The Future of AIDS

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Grim toll in Russia, India, and China

HIV/AIDS is a disease at once amazingly virulent and shockingly new. Only a generation ago, it lay undetected. Yet in the past two decades, by the reckoning of the Joint UN Programme on HIV/AIDS (UNAIDS), about 65 million people have contracted the illness, and perhaps 25 million of them have already died. The affliction is almost invariably lethal: scientists do not consider a cure to be even on the horizon. For now, it looks as if AIDS could end up as the coming century's top infectious killer.

At present, the HIV/AIDS pandemic, though global, is overwhelmingly concentrated in sub-Saharan Africa. Although this situation has exacted a terrible human cost, the rest of the world has been largely unaffected by Africa's tragedy. Things will be very different, however, in the next major area of HIV infection. Eurasia (which for the purposes of this essay is considered to be the territory encompassing the continent of Asia, plus Russia) will likely be home to the largest number of HIV victims in the decades ahead. Driven by the spread of the disease in the region's three largest countries -- China, India, and Russia -- the coming Eurasian pandemic threatens to derail the economic prospects of billions and alter the global military balance. And although the devastating costs of HIV/AIDS are clear, it is unclear that much will be done to head off the looming catastrophe.

Worlds apart

Today HIV/AIDS is decimating sub-Saharan Africa. According to UNAIDS, as of late 2001 more than 28 million of the world's roughly 40 million HIV carriers lived in that region, and about 9 percent of all sub- Saharan inhabitants between the ages of 15 and 49 were HIV carriers. (In parts of the continent, the rate is far higher: adult infection exceeded 30 percent in four countries last year, and in Botswana it was near an almost unimaginable 40 percent.) UNAIDS' best guesses put AIDS- related mortality in sub-Saharan states at over two million in 2001 -- suggesting that the disease accounted for every fifth death. So far perhaps 20 million sub-Saharan people have perished in the pandemic.

Africa's AIDS catastrophe is a humanitarian disaster of world historic proportions, yet the economic and political reverberations from this crisis have been remarkably muted outside the continent itself. The explanation for this awful dissonance lies in the region's marginal status in global economics and politics. By many measures, for example, sub-Saharan Africa's contribution to the world economy is less than Switzerland's. In military affairs, no regional state, save perhaps South Africa, has the capacity to conduct overseas combat operations, and indeed sub-Saharan governments are primarily preoccupied with local troubles. The states of the region are thus not well positioned to influence events much beyond their own borders under any circumstances, good or ill -- and the cruel consequence is that the world pays them little attention.

Circumstances are rather different in the world's other area of rapidly spreading HIV infection. Eurasia is home to the great majority of the world's population; five out of every eight people on

the planet live there. It has substantial economic weight -- its combined GNP in 2000 of $15 trillion exceeded that of either the United States or Europe. Militarily, it is home to four out of five of the world's million- strong armies, and four of the seven declared nuclear states. Thus, unlike in sub-Saharan Africa, unexpected shocks there -- such as the unfolding HIV/AIDS epidemic -- will have major worldwide repercussions.

In absolute terms, HIV/AIDS is already firmly established in Eurasia. According to conventional estimates, more than 7 million of the region's inhabitants were HIV carriers in 2001. And according to those same official estimates, it took less than a decade for sub-Saharan Africa's HIV population to leap from 7 million to 25 million.

It must be emphasized that there is currently no reliable method for accurately forecasting the long-term trajectory of the HIV/AIDS pandemic. Nevertheless, the prospect of tens of millions of Eurasian HIV cases -- and AIDS deaths -- in the decades ahead is by no means fanciful. To the contrary, absent a cure or a vaccine, it is quite possible that the center of the global HIV/AIDS crisis, in terms of absolute numbers, will shift from Africa to Eurasia over the coming generation.

Despite uncertainty about the future direction of the disease, a number of basic facts are already clear. First, even without approaching the infection rate of sub-Saharan Africa, HIV/AIDS is poised to exact a staggering human toll over the next quarter-century in the region's three pivotal countries -- Russia, India, and China. Second, the economic costs of the disease in these three countries will be vastly larger than they have been in sub-Saharan Africa. Finally, given how the disease spreads, some key Eurasian populations will be harder hit than others -- and some regional governments will prove less competent than their neighbors (and competitors) in handling the crisis that ensues.

The spread of HIV/AIDS through Eurasia, in short, will assuredly qualify as a humanitarian tragedy -- but it will be much more than that. The pandemic there stands to affect, and alter, the economic potential -- and by extension, the military power -- of the region's major states. And the disease will do more damage to some big countries than to others. Over the decades ahead, in other words, HIV/AIDS is set to be a factor in the very balance of power within Eurasia -- and thus in the relationship between Eurasian states and the rest of the world.

