10

Impact of the HIV/AIDS Epidemic on the Health Sectors of Developing Countries

MEAD OVER

Any discussion of the impact of acquired immune deficiency syndrome (AIDS) on health care systems must distinguish between treatment of the opportunistic illnesses associated with AIDS and treatment directed at the underlying cause, namely, the human immunodeficiency virus (HIV). Treatment of opportunistic illnesses can alleviate suffering but typically extends life by only months. Treatment that controls the HIV in the patient's body, called antiretroviral therapy or ART, can be much more successful, adding years to life expectancy.

Before 2001 the annual cost of a three-drug combination ART regimen for a patient in a poor country was approximately $10,000 to $25,000. Only a few of the richest developing countries, such as Brazil and Thailand, could attempt to finance ART for their AIDS patients. In most developing countries the only patients receiving ART were the very rich or those who had access to rationed, low-price supplies through a variety of pilot or research projects. Most other patients had little access to ART, and thus the impact of AIDS on these countries' health systems could be understood simply by considering the demand for and supply of the treatment of opportunistic illnesses.

Since 2001, however, generic versions of ART medications have become available in poor countries at a cost of as little as $150 a year. In 2001, at the Doha round of World Trade Organization (WTO) discussions, both industrial and developing countries negotiated and signed a Declaration on Trade-Related Aspects of Intellectual Property Rights (TRIPs) and Public Health, which confirmed provisions already implicit in earlier WTO

agreements: a country would have the right to grant "compulsory licenses" to a domestic pharmaceutical manufacturer to produce medications for domestic consumption when the national government decides there is a public health emergency. In 2003 further negotiation led to an extension of the declaration to permit countries without domestic pharmaceutical industries to import generic versions of patented drugs. Permission was made subject to the WTO's endorsement of the absence of domestic production capability, and generic manufacturers and exporters were required to ensure that the generic versions be easily distinguishable visually from the patented version.

Simultaneous with the dramatic fall in the prices of ART medication, poor countries are finding that new external sources for AIDS medication have appeared. Created in 2002, the Global Fund for AIDS, Tuberculosis, and Malaria has been funding proposals to finance the expansion of AIDS treatment in poor countries. The World Bank, which had previously financed the treatment of opportunistic illnesses and palliative care for AIDS, is allowing existing grants and credits to be reallocated to help strengthen national capacities for ART delivery. The U.S. government is dramatically increasing funding for ART in selected countries. And the World Health Organization (WHO) has joined with national governments and private foundations to announce the "3 by 5 Initiative," an ambitious plan to provide ART to 3 million AIDS patients by 2005.

Governments are struggling to understand the consequences of these rapid changes for their health care systems and to define their own policies for guiding the inflow of resources and complementing them with domestically financed initiatives. Questions they are asking include the following. How many AIDS patients do we have in our country? How many of them will come forward for ART? How many health workers do we have who can manage an AIDS patient on ART? Can our health care system achieve health benefits to AIDS patients as good as those achieved in pilot studies? Will AIDS patients crowd out other important health care programs, such as mother and child health programs, vaccination programs, and care for tuberculosis, malaria, diabetes, respiratory illness, and trauma? Will the current sources of funding for ART at some point dry up, forcing us to finance these drugs ourselves or let patients die? How can we ensure that our government and our health care system will be able to manage the inflow of resources for AIDS treatment without corruption or waste? What will be the impact of newly available, highly effective ART on the rate of new HIV infections? How should we alter our AIDS prevention programs as ART becomes widely available? How will current commitments to care for AIDS patients affect national expenditure and national priorities in the future?

The answers to these questions are complex and will necessarily differ from country to country. This chapter attempts to provide some guidance by, first, presenting a conceptual framework for analyzing the impact of AIDS on the health care system in the absence of ART, and then by adding ART to that picture.

Adjusting the Health Sector to the Treatment of Opportunistic Illnesses

AIDS affects the output of the health sector in two ways: by increasing demand and by reducing the supply of a given quality of care at a given price.[1] As a result, some HIV-negative people who would have obtained treatment for other illnesses had there been no epidemic are unable to do so, and total national expenditure on health care rises, both in absolute terms and as a proportion of national product.

Effect of AIDS on Demand for Care Before ART Was Available

Most people who develop AIDS are prime-age adults, defined as those aged 15 to 49. In the absence of AIDS, this age group typically accounts for only 10 to 20 percent of all deaths in a developing country in a given year, but the illnesses leading to these deaths typically generate a disproportionate share of total health care demand (Over and others, 1992; Sauerborn, Berman, and Nougtara, 1996). Moreover, several studies suggest that prime-age adults with AIDS tend to use more health care before death than those who die of other causes, or even than those with other prolonged illnesses. Thus the percentage increase in the demand for care by prime-age adults due to AIDS is likely to exceed the percentage increase in their mortality due to AIDS. As a result of these two factors, in a country where prime-age adults utilized one-fourth of all health care before AIDS, a given percentage increase in their demand for health care will increase total demand by at least one-fourth of that percentage. For example, a 40 percent increase in the mortality rate of prime-age adults will increase total demand for care by at least 10 percent, even though total mortality has increased by only 4 to 8 percent. If AIDS patients use ART, which prolongs their lives but does not cure them, the increase in demand will be much greater.

[1] This section draws on previously published material in World Bank (1997, 1999).

How much the demand for care increases in the aggregate depends on the increase in the prime-age adult death rate, which in turn depends on HIV prevalence in this group and the median time from infection to death. A stable prevalence rate of 5 percent among prime-age adults eventually increases their annual mortality by about 5 deaths per 1,000 persons if the median time from infection to death is 10 years. A prevalence rate of 30 percent, as observed in parts of southern Africa, will increase the number of deaths per 1,000 prime-age adults by 30 to 60, depending on the median time to death. In sub-Saharan Africa, where mortality rates in this age group were as high as 5 per 1,000 before the epidemic, even a 5 percent infection rate will double or triple the adult death rate. In a middle-income developing country with pre-epidemic adult mortality of 1 per 1,000, the same endemic level of HIV infection will increase prime-age adult mortality 5- or 10-fold.

Given these parameters, how much will the epidemic increase the demand for care? Consider a country where prime-age adults consumed one-fourth of all health care before the AIDS epidemic, where HIV prevalence is constant at 5 percent of prime-age adults, where the median time to death is 10 years, and where the baseline mortality rate among prime-age adults is 5 per 1,000. In this case mortality among prime-age adults will approximately double as a consequence of HIV/AIDS. If the demand for treatment is proportional to mortality for the respective causes (this depends on the costs of treatment, as well as the duration of the illness), then the demand for health services, at any given price, would increase by 25 percent. If the prevalence rate is higher, if mortality rates among those infected are higher (for given prevalence rates), or if the baseline adult mortality rate is lower, the percentage increase in demand will be correspondingly greater.

A final important factor that may increase demand is third-party payment for health care. This may take the form of private insurance, a government-run insurance program, or, more typically, health care partly financed through general taxation and offered at reduced cost to the patient. Because one or more of these types of third-party payment often cover a portion of health care costs, the price paid by the patient is usually a fraction of the cost of providing the care. Since third-party payment thus enables patients to purchase more care than they would otherwise, it increases the demand for care arising from any given level of illness, thus magnifying the price shock of an AIDS epidemic. For example, if patients themselves pay 25 percent of the cost of their care, they will reduce their utilization in response to any increase in cost by only one-fourth as much as they would if they had to pay the full increase.

