2004 (model output)

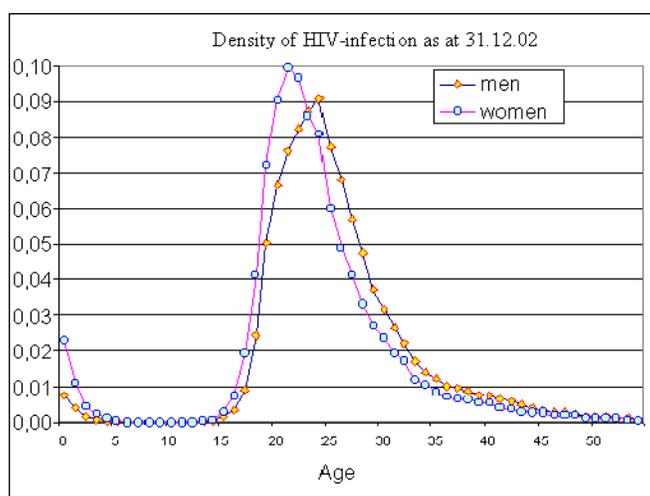


Figure 4

Existing Models of the Economic Impact of HIV/AIDS in Russia

Sources: Ruhl et al., 2002; Sharp, 2004 (a); ILO, 2004

Model	Brief Description
World Bank	Launched May, 2002. Designed as an interactive model with user interface. Model comprises 26 input parameters (17 user-defined) and 10 output variables (human & economic cost) with a forecasting period through 2050. Disability and health care benefits are modeled. Two author derived scenarios (optimistic and pessimistic). See references for more details.
UNDP	Launched February, 2004 (adaptation of Sharp, 2002). Comprises 2 aggregative growth models (Solow & Ramsey, with 40 year horizons) and a CGE model based on a World Bank Russian social accounting matrix (35 sectors, with a 20 year horizon). Demographics calculated exogenously using DemProj/AIMS, with 5 year age cohorts. Health care (excluding ART) and disability benefits are modeled. Three scenarios (low, medium and high AIDS). See references for more details.
ILO	Launched late 2004. Demographic, epidemiological and economic projects exogenously determined in a partial equilibrium environment to assess changes in population and economically active cohorts, changes in employment and GDP, financial sustainability of the pension fund, costs associated with disability benefits and health care expenditures. 5 scenarios. See references for more details.

Figure 5

External Sources' Prognoses of HIV Prevalence in Russia, 2005 through 2050

Source: Feshbach, 2005, p. 40

Year	Prognosis	Source
2005	5 million	Rian van de Braak, AIDS Foundation East-West
2007	2-3% of Russians	<i>The Sunday Herald</i> , quoting Dr. Pokrovsky
2008	7 million (1 in every 25 Russians)	<i>New York Times</i>
2008	>7 million	<i>The Baltimore Sun</i>
2010	8 million AIDS cases	US National Intelligence Council
2010	Optimistic: 2.32 million Pessimistic: 5.25 million	<i>The Moscow Times</i> , quoting the World Bank
2010	8 million (over 10% of adult population)	Transatlantic Partners Against AIDS
2020	5.4-14.5 million	<i>Christian Science Monitor</i> , quoting World Bank
2025	4-19 million	Nicholas Eberstadt, <i>Foreign Affairs</i>
2045	20.7 million lives will be lost	Reuters, quoting UNDP study
2050	72 million	Voice of America, quoting UN

Figure 6

Optimistic and Mid-Range Projections of Three Models

Sources: Ruhl et al., 2002; Sharp, 2004 (a); ILO, 2004

Scenario/Model	World Bank	UNDP	ILO
Low/Optimistic	-0.2 pop growth, 5% growth in IDU, - prevalence multiplier 4 (initially 1% adult prevalence) - IDU transmission rate 2, - non-IDU transmission 0.3	1) adult prevalence reaches a maximum 3% by 2015	1) 'Decreasing infection': falls by 50% (saturation of risk group)
			2) 'Constant Infection' (i.e. reached peak in 2002)
Mid-range	No mid-range scenario (only Pessimistic, which is not considered here)	2) adult prevalence reaches a maximum 6% by 2015	3) 'Growing infection': non-linearly by 50% towards end of review period
			4) 'Saturation of the IDU risk-group' (1 million people)