The New Russian Roulette

To assess the implications of HIV/AIDS for Russia, India, and China in the years ahead, one must begin by getting a clear sense of the situation today. Unfortunately, the available data on HIV infection in these countries are somewhat tentative, in large part because the highest authorities in Moscow, New Delhi, and Beijing are unable (and unwilling) to monitor their respective HIV epidemics closely and continuously. Even UNAIDS figures are vetted by host governments, raising the possibility that the results have been negotiated downward. Nevertheless, thumbnail sketches of the HIV situation in each country are still possible.

By all accounts, Russia's HIV/AIDS epidemic has exploded in recent years; the only dispute is over how much. Over the past 15 years, Russian medical authorities have registered a cumulative total of about 200,000 HIV-positive patients. Independent estimates, however, are much higher -- ranging from a UNAIDS figure of 700,000 carriers in 2001 to the Russian Academy of Medicine's total of one million in mid-2002, to U.S. intelligence sources'

approximation of one to two million carriers today. These latter figures imply an infection rate two to three times that of the United States.

Although the first HIV infections within the Russian Federation occurred before the end of communist rule, the demise of the Soviet state set the stage for the disease's rapid spread. The upheavals of Russia's ongoing transition -- economic and social dislocation, increased poverty, new freedoms (including greater opportunities for geographic mobility, extramarital sex, prostitution, and drug use) -- transformed the country into a far more conducive setting for the spread of HIV/AIDS. Health authorities first noted HIV in port cities such as Kaliningrad and St. Petersburg, but the infection apparently then rapidly made its way to other urban centers, including Siberian cities such as Irkutsk. Current indications are that it is now a truly nationwide phenomenon.

Russia's HIV/AIDS epidemic can be understood by looking at those groups at highest risk. As in most Western countries, there is a homosexual component to the spread of the disease, with men who have sex with other men emerging as an identifiable vector of HIV transmission. There is also a drug-use vector, in which intravenous (iv) drug users contaminate other users or their own sexual partners. This method of transmission appears to be particularly important in Russia: current press reports, for example, suggest that Moscow alone may contain almost one million drug users, including perhaps 150,000 needle-using heroin and cocaine addicts.

The infection appears to be spreading rapidly through these populations, but the scope of an HIV/AIDS "breakout" into the general population will depend to a large degree on risk behavior in the non- drug-using heterosexual population. Although accurate figures about sexual practices are hard to procure, basic demographic data suggest that previous constraints on behavior are eroding: the proportion of out-of-wedlock births, for example, has soared since the collapse of communism. Russia has also experienced an explosive increase in the incidence of curable sexually transmitted infections: official figures point to a 33-fold jump over the course of the 1990s. (This figure should not be taken literally, owing to the unreliability of both past and present health reporting, but it is nonetheless indicative.) Beyond this, Russia's flourishing level of prostitution factors importantly in the spread of HIV/AIDS among heterosexuals, particularly due to the substantial overlap between commercial sex workers and iv drug users.

Russia's transition from communism to capitalism has also coincided with a tremendous increase in criminal activity, a trend with important implications for the future of the HIV/AIDS epidemic. One factor is the spread of behavioral risk through small-scale crime, such as prostitution and iv drug use. At least as important, however, is the Russian Federation's prison system. Currently Russia incarcerates almost one million convicts at any given moment. Public health care, however, is notably absent in the Russian penal system; prison camps are consequently virtual incubation dishes for diseases such as drug- resistant tuberculosis and HIV. Unlike under the communist-era gulag, moreover, nowadays prisoners are released on a regular basis: in 2000, about 300,000 convicts were granted liberty. Most of them head back to their native towns, and a significant proportion of these former convicts are HIV positive. Russia's prison system, in other words, functions like a carburetor for HIV -- pumping a highly concentrated variant of the infection back through the general population.

The immediate prognosis for the Russian HIV/AIDS epidemic depends largely on the preventive policies the government pursues. Unfortunately, it is only a slight caricature to say that Moscow seems to have settled on a posture of malign neglect toward the gathering problem. The

Russian government is spending only $6 million a year of its own resources on HIV/AIDS programs. That sum pales in comparison to the more than $6 billion the United States devotes each year to its HIV problem, and surreal as this may sound, the Russian total is less than a third of the $20 million that Moscow pledged just this past summer to the un's worldwide campaign against HIV. Much of the anti-HIV work in Russia today is being funded not by Russians, but by foreign nongovernmental organizations such as Medicins Sans Frontieres and George Soros' Open Society Institute.

Beyond its own seeming lack of interest in tackling HIV/AIDS, the Russian government has also prevented outside organizations from financing related health activities -- most conspicuously, World Bank- proposed programs to combat tuberculosis, a disease associated with HIV infection that is now endemic throughout the country. Further complicating the struggle is Moscow's insistence that legal authorities have access to HIV test results. People who test positive for HIV and are thought to have contracted the illness through illegal drug use are subject to prosecution. This rule creates a powerful incentive among citizens to conceal and misrepresent their HIV status -- and further fans the spread of the disease.