Effect of AIDS on the Supply of Care Before Antiretroviral Therapy Was Available

Even as it increases the demand for care, the AIDS epidemic will reduce the supply of care available at a given price, in three ways. The magnitude of these effects will generally be larger, the poorer the country and the more widespread and severe the epidemic.

The first and largest effect is the increased cost of maintaining a given level of safety for medical procedures. Even without HIV, hospitals and clinics in poor countries may themselves pose a risk to health. Needles and other instruments are not always sterilized, rooms are often overcrowded and poorly ventilated, and care providers may lack rubber gloves and sometimes even soap. Without modern blood banks, a transfusion might infect the recipient with hepatitis B. In such situations infections of all types spread rapidly; some, including such common illnesses as pneumonia, may kill. Before HIV, however, infections picked up in a clinic or hospital were rarely fatal to persons not already in a seriously weakened state.

Because the AIDS epidemic has greatly increased the risk to patients of existing medical procedures, simply maintaining the level of safety that existed before HIV requires additional hygiene and blood screening, both of which increase the cost of care. In middle- to high-income countries, where blood screening and sterilization of injecting equipment are already the norm, the impact of AIDS is confined to the incremental cost of adding an HIV test to existing tests and using rubber gloves and face masks in situations where they were not used previously. In poor countries, where blood screening and needle sterilization were lacking before the epidemic, the resources needed to maintain the quality of care in the face of the AIDS epidemic can be substantial. For example, the annual budget of the Ugandan Blood Transfusion Service, which was established in response to the epidemic and meets the demands of the entire Ugandan national health care system for clean blood, is estimated to be about $1.2 million, including capital and recurrent costs. This amounts to about 2 percent of national public health expenditure, or about 1 percent of total national health expenditure (European Commission, 1995).

Despite the potentially high costs of blood screening, HIV has greatly increased the justification for a government role in ensuring a safe blood supply. However, there is no convincing rationale for government to subsidize the entire cost of running such a service indefinitely. Blood screening and improved collection procedures will protect blood donors and recipients. However, since the average donor and recipient do not engage in unprotected sex with a large number of partners, a person infected

while giving or receiving blood is not likely to pass the infection to many others. Thus, in developing countries where the cost of establishing a safe blood supply is high, blood screening will not be among the more cost-effective approaches to preventing an epidemic based on sexual transmission.

To be sure, blood screening and better hygiene will help to prevent the spread of other infectious diseases besides AIDS. Such measures will also reduce the occupational risk of contracting AIDS and other diseases that health care workers face, and therefore reduce the amount of additional compensation needed to offset their occupational risk—an issue that will be discussed below. A careful accounting of the net cost of protecting patients from HIV by screening blood would need to take into consideration these additional benefits, for which data are lacking. However, it seems likely that, even if these benefits are taken into account, the remaining cost of screening blood and improving hygiene to protect patients from HIV/AIDS would substantially increase the unit cost of medical care.

The second factor reducing the supply of medical care at a given price is the increased attrition and absenteeism of health care workers who become infected with HIV. Like all prime-age adults, health care workers may become infected with HIV as a result of sexual contact or the use of unsterile injecting equipment outside of their work. Unlike other adults, they face an additional risk of becoming infected in the course of their work; however, this risk is generally much smaller than the risk from sexual contact. Thus whether the AIDS mortality rate among health care workers is higher or lower than among the general population depends mostly on the effects of income, education, and social status on sexual behavior. Two studies of HIV prevalence among health care workers from Africa suggest that doctors and nurses are at least as likely to become infected as other people (Mann and others, 1986; Buvé and others, 1994). If this is true elsewhere, a country with stable 5 percent HIV prevalence can expect that each year between 0.5 and 1 percent of its health care providers will die from AIDS; a country with 30 percent prevalence would lose 3 to 7 percent a year. This attrition from AIDS deaths may substantially increase the cost of health care. For example, if labor costs are half of total health care costs, and if training or recruiting a replacement worker requires a one-time expenditure equal to the worker's annual salary, then a 7 percent increase in attrition will increase total costs in the health sector by 3.5 percent.

The third way in which AIDS reduces the supply of health care is through the additional risk it imposes on health care workers. Even though most HIV-infected health care workers acquire their infection through

sexual contact, in a society with a large proportion of HIV-positive patients, health care work will be more dangerous than if there were no HIV. Some students who would have become doctors and nurses will therefore choose alternative occupations, unless they are compensated with higher pay for the increased risk. A recent survey of medical and nursing students in the United States found that AIDS had indeed reduced the attractiveness of specialties in which contact with HIV-positive patients was more likely (Bernstein, Rabkin, and Wolland, 1990; Mazzullo and others, 1990). This problem is likely to be most severe in hard-hit developing countries, where HIV prevalence is much higher and rubber gloves and other protective equipment are often in short supply. In Zambia, for example, some nurses have demanded special payments to compensate for the increased occupational risk due to HIV (Buvé and others, 1994). A recent qualitative study in Ethiopia quotes health workers as saying, for example, "HIV/AIDS has increased our exposure to the virus and we fear contracting it," and "I have a son who used to be interested in joining the medical profession . . . but decided to join another profession. His reason was that he has observed the risk his parents are exposed to . . ." (Lindelöw, Serneels, and Lemma, 2003).

The magnitude of these increased costs due to higher required compensation of medical staff has not been estimated. As noted above, improved precautions in hospitals and clinics may reduce these costs. But because people respond to perceived risk rather than actual risk, such improvements may have little impact on the demand for increased compensation. Thus it seems clear that health care workers' perception of risk will either increase the cost or lower the quality of care. In either case the effect is an unambiguous increase in the cost of a quality-adjusted unit of care.

The total impact of these three effects—increased cost of preventing infections in medical facilities, attrition of health care workers due to HIV, and the additional pay that health care workers demand to compensate them for the increased risk of becoming infected—will depend most importantly on the prevalence of HIV and whether modern blood banks and hygienic practices are already in place. In a country that has 5 percent HIV prevalence among prime-age adults and lacked blood banks and blood screening before the epidemic, a conservative guess is that the cost of providing care of a given quantity and quality will rise by about 10 percent.

Now that relatively inexpensive ART is available, health care systems can use it to mitigate the effects of the attrition of workers due to HIV/AIDS and the fear of becoming infected from a patient. Workers with AIDS who

adhere to ART will remain healthy and productive, and uninfected workers who know that prophylactic ART is available in case of an accidental needle stick will be less fearful of treating their patients. However, these uses of ART have costs that might be of the same order of magnitude as the original impact.