Figure 7

Resulting Demographic Profiles from Three Optimistic and Mid-Range Scenarios

Sources: Ruhl et al., 2002; Sharp, 2004 (a); ILO, 2004

Scenario/Model	World Bank	UNDP	ILO
Low/Optimistic	- Mortality from 500/mo. (2005) to 21,000/mo. (2020)	- 3.48 million deaths, a 2.6% population loss by 2020, 9.58 million deaths/8.2% population loss by 2045	1) Peak HIV 636,000 by 2006, peak AIDS 255,000 by 2011. Employed labor force reduced by -0.5% (2010) and -1.4% (2050)
	- Cumulative HIV+ from 1.2 mln (2005) to 5.4 mln (2020)		2) Peak HIV 685,000 by 2007, peak AIDS 257,000 by 2012. Employed labor force is reduced by -0.5% (2010) and -2.3% (2050)
Mid-range	None (only Pessimistic – not considered)	6.9 million deaths/5.1% population loss by 2020, 16.39 million deaths/14% population loss by 2045	3) Peak HIV 699,000 by 2008, Peak AIDS 259,000 by 2012. Employed labor force reduce by -0.5% (2010) and -3% (2050)
			4) Peak HIV 1,169,000 by 2008, peak AIDS 385,000 by 2010. Employed labor force reduced -0.9% (2010) and -5.4% (2050)

Figure 8

World Bank “Optimistic” Scenario, Cumulative HIV Cases

Source: Ruhl et al., 2002 (model output)

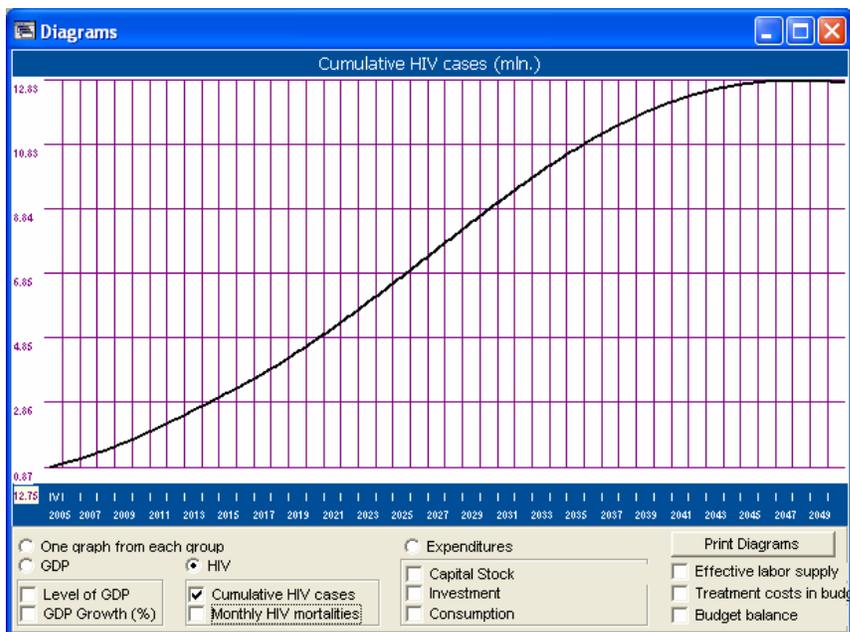


Figure 9

ILO All Scenarios, Cumulative HIV Cases

Source: ILO, 2004 (model output)