A tryst with disease

In India, as elsewhere, current numbers are uncertain. UNAIDS has suggested that about four million Indians were HIV positive in 2001 -- a figure that squares with New Delhi's official estimates. In August 2002, however, Health Minister Shatrughan Sinha publicly warned that the true numbers might be much higher, owing to the sketchy disease- surveillance capabilities of several large Indian states. This view is corroborated by a U.S. National Intelligence Council estimate that India has between five and eight million HIV sufferers.

HIV was first diagnosed in India in the mid-1980s. As in Russia (and in most other countries), HIV first emerged in India's urban centers; Mumbai (Bombay), Chennai (Madras), and Bangalore were among the early high-risk cities. Studies suggest that the disease has spread through two geographic pathways: first, along the main trunk roads that serve as the transport network for this enormous country, and second, along the border regions near Burma, where drug use is widespread.

Firm conclusions are difficult since epidemiological surveys (which calculate the incidence, distribution, and control of disease) are still very limited in scope and scale in India. In most of the country, moreover, people are still reluctant to discuss behavior that contributes to the spread of the disease. Homosexual sex, for instance, is an apparent vector for HIV transmission in India, but public sensibilities preclude a discussion of this factor. Drug use has also grown over the past decade, but is mostly confined to the border with Burma. Reports indicate, however, that most of the Indian HIV/AIDS epidemic today is heterosexual -- and is transmitted by commercial sex workers and commercial truckers. (Prostitution in India appears to be widespread: in the early 1990s, Indian social scientists estimated that 2 million prostitutes were at work in the country, and demand has only grown during the intervening decade.) Furthermore, if current accounts are accurate, many monogamous women in India are being infected by husbands having extramarital affairs. And given the high levels of illiteracy among women in India and the taboos concerning sexually transmitted diseases more generally, very little information seems to be available to India's adult female population about HIV risks.

The Indian government has responded to the country's HIV epidemic unevenly. New Delhi announced a National AIDS Control Program in 1987, but follow-through was haphazard and the government's own anti-AIDS organization devoted a considerable portion of its energies to arguing that outside groups were overestimating the prevalence of HIV in India. India is currently in the second phase of a ten-year government program for combating the spread of HIV. India's federal system, however, grants wide latitude to states, and these have shown varying levels of interest (and competence) in dealing with the problem. In April 2002, New Delhi announced a nationwide target of "zero ... new [HIV] infections by 2007." But barring a miracle cure, that goal is utterly fanciful -- and only raises questions about the seriousness of the effort overall.

Great leap backward

Of the three countries under consideration, the uncertainties are greatest for China. The overwhelming majority of HIV cases in the country are undocumented and untreated: as of 2001, a cumulative total of only 30,000 HIV cases had been registered. Consequently, estimates of the total current cases and the number of new cases of HIV in China rely heavily on guesswork.

In August 2001, health authorities in Beijing announced that 600,000 Chinese were HIV positive as of 2000. A little later, in July 2002, UNAIDS estimated that the total number of people living with HIV/AIDS in China was 850,000 -- a figure with which Beijing, at the time, concurred. Just two months thereafter, however, the Chinese Health Ministry raised the official estimate to one million.

Other sources suggest that the total may be even higher. (Indeed, according to some claims, the province of Henan alone might already have 1.2 million HIV carriers.) A June 2002 un report suggested that China's HIV population was between 800,000 and 1.5 million people. The U.S. intelligence community, for its part, estimates that China has one million to two million HIV carriers. Nor is this the upper boundary of informed guesswork. In June 2002, an unnamed un official told The New York Times that there could be as many as 6 million HIV cases in China today; if that claim proves accurate, China would currently have the largest HIV population of any country in the world.

Given China's enormous population, these huge HIV numbers still translate into relatively low rates of prevalence: a million HIV carriers would mean a rate of about 0.13 percent; 2 million, about 0.25 percent; and even with the astronomical figure of 6 million, China's HIV prevalence rate would be only somewhat higher than the current 0.7 percent rate in the United States. But whatever the true rate is, there can be no doubt that totals are rising swiftly. Chinese authorities and UNAIDS, for instance, both suggest that the prevalence of HIV in China has been increasing recently by about 20-30 percent per year; the U.S. Centers for Disease Control and Prevention also note that at current rates the number of victims could double in 30 months.

HIV is currently transmitted in China by three main routes: extramarital heterosexual intercourse (abetted by the ongoing expansion of China's commercial sex business), illicit iv drug use, and the sale of unsafe blood. This latter factor is in many respects particular to China and reflects the realities of China's ongoing economic transition. With the demise of the rural commune system and the attendant disintegration of public health care in the Chinese countryside, both patients and doctors needed new means of financing rural health care. One such method was

the sale of blood or plasma by impoverished farmers to pharmaceutical concerns, clinics, or unregulated agents called "blood heads." These transactions typically took place without the benefit of fresh, disposable needles. Officially encouraged through the early 1990s, this trade in blood was outlawed in 1998 -- yet it still continues.