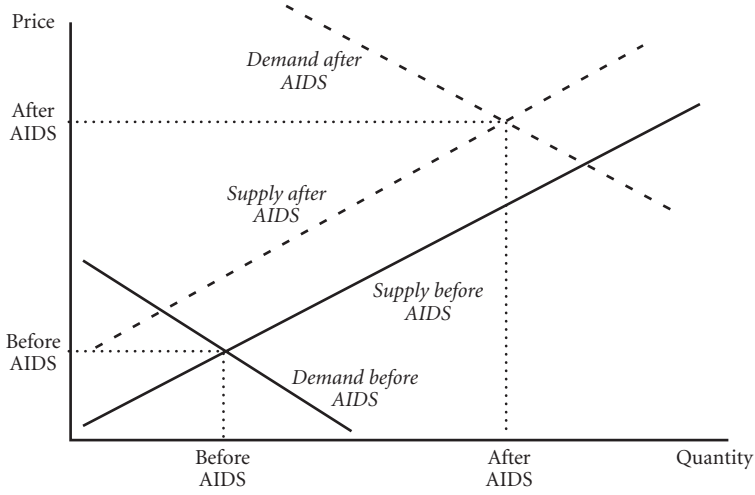
Partial Equilibrium Analysis

Taken together, increased demand and reduced supply have two related impacts: first, health care becomes scarcer and thus more expensive, and second, national health care expenditure rises. The size of these impacts depends partly on the elasticities of the demand for and the supply of care. The elasticity of demand for adult health care is usually small, since there are no close substitutes, and people who are sick and have the ability to pay will often pay whatever is necessary to get well. For simulation purposes, assume that a price increase of 10 percent would decrease utilization by only about 8 percent, for an elasticity of 0.8.

Higher prices also generally increase supply. Here, too, however, the nature of the health sector affects the response. In the very short run, perhaps a month, the supply of care is unlikely to respond much to greater demand and higher prices, whereas over the long run, the supply of physicians and inputs to health care can expand as much as necessary. Over the medium run, five years or so, one would expect the supply of care to respond somewhat to increased demand and the resulting higher price. One response observed in Canada, Egypt, India, Indonesia, and the Philippines is that physicians who work in the public sector rearrange their schedules to offer more health care privately, after their obligations to the government have been met. The elasticity of this response has been estimated at about 0.5 (Chawla, 1993, 1997; Bolduc, Fortin, and Fournier, 1996).

Under these assumptions, it is possible to estimate the impact of HIV/AIDS on the quantity and the price of health services (illustrated in Figure 10.1). It was argued above that a constant 5 percent HIV prevalence rate would increase the demand for care over the pre-epidemic level by about one-fourth and the cost of care of a given quality by 10 percent. Drawing on the assumptions in this subsection about the elasticities of demand and supply, and assuming that patients pay half the cost of their health care, the price of care would rise by about 30 percent. Total national health expenditure and the government's share of expenditure would both increase by about 43 percent ($1.3 \times 1.1 = 1.43$). With the same supply and demand elasticities, the increase would be less in a country like India,

Figure 10.1. Impact of HIV/AIDS on the Price and Quantity of Health Care



where only about one-fifth of the cost of care is paid by the government, and substantially more in many countries of Latin America and Eastern Europe, where three-fourths or more of the cost is typically subsidized.

Does the available empirical evidence support these conclusions? Measuring the scarcity of medical care through changes in the price of care of a given quality is problematic because of the difficulties in measuring quality. This is especially true in developing countries, where a general lack of data is compounded in the health sector by government subsidies and nonprice forms of rationing. In such cases the effective price of care may rise even though nominal prices remain constant. Furthermore, because of the lag between infection and death, the time between the attainment of a given HIV prevalence rate and the full impact of that rate on the demand and supply of health care can be 10 years or more. For these reasons one cannot accurately assess changes in the scarcity of health care in developing countries by observing changes in nominal prices. Nonetheless, one can get some sense of the extent to which HIV/AIDS increases the effective price of health care by considering whether the epidemic makes it more difficult to obtain care. Studies of hospital admissions data suggest that this is the case.

Table 10.1 shows the percentage of beds occupied by HIV-positive patients in six referral hospitals in developing countries that had large epidemics in the mid-1990s. The hospitals in question are the top health care institutions in each country, providing the best care available outside of a

Table 10.1. Hospital Beds Occupied by HIV-Positive Patients in Selected Cities, Circa 1996
(Percent)

City	Hospital	Share of Beds
Chiang Mai, Thailand	Provincial	50
Kinshasa, Democratic Republic of Congo	Mama Yemo	50
Kigali, Rwanda	Central	60
Bujumbura, Burundi	Prince Regent	70
Nairobi, Kenya	Kenyatta National	39
Kampala, Uganda	Rubaga	56

Source: World Bank (1999).

few expensive private clinics. Because these hospitals are at the apex of their health care pyramids, it is likely that AIDS patients make up a significant proportion of their patients. Even so, the percentage of beds occupied by HIV-positive patients is striking, ranging from 39 percent in Nairobi, Kenya, to 70 percent in Bujumbura, Burundi.

If these hospitals were operating well below capacity before the epidemic, they might have accommodated the HIV-positive patients without reducing care for the HIV-negative ones. Although no data on occupancy prior to the epidemic are available for these specific hospitals, bed occupancy rates in such hospitals typically were well above 50 percent even before AIDS appeared on the scene.

The best evidence that AIDS sometimes makes it more difficult for people not infected with the virus to get medical treatment comes from an in-depth study of Kenyatta National Hospital, the premier teaching hospital in Nairobi, Kenya. The study compared all patients admitted during a 22-day period in 1988 and 1989 with those admitted during a 15-day period in 1992 (Floyd and Gilks, 1996). The researchers found that the number of HIV-positive patients more than doubled, whereas the number of HIV-negative admissions shrank by 18 percent. Since it is very unlikely that the number of HIV-negative people in the hospital's catchment area shrank by this much, this evidence suggests that the AIDS epidemic did in fact result in some HIV-negative patients being dissuaded or barred from admission to the hospital.

Of course, no data exist on what happened to the HIV-negative patients who were not admitted. But hospital records show that the mortality rates for those who were admitted increased between the two periods, from 14 percent to 23 percent. The mortality rate for the HIV-positive patients did not increase, and other indicators of the quality of care remained constant. Thus the most likely explanation for the increased mortality rate among the HIV-negative patients is that the rationing scheme used to allocate

increasingly scarce beds had the effect of changing the mix of HIV-negative patients toward those with more severe illnesses. Whether the rationing was imposed by hospital staff or was a response by prospective patients to their perception of a higher effective price of care, it is likely to have excluded some patients whose lives the hospital could have saved.[2]

Characteristics of the Market for AIDS Treatment

The substantial resource flows necessary to expand the availability of ART in poor countries will shift the demand curve for health care services upward and to the right, as depicted in Figure 10.1. In each country the size of the epidemic, together with the amount of new funding available, will determine the extent of the shift in demand. The amount of funding also affects the elasticity of the demand curve, with more funding associated with less elasticity. When the demand curve is less elastic, any increase in the cost of care is translated directly into increases in both prices and expenditure, rather than into reductions in utilization. Thus the outcome of new ART funding will depend largely on the nature of the public and private supply responses.