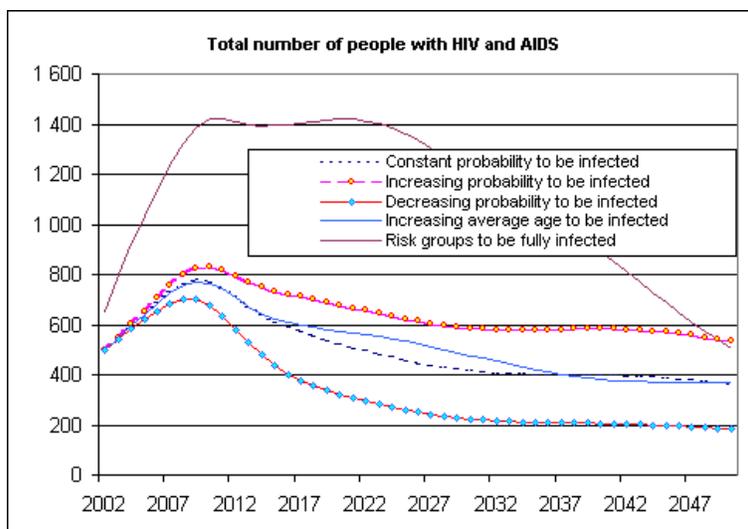


Figure 10

Impact of AIDS on GDP Levels – Three Models

Sources: (author constructed from model output) Ruhl et al., 2002; Sharp, 2004 (a); ILO, 2004