The Chinese HIV epidemic appears to be predominantly heterosexual in nature, and the risk of HIV infection is disproportionately high among the rural poor. High-risk subpopulations include iv drug users, buyers and sellers of blood, and commercial sex workers. Larger at-risk groups may include the so-called floating population (the more than 100 million migrants from rural areas seeking opportunity on the fringes of Chinese urban life) and the "unmarriageable males" (the rising number of young men in China who, due to the country's growing gender imbalance, have no realistic prospect of finding a bride). Although epidemiological data on HIV risk factors for China are spotty, there is also no doubt that behavioral mores are rapidly changing. One telling indication is that between 1985 and 2001 the registered incidence of sexually transmitted infections in China soared by more than a hundredfold.

Until very recently, Beijing's response to the mounting HIV crisis was, at best, peripheral. Despite many warnings from public health experts, China's political leaders seem to be in denial. In September 2002, news reports revealed that the Chinese Communist Party's Central Committee had ordered a study of the nation's HIV situation (apparently the first ever such study initiated by the government). This past summer the Chinese government also began cooperation with the U.S. National Institutes of Health to monitor the epidemic. But open discussion of HIV in China is still not officially permitted. In particular, the issue of HIV-tainted blood remains taboo -- perhaps because of the regime's arguable complicity in the gathering tragedy. Research on the blood problem continues to be discouraged; activists who bring the problem up continue to be jailed. Unfortunately for the government, an epidemic cannot be censored -- and unfortunately for China, suppressing information about HIV/AIDS only makes matters worse.

The bottom line

For all the shortcomings of available information about HIV in Eurasia, several facts are clear.

First, regardless of the sources one prefers, enormous numbers of people are already infected with HIV in Russia, India, and China. If one trusts UNAIDS estimates, the total for the three countries already exceeds 5.5 million; if one prefers the U.S. intelligence community's statistics, the collective figure may be as high as 12 million.

Second, in each of these countries the continued rapid transmission of HIV is assured and is poised to "break out" into the general population. Russia and China in particular seem to have special potential "epidemiological pumps" for exposing broad segments of their populations to HIV risk -- in the former, the national prison system, and in the latter, the prevalence of HIV-tainted blood transfusions combined with the newfound mobility of the rural poor.

Finally, none of the governments in question has pursued effective public health measures to prevent the spread of HIV. To the contrary, each of these governments has taken at best a halfhearted approach to stemming the HIV epidemic. Taken together, these facts strongly suggest that the HIV/AIDS crises in Russia, India, and China are only just beginning. But how far will these crises go -- and what will be their economic and political consequences?

In seeking to predict the future course of HIV/AIDS, there is much we still do not know or understand. Although scientists have exhaustively analyzed the genetic makeup of the virus, the public health community knows far less about its spread -- the very human demographic, sociological, and behavioral factors that account for its grim progress through the world. Indeed, as The New York Times medical correspondent Lawrence Altman M.D. noted in early 2001, "HIV's toll has vastly exceeded the most pessimistic report issued earlier in the epidemic, and the misjudgment largely reflects gaps in knowledge about HIV and AIDS." For now, modeling the future of the HIV pandemic is at least as much art as science; intuition counts no less than technique.

To consider what may yet happen in Eurasia, we need to be able to explain what has already befallen sub-Saharan Africa. Twenty million deaths into Africa's AIDS catastrophe, the medical and public health literature remains curiously vague -- even euphemistic -- about exactly how HIV spread so fearsomely fast through the region. In broadest outline, however, Africa's HIV disaster is evidently due to a collision between ecological risks (prevalent malnutrition and a heavy preexisting burden of infectious diseases, both of which impair the body's ability to fight disease) and behavioral risk (more specifically, sexual transmission patterns and specific sexual practices that raise the odds of contagion).

Conversely, it is worth noting why HIV has made relatively limited inroads into the populations of wealthy Western countries. This seems to be due to their favorable "ecological" advantages (better nutrition and minimal endemic disease fortify their residents' immune systems), their particular "behaviorial" dispositions (risky practices, such as drug use and prostitution, have not proliferated catastrophically), and public health infrastructures that have successfully contained potentially lethal risk factors.