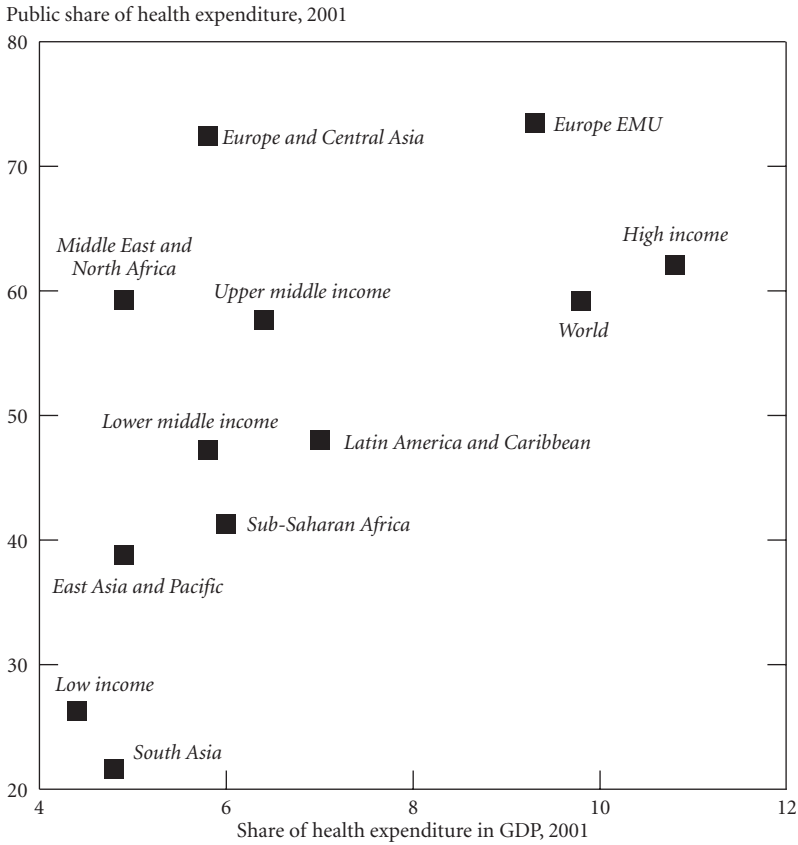
The model of supply implicit in Figure 10.1 is a simple one, derived from models of perfectly competitive firms. In reality only a portion of the market for health care services is served by private, for-profit health care facilities. Figure 10.2 shows that, even in the poorest countries, where health expenditure is a small proportion of domestic product, at least one-fifth of all health expenditure occurs in the public sector. Another substantial proportion of health care services is delivered by nonprofit, nongovernmental organizations, many of which are faith-based.

Agency Problems in Health Care

Patients seek the care of trained health care providers partly because these providers have specialized knowledge, and partly because the provider gives them access to pharmaceutical products and medical proce-

[2]In a follow-up study of the same hospital, the authors found that HIV-negative admissions were back up. However, hospital utilization had surged to over 100 percent, implying that some patients were sleeping on the floor and in hallways. Thus the quality of care was lower, and the "effective price" of care was driven upward by the epidemic (Floyd and Gilks, 1996).

Figure 10.2. Relationship of Health Expenditure Share of GDP to Public Share of Health Expenditure by World Region and by Income
(Percent)



Source: World Bank (2004, Table 2.14).

dures that patients have difficulty obtaining directly. The provider serves as the agent of his or her patients, but is also, like all agents, subject to conflicting interests. Professional ethics and concern for his or her reputation both motivate the provider to be a "good" agent, making choices that the patient would make with the same information. However, the provider is also tempted to make choices against the best interests of patients. For example, the provider has an incentive to spend more on medical care of doubtful efficacy, when wasteful expenditures would benefit the provider and cannot easily be distinguished from useful expenditures by the patient.

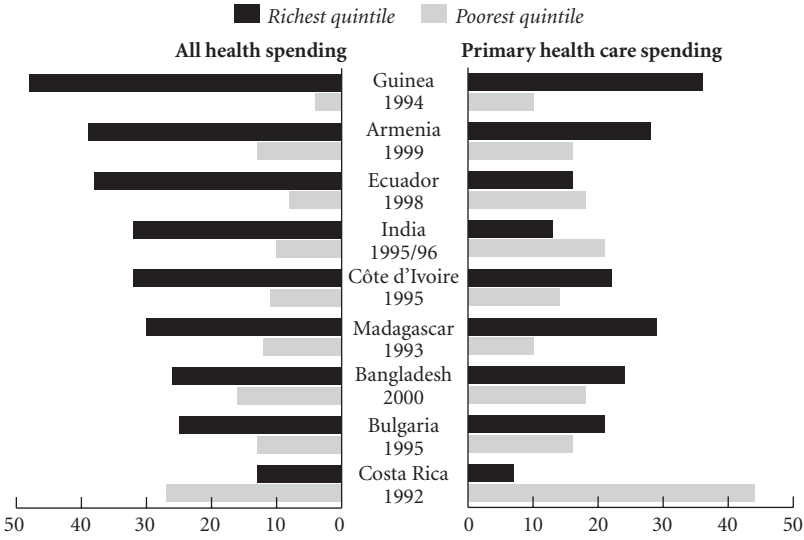
Furthermore, the provider has some monopoly power, due not only to his or her specialized knowledge but also to the difficulty the patient would face in switching to another provider. The equilibrium between these conflicting interests can shift when the demand for health care is dramatically increased, for example by an AIDS epidemic. In situations of excess demand, the patient is less likely to be able to choose his or her provider, and the potential financial rewards to the provider from opportunistic behavior increase. Thus with excess demand the equilibrium is likely to shift toward more opportunistic provider behavior.

The situation is more complex when the provider is employed by the public sector or accountable to a third-party payer, such as a government or private health insurance fund. In these situations the provider is an agent not only of the patient, but also of the third party. With respect to the third-party payer, perfect agency on the part of the provider means maximizing efficiency and maximizing the equity of distribution of his or her output by income class. This is not always the same as maximizing quality or patient satisfaction, and thus is not completely in accord with perfect agency on behalf of the patient. The health care provider now must advise the patient in a way that balances the requirements of both these different principals against each other and against his or her own personal needs and constraints.

The government or other third-party financer of health care can observe the performance of the provider by periodically exercising supervision or in a variety of more subtle but more expensive ways. For example, the supervisor might employ actors to impersonate an individual seeking care and report the provider's behavior and treatment decisions. However, accurate quality control requires resources, which could have otherwise been spent on higher salaries for the providers, on more drugs or other medical supplies, or on public goods outside the health sector.

Furthermore, the salaries of civil servants, including health care providers, in poor countries are often extremely low, and lower than those of providers in the private sector. These low salaries combined with traditional job protection for civil servants limit the sanctions that the government can bring to bear on the provider. Indeed, evidence and experience show that, in many poor countries, the government cannot even identify and remove nonexistent employees from the payroll, much less those who do exist but only occasionally show up for work. For example, a study of civil service rolls in Honduras in 2000 found that 8.3 percent of the health workers and 5.0 percent of employees in public education receiving salaries were "ghost workers" who had either died, left the service, or never existed (Lindelöw, 2003).