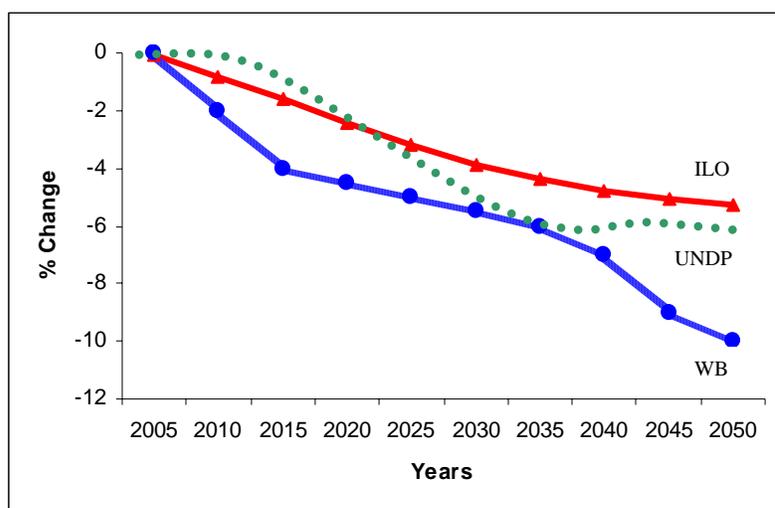


Figure 11

ILO Estimates of Medical Expenditures, All Scenarios

Source: ILO, 2004

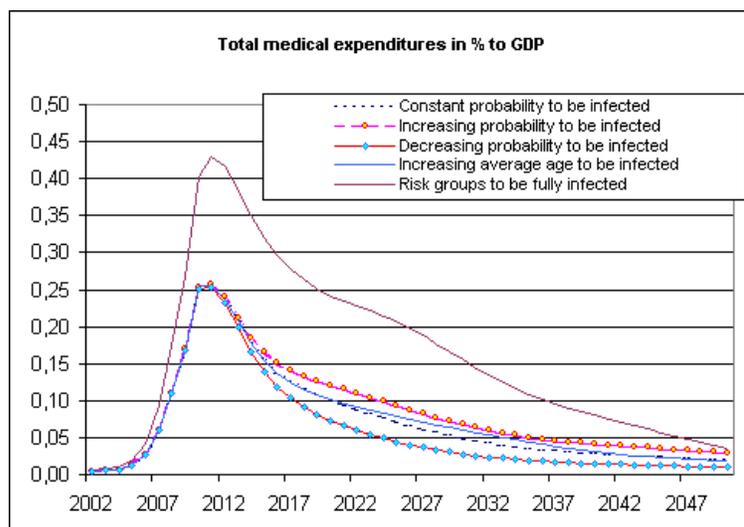


Figure 12

Social Policy Implications: ILO “Risk Group Saturation” Scenario

Source: (author constructed from model output) ILO, 2004

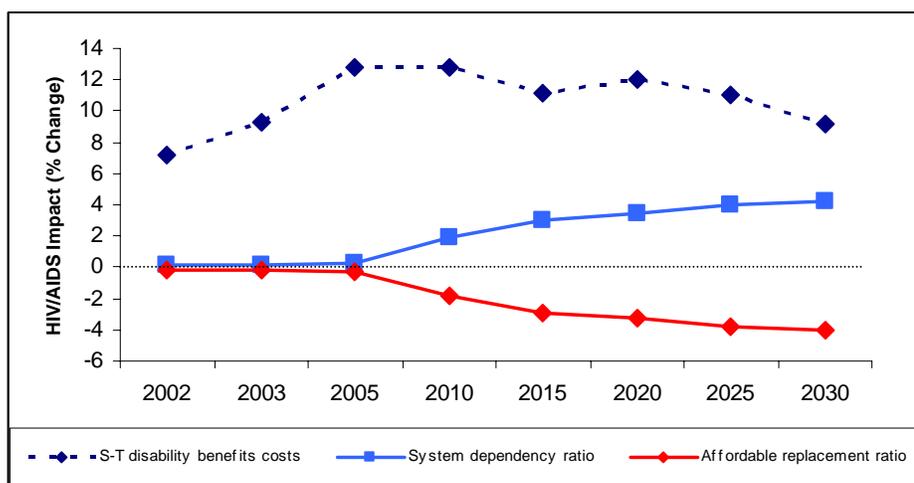


Figure 13

Russia Dependency Ratios by Age Structure

Source: UNDP 2004a, p.38

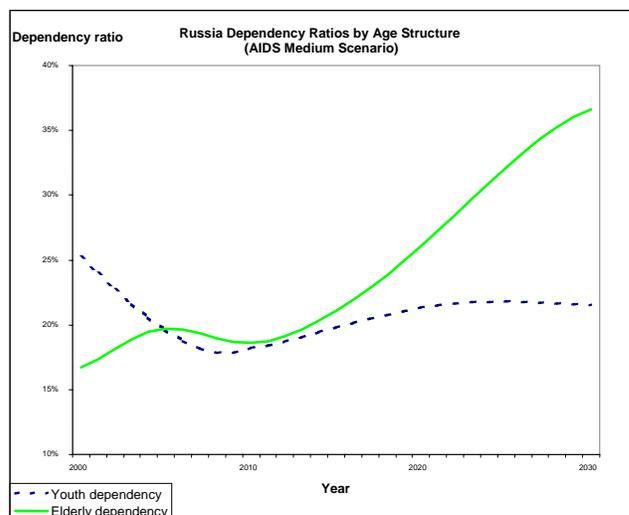


Figure 14

Impact on Life Expectancy, Medium Scenario

Source: UNDP, 2004a, p.45

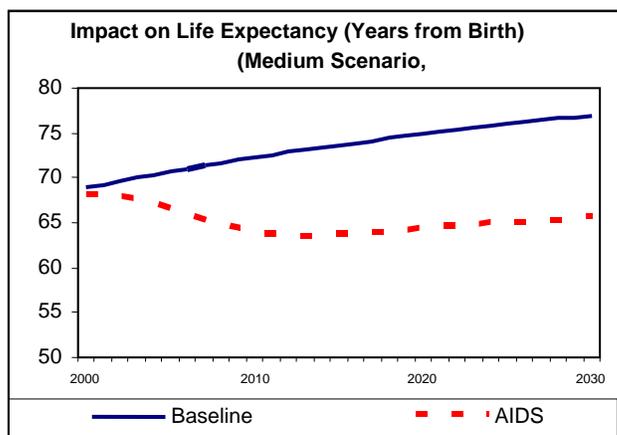


Figure 15

Effect of Declining Life Expectancy on HDI in Russia

Source: UNDP, 2004a, p. 44

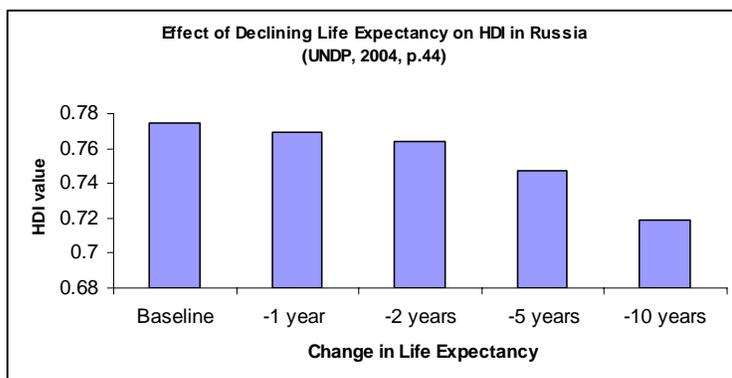
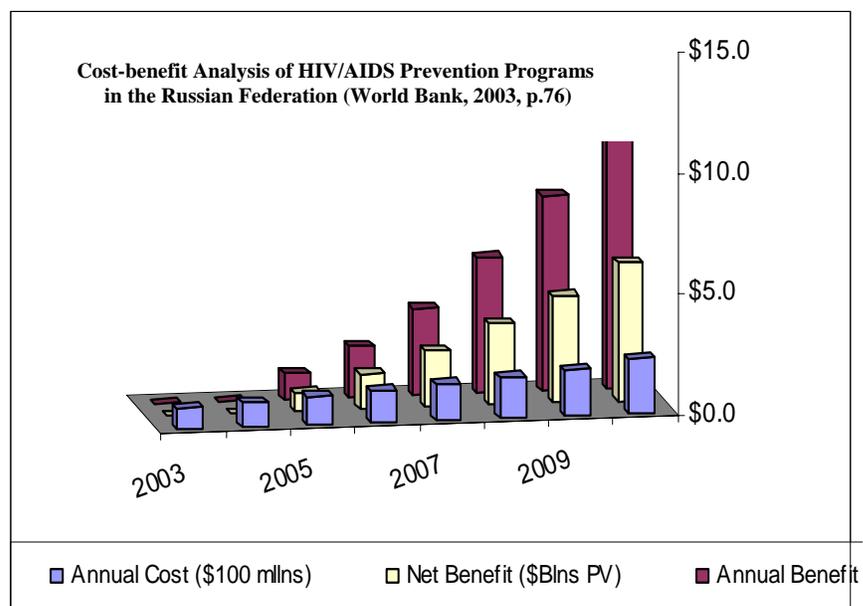


Figure 16

Cost-Benefit Analysis of HIV/AIDS Prevention Programs in the Russian Federation

Source: author constructed from World Bank 2003, p. 76



¹ The ILO reporting format does not facilitate calculating changes in long-term annual growth rates.

² These are defined (ILO, 2004, p.24) as follows: the 'short-term disability benefit cost' refers to Russian government compensation to workers with 'temporary disability' associated with HIV/AIDS (assumed to be a 20% reduction in the ability to work with HIV; 'pension dependency ratio' is the ratio of the number of employed persons to the number of people receiving pension benefits (age and disability categories); the 'affordable replacement ratio' is the ratio of the pension contribution rate to the pension dependency rate, characterizing the viability of a 'pay-as-you-go' pension system.