Given what is known about the ecological and behavioral HIV risks in Eurasia, it seems safe to suggest that China, India, and Russia today are susceptible to distinctly greater HIV/AIDS risks than are the aUuent Western countries -- but distinctly lower risks than those in much of sub-Saharan Africa. Where Eurasia will fall between these two poles is not yet clear, but expert opinion has already hazarded some predictions. China's health minister, Zhang Wenkang, warned last year of 10 million HIV infections by 2010; the head of UNAIDS, Peter Piot, has set the figure at 20 million. The former figure would correspond with an HIV prevalence of 1.3 percent among adults; the latter figure would suggest 2.5 percent. For India, the U.S. intelligence community has predicted 20 million to 25 million HIV carriers by 2010 -- numbers consistent with a prevalence rate of 3-4 percent. And in Russia, that country's leading AIDS authority, Dr. Vadim Pokrovsky, expects 5 million HIV sufferers by 2005, corresponding to an HIV prevalence rate of 6 percent among adults. U.S. intelligence estimates run as high as 8 million by 2010, implying a virtually sub-Saharan infection rate of 11 percent.

With these figures in mind, it is possible to map out prospective paths for HIV/AIDS in Russia, India, and China over the next quarter-century, using demographic and epidemiological modeling techniques. The assumptions behind any model drive its results -- and so any projections can only be illustrative. And from what we know about the record of past HIV/AIDS projections, no one should expect this exercise to be profoundly prescient. But such modeling can nonetheless help to clarify thinking, for it has the virtue of internal consistency.

At the risk of making eyes glaze, let me briefly review the components of this "model." After all, I do not want to seem to be pulling results out of a magical black box.

First, I needed a "baseline" to describe the expected demographic trends in the absence of HIV/AIDS: for this baseline, I chose the U.S. Census Bureau's most recent population projections for the period from 2000 to 2025 for China, India, and Russia. Then, I had to make some basic presumptions about the nature of the local HIV/AIDS epidemics themselves.1 These particular assumptions affect all subsequent calculations -- but the only truly critical one was that the epidemics would be essentially "heterosexual" in nature. (As the previous discussion showed, that view is not the least bit unrealistic.) I assumed the HIV-positive population to be one million as of 2002 in Russia, two million in China, and four million in India -- necessarily arbitrary figures, to be sure, but ones well within the range of informed assessments today.

Finally, I had to make conjectures about distinct future HIV "prevalence scenarios" for each of the three countries. That is to say, how bad would the epidemic become over time? Clearly, this was the trickiest -- and most arbitrary -- facet of the effort. I identified three "families" of scenarios for the disease, which I termed "severe," "intermediate," and "mild" -- corresponding to high, medium, and low levels of HIV infection. ("Severe" is taken here to mean adult HIV prevalence by 2025 reaching as high as 10 percent in Russia, 7 percent in India, and 5 percent in China; "intermediate," 6 percent, 5 percent, and 3.5 percent, respectively; and "mild," 2 percent, 1.5 percent, and 1.5 percent.) These different scenarios, though quite arbitrary, fall well within the expectations of informed independent observers today.

Chronicle of deaths foretold

The model lays out a series of specific and staggering implications for the spread of HIV/AIDS in Russia, China, and India.

The magnitude of infection. First, the absolute magnitude of the Eurasian HIV/AIDS epidemic over the coming quarter-century will match or exceed that of the entire worldwide HIV crisis up to now. For example, under the assumptions of even a mild epidemic, the cumulative total of new HIV cases in China, India, and Russia from 2000 to 2025 would be about 66 million, compared to UNAIDS estimates of about 65 million infected worldwide to date. The other scenarios predict even higher HIV totals: an intermediate epidemic would suggest nearly 200 million new HIV cases in the next 25 years, and a severe epidemic would lead to more than 250 million new cases (see Table 1).

The death toll. In each scenario, the cumulative death toll from AIDS over the next 25 years for Russia, China, and India vastly exceeds the total number of people killed by AIDS globally so far. UNAIDS estimates that AIDS -- from its onset to the present day -- has taken about 25 million lives. By contrast, a mild epidemic would project a cumulative total of about 43 million AIDS deaths for these three countries from 2000 to 2025. And the other projections look far worse. During an intermediate epidemic, for example, the hypothetical toll would be about 105 million, more than four times as many as have died to date (see Table 2).

On an annual basis, the numbers are equally astonishing. According to UNAIDS, the current annual aggregate death total from AIDS is about 3 million people per year. By comparison, the mild epidemic scenario suggests that Russia, India, and China would suffer a collective total of nearly 1.7 million deaths a year in 2010, and 2.3 million by 2015. In an intermediate-epidemic family of scenarios, deaths would top 3 million in 2010 and would approach 6 million in 2025.

New AIDS cases. In every scenario considered here, Russia, India, and China would each have to contend with massive numbers of new AIDS cases in the decade 2010-20. That result follows simply from the long incubation period between HIV infection and the onset of AIDS, and the large number of HIV carriers that each country is projected to accumulate between 2000 and 2015. The discussion also presumes that a cure for AIDS will not be found during this time frame.