Figure 10.3. Incidence of Public Health Care Expenditure by Income Quintile in Selected Countries
(Percent)



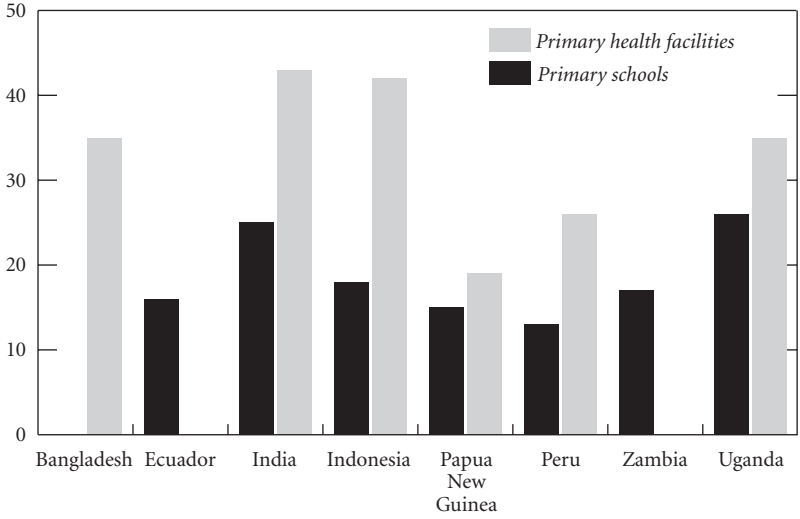
Sources: World Bank (2003); Filmer (2003).

Similarly, the patient can, in theory, learn that a given provider gives poor service or low-quality treatment and choose a different provider the next time. However, in rural areas of poor countries, alternative providers are scarce, and patients must often walk long distances to exercise this option. In that case, local providers, whether in the public or the private sector, have substantial market power and can exercise that power in their own interest, to the detriment of their patients. The result is often poor performance of the health system overall, as documented in the next section.

Poor Performance of Health Services in Poor Countries

How well do health care providers serve as agents to their two principals? Figure 10.3 casts light on whether public health care spending in poor countries is truly serving the poor—a presumed objective of the government. Note that, in most of the countries in the figure, the richest quintile benefits far more than the poorest from all health spending. Primary health care, which tends to be located in rural areas, is also biased toward the richest quintile, although less extremely so than overall health care

Figure 10.4. Unexplained Staff Absenteeism in Primary Schools and Primary Health Facilities in Selected Countries[1]
(Percent)



Source: World Bank (2003).
[1]Percent of all staff who were supposed to be present but were not on the day of an unannounced visit. It includes staff whose absence is excused for various reasons, such as training.

spending. As publicly financed AIDS treatment expenditure increases in poor countries, it would be surprising if this expenditure did not primarily benefit the richest AIDS patients.

Another basic indicator of the performance of health care workers is whether they show up for work. Data collected in eight countries for the World Bank's *World Development Report 2004* suggest that absenteeism is frequently a serious problem (World Bank, 2003). Figure 10.4 shows that the share of staff in peripheral health facilities with *unexplained* absences varied from 18 percent in Papua New Guinea to 43 percent in India. Variation within countries is also important. For example, in Bangladesh absenteeism among physicians is fully 75 percent, much higher than that among nonphysicians.

These data suggest that expanding ART or any other any medical program that depends on the dedicated hard work of rural public health care providers is likely to fall short of its potential unless the incentives that guide these workers' behavior are restructured. One ingredient of this restructuring will certainly be higher salaries for health care workers charged with these new responsibilities. However, a recent study from

Uganda, which compared the efficiency and quality of health care in the public sector with that in the faith-based private sector, found that, despite somewhat higher salaries, the public sector was less productive and was perceived by patients as producing lower-quality care (Reinikka and Svensson, 2003). Better performance is more likely to depend on improved supervision and a closer link between worker performance and a variety of rewards, including financial compensation and professional prestige.

Impact of Antiretroviral Medication on the Health Sector

Of the more than 40 million people worldwide believed to be infected with HIV, WHO estimates that approximately 5.9 million currently need ART to prolong their lives (WHO, 2003). Most of those in need who live in rich countries are receiving such care. But more than 3 million people living mainly in poorer countries do not currently have access to that care. Figure 10.5 shows that the gap between current coverage and need is concentrated in the poorest countries of Africa and Asia.

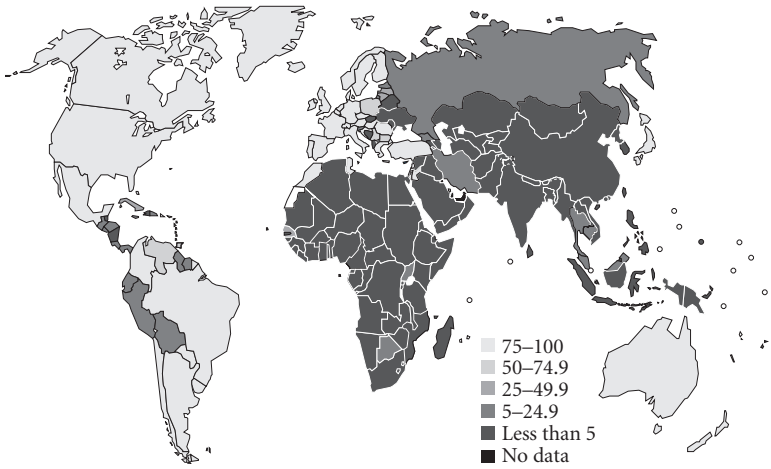
As mentioned previously, WHO has advanced the goal of providing ART to 3 million of the more than 5 million needing treatment by the year 2005—the 3 by 5 Initiative. The organization has focused on 34 high-priority countries (listed in Table 10.2) that, according to estimates, together have approximately that number of people currently in need of ART.

Basics of Combination Therapy for AIDS

Four classes of medications are used in ART: antiretroviral drugs, nucleoside reverse transcriptase inhibitors (NRTIs), nonnucleoside reverse transcriptase inhibitors (NNRTIs), and protease inhibitors (PIs). Each acts against HIV in a different way. The therapy recommended for patients entering ART for the first time consists of two NRTIs and one other compound, either an NNRTI or a PI. If a patient has problems with the first therapy received, he or she is moved to the second-line therapy, which is often more expensive.

Whether ART is successful in preventing HIV-related illness and prolonging the life of the patient depends most of all on how well the patient adheres to the prescribed times and doses of all of the medications. Typically the patient must take medications several times a day, at precise intervals. Some medications must be taken before eating, others after eating. The medical regime is simplified if the three drugs are packaged in the same pill,

Figure 10.5. Coverage of Adults in Need of Antiretroviral Therapy, November 2003
(Percent)



Source: World Health Organization (2003).

but only a few triple-drug combinations are available in single-pill format. Imperfect adherence leads to the selection of a strain of HIV that is resistant to this drug combination. Adherence is thus important not only for the individual patient, but also to prevent the possibility that the patient will transmit a resistant strain to others, for whom the same drug combination would then not be helpful. Since, again, second- and third-line therapies tend to be more expensive, patients with resistant strains might not be able to find the right drug combination at a price they can afford.

A matter still under some dispute in the medical community is whether test results materially assist physicians attempting to manage patients on ART. So-called CD-4 tests are relatively inexpensive and track the status of the immune system. Viral load tests, which measure the quantity of virus in the bloodstream, are more expensive. The 3 by 5 program is based on the assumption that relatively few tests are needed, far fewer than have typically been funded in poor countries.