The model's illustrative calculations, for example, suggest that China experienced "only" 30,000 new AIDS cases in 2000. By 2015, assuming just a mild epidemic, new AIDS cases in China erupt at a pace of nearly 100,000 per month. In India, the projected numbers are equally shocking. In 2000, according to these estimates, India was facing a significant burden of 100,000 new cases of AIDS a year. But even under a mild epidemic, the total would exceed one million a year in 2015, and would rise still higher for every year between 2015 and 2025 (see Table 3).

Population changes. The HIV/AIDS epidemics modeled here could significantly alter population dynamics in these Eurasian countries and might substantially reduce the future size of certain economically important population cohorts. Under the milder epidemic, for instance, the aggregate populations of India, China, and Russia would be almost 90 million lower in 2025 than Census Bureau projections (the baseline) currently anticipate (see Table 4). Worse, the cohort often labeled the "economically active" population -- persons 15 to 64 years of age -- would be about 44 million fewer than currently projected (see Table 5). Under less optimistic scenarios, the demographic impact is correspondingly greater.

In these projections, Russia is hit especially hard demographically. This trend occurs not simply because the model posits somewhat higher HIV rates for Russia than for India or China but also because Russia's population is projected to decline over the coming quarter-century -- even in the absence of any worsening of its HIV crisis. Under the conditions of even a mild epidemic, however, that decline is projected to accelerate dramatically.

Reduced life expectancy. Finally, and in some ways most portentous, all of the scenarios point to either a stagnation or a reduction in national health levels as reflected by life expectancy at birth. This decline is an inescapable arithmetic consequence of the expected surge in mortality. In many ways, the future looks bleakest for Russia. For instance, under the severe epidemic scenario, Russian life expectancy would be a full decade lower a generation hence than it is today. The projections for China and India, although not as dramatic, are still deeply troubling (see Table 6).

This modeling exercise can be faulted in a number of respects -- modeling exercises always can. What these separate scenarios commonly highlight, however, is this: reasonable, historically grounded assumptions about the future course of HIV/AIDS suggest the real possibility, and perhaps even the likelihood, of an unprecedented cost in human lives for Russia, India, and China in the years just ahead.

The economic consequences of the disease

Eurasia's HIV/AIDS epidemic will clearly have far-reaching economic ramifications in the coming decades. The number of dead, to begin with, threatens to be absolutely enormous. Furthermore, AIDS typically does not kill its victims immediately but subjects them to a

prolonged period of gradually mounting debility and incapacity. This is a period, often extending for years, during which the victim's needs grow while his or her own ability to attend to them steadily diminishes. And AIDS does not kill randomly but instead tends to strike people in their prime reproductive ages -- years that coincide in most populations with the highest rates of labor productivity. Given this combination of factors, what sort of impact can we expect an HIV/AIDS epidemic to inflict on the economies of Russia, India, and China?

This question has received surprisingly little rigorous consideration. Two decades into the epidemic, the state of economic thinking about this complex set of interactions can still be described fairly as introductory and exploratory. The emerging economic literature on the subject has identified some of the potential macroeconomic repercussions of AIDS-related illness and death. Population growth, labor supply, and savings rates all will be hurt -- indeed the more comprehensive the framework employed, the more negative the conclusions seem to be.

Even so, a number of important potential economic ramifications of an HIV/AIDS epidemic in a low-income setting have as yet received little consideration. Two in particular deserve mention here. First, by curtailing adult life spans, a widespread HIV epidemic seriously alters the calculus of investment in higher education and technical skills -- thereby undermining the local process of investment in human capital. Second, widespread HIV prevalence could affect international decisions about direct investment, technology transfer, and personnel allocation in places perceived to be of high health risk. These factors suggest that HIV breakout could have lasting economic consequences -- in effect, cutting aUicted countries off from globalization. The long-run economic impact of these effects could be even more significant than the constraints the epidemic could impose on local labor supplies or savings.

Precisely calculating the prospective economic cost of HIV/AIDS for a society would be a highly exacting task (it would essentially require figuring out how much less a population would earn due to HIV, how much more it would be obliged to devote to covering the needs of AIDS victims, and the present value of the differences in those two amounts). This exercise would require detailed data that are simply unavailable today for any country. There is, however, an extremely simple alternative approach to thinking about the possible economic implications of these HIV/AIDS epidemics, one that may promise a serviceable first approximation of the macroeconomic impact. We might call this the "health-based productivity" approach.

Modern economic development has seen an important and well-documented shift in patterns of global economic performance: a continuing move away from natural-resource-based wealth and toward wealth generated by human knowledge and skills. Put another way, "human capital" has become a predominant and increasingly important factor in overall economic potential. In modern times, this trend has made for a robust link between health and productivity at the national level. This association holds both across nations at any given point in time, and also within particular countries over time.

Naturally, these simple patterns do not capture the complexity of the health-productivity relationship, nor do they indicate causal directions. On the one hand, wealth is an instrument that helps people afford lifestyle patterns that lead to better health. On the other hand, improvements in health can boost productivity by extending potential work-life, enhancing physical capacity, and facilitating learning. Regardless of these complexities, for any country, at any point in time, life expectancy is a fairly good predictor of per capita economic output.

The health of nations

What would these HIV/AIDS projections for Russia, India, and China imply for each country's economic performance if we relied solely on a simple health-based productivity model? The answers can be computed by using World Bank data to estimate the recent (circa 1999) correspondence between national life expectancy and output per member of the "potential work force" (i.e., persons 15-64 years of age), and then combining these figures with the simulations of national life expectancy and potential work force size from the various HIV scenarios.

By this method, Russia's GNP per "person of working age" would be projected to rise by about 50 percent between 2000 and 2025 without HIV. Health-based productivity predictions, however, indicate that an HIV epidemic could radically reduce per capita productivity under any of the scenarios discussed earlier. Even with a mild epidemic, Russia's predicted output growth per working person would be less than half as great as under the "no HIV" baseline scenario. And if there was an intermediate epidemic, the predicted level of output would actually be lower in 2025 than it was in 2000.

For India, this method predicts about an 80 percent increase in GNP per working-age person over the next 25 years assuming the absence of AIDS. All of the HIV scenarios, however, would reduce that growth significantly. A milder epidemic, for example, would depress predicted growth by about two-fifths; under the intermediate epidemic scenario, output per working person would be no higher in 2025 than it is today.

China without AIDS would, by this method, experience a predicted increase in output per working-age person of more than 50 percent during the next 25 years. But even a mild epidemic would cut that growth by half -- or, to put it slightly differently, even an epidemic with a peak HIV prevalence rate of 1.5 percent would cut more than half a percentage point a year off China's long-term economic growth rate. Under an intermediate epidemic, output per working person would barely rise between 2000 and 2025. And under the most pessimistic of the scenarios, Chinese productivity over that same period would actually decline.

This method also permits the prediction of national levels of output, a set of figures that merits examination. In Russia, for instance, even though the model predicts a baseline increase of more than 50 percent in output per potential worker, national output would increase only by about 33 percent in the "no AIDS" case. This discrepancy results from the decline in the absolute number of Russians between the ages of 15 and 64. The HIV scenarios reduce Russia's future GNP not only by reducing predicted output per worker, but also by cutting the size of the 15-64 cohort. Thus, under conditions of a mild epidemic, Russia's national output would remain completely stagnant between 2000 and 2025. And under the intermediate epidemic scenario, Russia's GNP would be a shocking 40 percent lower in 2025 than it is today. Indeed, the model suggests that HIV/AIDS in Russia might, under a variety of scenarios, prevent the Russian economy from experiencing any growth in the years ahead.

For India, the model suggests that GNP absent HIV would be almost 170 percent higher in 2025 than in 2000 -- with growth driven both by a larger work force and by increasing worker productivity. Under the mild epidemic scenario, GNP would still rise substantially -- but by about a third less over that quarter-century than the "no AIDS" baseline would have predicted. If there was an intermediate epidemic, predicted GNP in 2025 would be 40 percent lower than in the

baseline scenario; national output would still grow, but growth would be cut by three-fourths over the next 25 years.

As for China, health-based predictions of economic output suggest relatively modest output growth of 80 percent between 2000 and 2025. The mild epidemic scenario would be predicted to cut that growth by more than a third; an intermediate epidemic, by much more. The more pessimistic scenarios would suggest even more dramatic economic repercussions for the Chinese economy.

Health-based predictions of future economic output are admittedly an overly simplistic measure for assessing the prospective performance of extraordinarily complex societies. Even so, health and wealth are closely connected in the modern world. To the extent that HIV/AIDS compromises national health prospects, it also compromises economic potential.

A gathering storm

In the decades ahead, the likelihood of HIV breakout into the general population in Eurasia will depend on the extent to which local Eurasian populations can avoid replicating the risk factors that led to such a breakout in sub-Saharan Africa. Fortunately, Eurasia enjoys some ecological protections that sub-Saharan Africa lacks. Nutrition in India, China, and Russia is generally superior to that in sub-Saharan states, and the burden of endemic disease is also distinctly lower. With respect to behavioral risks, we know very much less about the situation in China, India, and Russia than we would like. Sexual transmission patterns, the prevalence of risky sexual practices, and the extent of other dangerous practices (such as iv drug use) will do much to determine the future trajectory of the HIV/AIDS epidemic in these three countries. Amazingly, neither local nor international health studies have examined in any sustained manner these potentially deadly risk factors.

Despite the limits of our knowledge, available information suggests that major HIV epidemics are already underway in China, India, and Russia, and that local social mores and behavioral practices are set to further spread the disease. The precise trajectory that HIV/AIDS will follow in these three countries cannot be foretold at this time. But as the hypothetical scenarios show, even fairly mild epidemics (by sub- Saharan standards) could have a tremendous impact on long-term health and mortality trends in all of these countries. Indeed, China, India, and Russia together could experience more HIV infections and AIDS deaths over the coming quarter-century than the entire planet has thus far.