So far, the available evidence suggests that adherence to treatment regimens in developing countries has been relatively good. For example, in Uganda a pilot study reported adherence rates above 85 percent (Okero and others, 2003). However, since treatment has thus far been available only to a small fraction of the eligible populations in developing countries,

Table 10.2. High-Priority Countries for the WHO 3 by 5 Initiative

Angola	Ethiopia	Mozambique	Swaziland
Botswana	Ghana	Myanmar	Tanzania
Burkina Faso	Guinea	Namibia	Thailand
Burundi	Haiti	Nigeria	Uganda
Cameroon	India	Russian Federation	Ukraine
Central African Rep.	Indonesia	Rwanda	Vietnam
China	Kenya	South Africa	Zambia
Congo, Dem. Rep. of	Lesotho	Sudan	Zimbabwe
Côte d'Ivoire	Malawi		

Source: World Health Organization (2003).

it remains unknown how well the general population of HIV-infected people in these countries will be able to adhere.

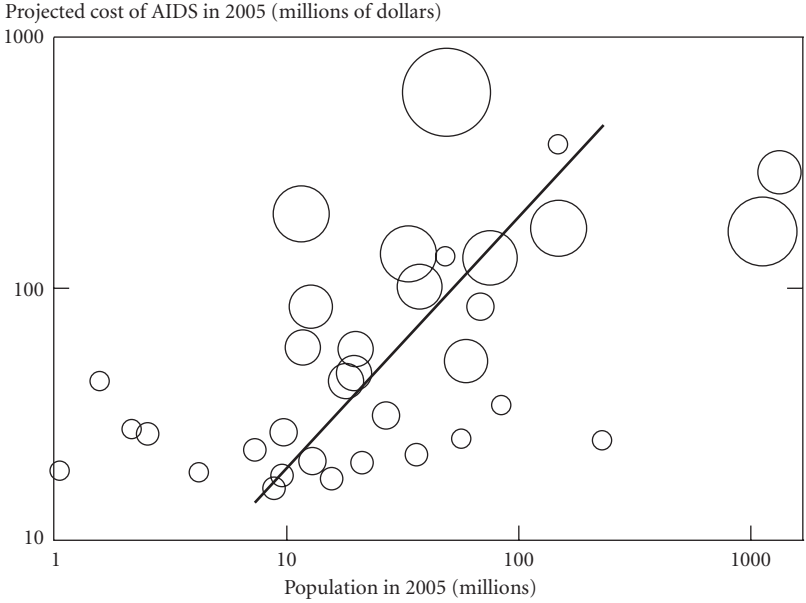
Projected Burden if the 3 by 5 Goals Are Met

The attempt to scale up ART until 3 million patients have access will present serious challenges to most countries. WHO has projected the AIDS program expenditure for 2004/05 that would be necessary to meet the 3 by 5 goal in each of the 34 countries in Table 10.2. Figure 10.6 plots for each country this estimated expenditure against the country's population. The areas of the circles representing individual countries in the figure are proportional to their share of all AIDS patients in this group, and the straight line represents annual expenditure per capita (for the whole population, not just of AIDS patients) of $2. Countries above and to the left of the line are estimated to need to spend more than $2 per capita a year.

How does this projected expenditure compare with existing public health expenditure in the same countries? Figure 10.7 shows, for the 34 countries, the ratio of projected AIDS expenditure in 2005 to public health expenditure without AIDS in 2002. In 20 of the 34 countries, that ratio is one-third or less, so that the goal seems feasible on this measure. But in the other 14 countries, the ratio is greater than one-third, and in 3 countries it is greater than one. That is, projected total AIDS expenditure in these countries in 2005 will exceed total public health expenditure in 2002. These 14 countries, and especially the last 3, will have great difficulty absorbing the proposed AIDS expenditure.

Figure 10.8 plots the same variables in per capita terms, with each circle again proportional in size to the country's share of the 3 million AIDS patients in these countries as a group. It is somewhat reassuring to note that, of the four countries with the largest numbers of patients needing care, two lie below the line, indicating that the required increase in public

Figure 10.6. Distribution of 3 by 5 Initiative Target Countries by Projected AIDS Expenditure and Population[1]



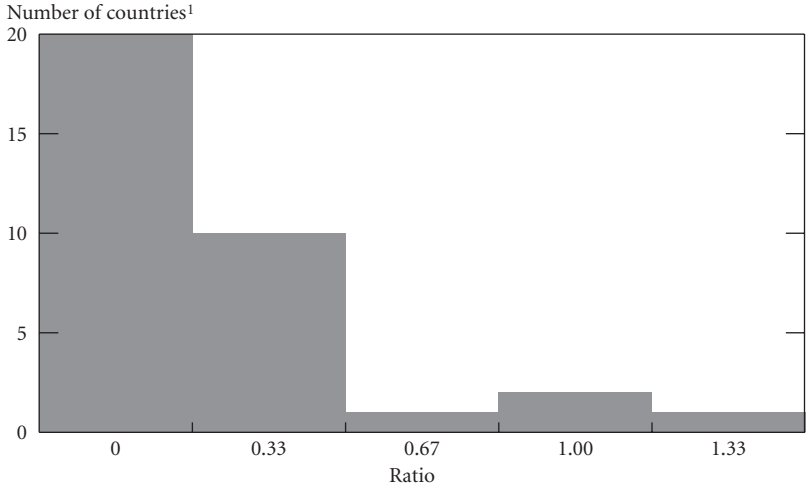
Source: Benjamin Johns, Stefano Bertozzi, and others on the WHO 3 by 5 Initiative team, personal communication with the author.

[1]Both axes scaled in logarithms. Each circle represents one country, with its area proportional to the country's share of all AIDS patients in the 34 countries (listed in Table 10.2).

expenditure will be less than one-third of current public health expenditures in these countries.

The above analyses assume that a country's ability to absorb additional AIDS expenditure depends on the magnitude of this additional expenditure relative to current public health expenditure. An alternative perspective is provided by comparing prospective expenditure with the number of physicians in the country. Several objections might be raised to this approach. First, not all physicians will be involved in AIDS care. Some will continue to specialize in other types of care, never treating an AIDS patient, whereas many general practitioners and internal medicine specialists will treat AIDS cases as an increasingly large proportion of their practices. Second, according to the guidelines developed by WHO for the 3 by 5 Initiative, certain types of paramedical personnel, including nurse practitioners and some nurses with special training, will be managing AIDS patients under the guidance of supervising physicians. Despite these draw-

Figure 10.7. Country Distribution of the Ratio of Projected AIDS Expenditure, 2005, to Total Public Health Expenditure Without AIDS, 2002



Source: Benjamin Johns, Stefano Bertozzi, and others on the WHO 3 by 5 Initiative team, personal communication with the author.

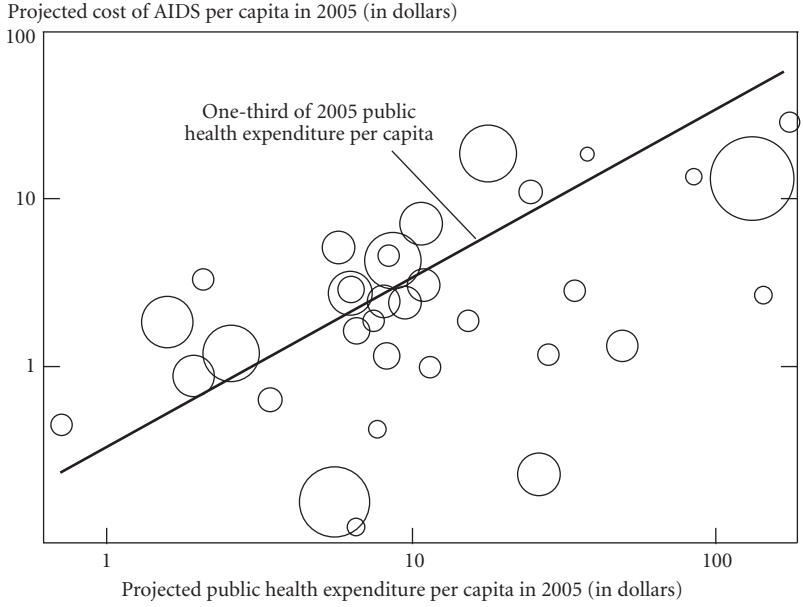
[1]Countries are the 34 countries listed in Table 10.2.

backs, the perspective provided by this measure is potentially useful, because physicians will remain the primary decision makers in the allocation of existing and new publicly provided AIDS treatment resources.

The vertical axis in Figure 10.9 plots, for each of the 34 countries, the ratio of projected 2005 AIDS expenditure to the number of physicians in the country. The horizontal axis plots countries' GDP per capita. The circles again are proportional in size to the country's share of total AIDS patients in the 34 countries. (Both axes are scaled in logarithms for greater clarity.) The two lines divide the figure into four sections. The upward sloping line represents 10 times GDP per capita. Countries above this line will be attempting to allocate AIDS treatment resources per physician exceeding that amount. The second, vertical line separates the poorest countries (those with GDP per capita less than $500) from the less poor.

Figure 10.9 thus classifies the 34 countries into essentially three groups, summarized in Table 10.3. In the eight countries in the lower right quadrant of the figure, projected AIDS expenditure per physician in 2005 is less than 10 times GDP per capita, and GDP per capita is relatively large. These countries face a feasible challenge. The average country in this group will have to allocate about 1.8 times GDP per capita for each physi-

Figure 10.8. Distribution of 3 by 5 Initiative Target Countries by Cost of AIDS per Capita and Public Health Spending per Capita[1]



Source: Benjamin Johns, Stefano Bertozzi, and others on the WHO 3 by 5 Initiative team, personal communication with the author.

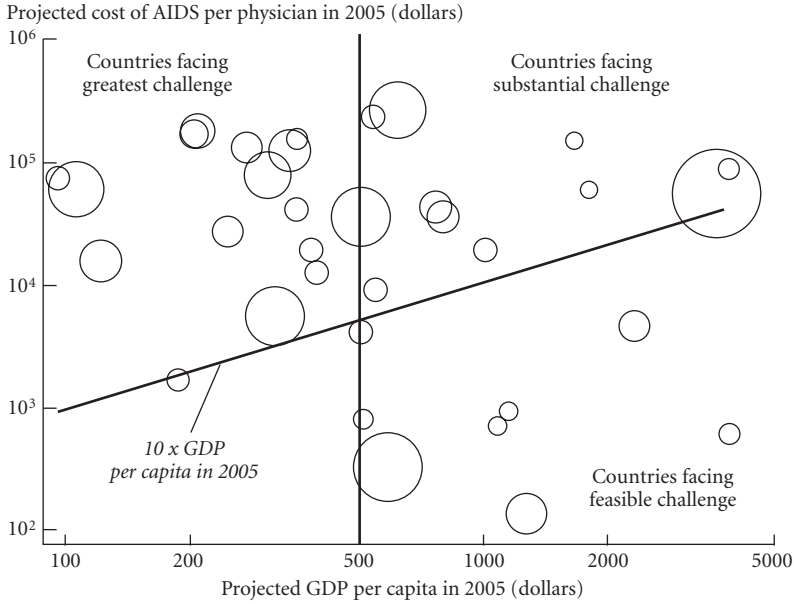
[1]Both axes scaled in logarithms. Each circle represents one country, with its area proportional to the country's share of all AIDS patients in the 34 countries (listed in Table 10.2).

cian. These countries are more likely than the others in the figure to have both the economic resources and the medical resources (as proxied by the number of physicians) necessary to greatly expand ART access, should they receive the resources and direct their energy to the vigorous expansion of ART.

The 11 countries in the upper right portion of the figure face a substantial challenge. Although their economic resources are similar to those of the group of countries below them in the figure, they have more AIDS patients or fewer physicians, or both. For the average country in this group, the 3 by 5 Initiative will require that they channel new resources to AIDS care equivalent to about 113 times their 2005 GDP per capita, for each resident physician. In these countries, then, the effort to reach the 3 by 5 goal will put greater pressure on existing resources.

The remaining 14 countries in the upper left portion of Figure 10.9 (only one country lies in the lower left quadrant) face the greatest chal-

Figure 10.9. Distribution of 3 by 5 Initiative Target Countries by Cost of AIDS per Physician and GDP per Capita[1]



Source: Benjamin Johns, Stefano Bertozzi, and others on the WHO 3 by 5 Initiative team, personal communication with the author.

[1]Both axes scaled in logarithms. Each circle represents one country, with its area proportional to the country's share of all AIDS patients in the 34 countries (listed in Table 10.2).

lenge. Both their economic capacity and their medical capacity are small in relation to their number of AIDS cases. The average country in this group will be required to increase health spending by 368 times GDP per capita for each resident physician. In the most severely challenged country this ratio reaches 879. In all these 14 countries the attempt to spend millions of dollars on expanding ART must cope with systems that are not equipped to manage such large sums. Medical personnel are already stretching to meet current public health objectives and will have to divert time from these objectives to expand their treatment of AIDS cases. The temptations for medical personnel to divert AIDS treatment resources to other uses or to sell treatment access at black market prices will be extreme, and the resulting leakage from the system will reduce the efficiency of AIDS expenditure. As a result, in the 14 countries facing the greatest challenge, either the number of AIDS patients effectively treated will fall short of the objective, or the total expenditure required will be greater.

Table 10.3. Projected AIDS Spending in Countries Targeted by the WHO 3 by 5 Initiative

Projected Spending (as multiple of GDP per capita per physician)	Countries Facing:[1]		
	Feasible challenge	Substantial challenge	Greatest challenge
Average of countries in group	1.8	113	368
Highest country in group	8.7	441	879
Memorandum:			
Number of countries	8	11	14
Share of ART patients (percent)	21	41	38

Source: Author's calculations based on data from Gutierrez and others (2004).
[1]As identified in Figure 10.9.

Impact on Demand

The above assessment is perhaps too pessimistic in one respect: it does not take into account the reduction in the demand for treatment of opportunistic illnesses that occurs when AIDS patients are effectively treated with antiretroviral medications. In Brazil the demand for health care to treat three important types of opportunistic illness decreased during the period when that country expanded access to antiretroviral medication (Schechter, 2004). So, to the extent that the 34 high-priority countries discussed above are currently treating opportunistic illnesses in their AIDS patients, the effort to increase access to ART will be partly offset by decreased demand for treatment of these dangerous illnesses.

It is difficult to take much comfort from this possibility, however, for one reason: Brazil's level of development is much higher than that of any of the 14 countries identified in Figure 10.9 as facing the greatest challenge. Indeed, with a GDP per capita of approximately $3,000, Brazil's economic strength exceeds that of all but 2 of the 34 priority countries. Furthermore, Brazil has more physicians per capita than any other country on the list except Russia. Thus, in the classification in Figure 10.9, Brazil would have appeared in the lower right portion as one of the countries facing a feasible challenge. Lessons from Brazil may be difficult to apply to the countries facing the greatest challenge, which have on average one-sixth Brazil's GDP per capita, much higher HIV prevalence, and far less medical resources and infrastructure.