From a purely ecological standpoint (that is, focusing on nutrition and endemic disease), India probably stands a greater risk today than either Russia or China for an HIV/AIDS breakout. Yet in the simulations, the country whose economic prospects seemed most threatened by the disease was Russia. Two factors largely account for this result: the country's poor health performance, entirely irrespective of HIV, and, relatedly, the country's prospect for long- term population decline. In HIV/AIDS scenarios well within the realm of current informed expectations, Russia's economy 25 years hence might be no larger than it is today. In a world characterized by general economic growth, such a result would only increase Russia's marginalization both within the world economy and on the world stage.

But Russia's limited future economic prospects seem to be established already by a host of other factors that have nothing to do with HIV. From a geopolitical standpoint, then, the most

pertinent question is whether the unfolding HIV/AIDS epidemics in China and India will be sufficiently powerful to alter the future economic or political balance between these two rising and ambitious states. To judge by these simulations, it is possible that HIV/AIDS could play such a role in the years ahead -- and again, relying on these simulations, the balance of risks presently appears to weigh more heavily against India than against China.

On the other hand, and somewhat paradoxically, China may have more difficulty mounting an effective response to an emerging HIV crisis than would either Russia or India. The reasons have to do with constraints on anti-HIV/AIDS policies in China. In contemporary Eurasia, perhaps the most successful HIV-control campaign thus far has been Thailand's. The Thai campaign relied on cooperation between the government and civil society to educate the public about HIV and to intervene with high-risk groups. Analyses of the program by the World Bank and other groups have stressed the value of civil-society participation, as well as the importance of popular trust in the government in lending credibility to the state's massive public education effort. Whether China could replicate Thailand's approach is by no means clear. A public health campaign premised on the independence of nonstate actors and the population's confidence in its government could be rather more difficult for Beijing.

Even without these constraints, the prospects of a Thai-style campaign doing much for Russia or India still look grim. When Thailand inaugurated its muscular anti-HIV campaign, adult HIV prevalence was lower there than it is today in Russia and India. And even after Thailand's policies went into effect, the estimated number of HIV carriers more than doubled over the subsequent decade -- the grim arithmetic of the disease being that newly diagnosed infections will add to the patient pool for some time, even if an effective program is diminishing the stream of newcomers.

Eurasian states' responses to their respective HIV crises may also be circumscribed by economic considerations. For now, the most effective medical intervention for prolonging HIV patients' lives is the complex "drug cocktail" of anti-retroviral drugs. It is true that many people with HIV in the advanced industrialized West have been given a new lease on life by taking these drugs, and that this has made the disease less of a life sentence than it was before. The problem with thinking that this advance represents a solution to the developing world's HIV/AIDS problems, however, is that the cocktail is extremely costly -- typically $15,000 or more per patient per year. Even the generic versions of the drugs, a year's supply of which can be manufactured for $600, are not affordable by most countries for most of their people with AIDS. And even if they had the money, the unfortunate fact is that they would probably not spend it on this cause, because the cost of distributing the treatment (even assuming that the drugs were given away free) would often be more than the economic value to governments of the lives thus saved. The tragic truth is that until some kind of actual cure is discovered, most people with HIV/AIDS in the developing world are essentially doomed.

Despite this awful reality, there are still things states can do to at least contain the risk of contagion within their populations. Governments can competently monitor the spread of the disease and warn their citizens accordingly. They can engage in public education campaigns to apprise their people of the deadly risks they face with HIV, urging them to alter specific behaviors. They can attend to the explosion of curable sexually transmitted infections, since these have proved to be a leading indicator for HIV transmission. And they can intervene with groups at high risk of HIV to encourage lifestyles that will court fewer dangers. But governments in Eurasia are not yet doing enough of these things.

HIV in the region may be likened to a gathering tempest, and the governments in Moscow, New Delhi, and Beijing to captains of vessels in its path. The storm, already within sight and rapidly advancing, is enormously powerful and capable of untold tragedy and destruction. From the captain's deck, however, officers continue to regard the approaching squall with curious detachment, unconcerned about its implications for their ship. When they come to their senses, the tempest will be even nearer than it is now -- and they may discover that their ability to navigate out of harm's way is more limited than they would have supposed.

For the technically inclined, I assumed that 1) each epidemic got underway around 1985; 2) in each country, the median incubation period for HIV carriers between infection with HIV and the onset of AIDS is nine years; 3) life expectancy after the onset of AIDS averages two years; and 4) HIV epidemics in Russia, China, and India are all subject to the "standard heterosexual" distribution between the sexes and over age groups that has been witnessed in other low-income countries (especially those of sub-Saharan Africa). For computing demographic and epidemiological results, I selected the spectrum software package developed by the Futures Group International for the U.S. Agency for International Development.

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