In developing countries, instead of seeing a reduction in the demand for opportunistic care, ART program managers may find themselves frustrated by insufficient uptake of the publicly financed ART care available. Reports from both Thailand and Botswana suggest that it may be difficult to recruit patients who are eligible for ART until their illness has advanced

so far that they are difficult to help. In order to achieve their coverage goals, governments may find it necessary to provide incentives to patients in order to compensate them for the stigma of seeking care before they are sick, and for transportation and other costs associated with ART adherence. When such incentives are financial, they are referred to in other contexts as "conditional grants," because they are conditioned on the patient performing certain activities—in this case, seeking care and adhering to a medication regime. Such payments are not considered in the WHO estimates used above. The cost of such demand-side subsidies will inflate program costs and complicate management.

Impact on Supply

Increasing government expenditure on ART will have four effects on the supply of medical care. First, when ART is also made available to health care personnel who suffer needle-stick or other accidents that threaten to infect them with HIV, it increases their willingness to treat AIDS patients. Indeed, since health care personnel often do not know who is HIV-positive, the availability of prophylactic ART increases their willingness to supply all types of medical care.

The complexity of ART and the potential financial and professional rewards from the management of AIDS patients will increase the demand for training by medical personnel. In less poor countries some of this demand will be satisfied by the private sector. Governments may want to at least observe, if not regulate, the quality of such privately offered training in AIDS management. To the extent that countries have difficulty recruiting patients to ART regimes, they will need to reinforce and expand their voluntary counseling and testing programs and the communication campaigns that support them. Only if people trust in the confidentiality of such programs and can find a center located close to their home are they likely to seek information about their HIV status and seek care at the appropriate stage.

Physicians will benefit from greatly expanded expenditure on ART, regardless of the quality of care offered or the difficulty of accessing it. The substantial increase in the demand for their services caused by this influx of medical spending will raise both the wages and the prestige of physicians and, to some degree, of all medical personnel. Although this increase in their status is appropriate if they respond to the higher wages with increased effort and quality of care, governments may want to strengthen medical review boards and other professional systems designed to ensure that ethical considerations outweigh financial ones in the conduct of medical business.

Medium-Term Considerations

The international community has responded to WHO's appeal to treat 3 million AIDS patients by 2005. However, it has been little noticed that, in a global HIV-positive population of 40 million, 4 million or 5 million people become newly eligible for treatment each year. Thus, in the 34 priority countries, the achievement of the 3 by 5 goal will lead to a demand for "6 by 6," as 3 million additional people become eligible and in need of care before 2006. This will be followed by the need for "9 by 7," then "12 by 8," and so on.

The number of HIV-positive people receiving ART will grow rapidly, meaning that an ever-larger portion of some national populations will have to take medication every day in order to survive. The financial requirements will rise commensurately. It is not clear that the international community has given sufficient thought to this arithmetic, which cannot be avoided in the medium term. Prevention of new infections, which advocates of ART hope will be stimulated by the availability of ART, cannot affect the medium-term prospect, but it will be important over a period of 10 years or more in preventing the continued accumulation of AIDS cases needing treatment.

Another medium-term issue is equity across disease categories. In the poorest countries, neither competent expertise nor public subsidies is widely available for people needing care for cancer, end-stage renal disease, life-threatening trauma, or birth complications. Massive new public expenditure for ART will have several effects on patient access to care for these other serious medical conditions. First, since the wages of all physicians will be higher, the cost of care for these other diseases will increase even without new subsidies for AIDS care. Thus, on balance, patients with other diseases can be expected to have increasing difficulty finding affordable treatment. This tendency may be offset to some degree by the wider availability of trained personnel. However, in many poor countries the expansion of access to ART is likely to result in a hypertrophy of ART capacity without comparable development of the rest of the health care system.

Despite the complaints of patients with these underserved medical conditions, the strength of the HIV-positive lobby will grow more quickly. As the number of patients dependent on daily doses of ART increases, they will become an ever more potent interest group, influencing the formulation of health policy in all severely affected countries. A challenge to government will be to engage this group in preventing the further spread of HIV as well as in ensuring the quality and accessibility of treatment. To the

extent that HIV-positive groups assist in reducing new infections, they will help ensure the affordability of continued treatment and thus serve their own long-term interests.

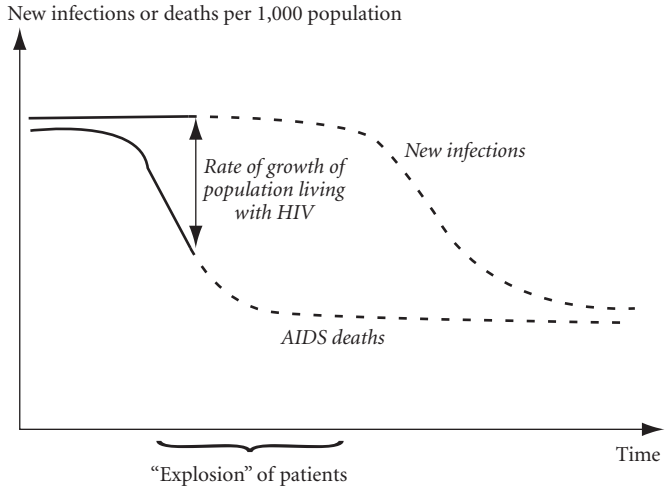
A Longer-Term Perspective: The AIDS Transition

The literature on the population problem in developing countries stresses the so-called demographic transition, from a growth path of high birth and death rates to one of low rates of both births and deaths. When death rates first fell in poor countries in the mid-twentieth century, there was no immediate prospect of a fall in birthrates. Instead observers were alarmed by a doubling or tripling of population growth rates. Applying the arithmetic of compound interest to these high growth rates led to use of terms like the "population explosion" and "the population bomb" (the title of a popular book in the late 1960s). In the latter half of the century, however, birthrates began to fall in one poor country after another. Sometimes they fell as a result of draconian government intervention, such as the "one child per family" policy in China or forced sterilization in India. Elsewhere countries achieved similar results through a combination of publicly financed family planning clinics, public information campaigns designed to persuade people to have fewer children, and economic development, which shifted the economic incentives of households toward having fewer but more educated children. In the early twenty-first century the story of the demographic transition from a high-birth, high-death regime to a low-birth, low-death regime is a subject of largely historical research.

Today we are arguably at the beginning of an "AIDS transition," for which aspects of the demographic transition may hold lessons. Figure 10.10 relabels the curves from the familiar depiction of the demographic transition with the analogous concepts from the AIDS transition. The role of births in the demographic transition is played by the flow of new HIV infections, and the role of overall population mortality, by AIDS mortality. As ART becomes accessible to an ever-larger proportion of those with advanced HIV-related disease, some countries are beginning to experience an increase in the growth rate of people living with HIV/AIDS, of whom an ever-larger percentage will be dependent on ART for survival.

If AIDS deaths decline while the incidence of HIV infection remains stable, there will necessarily be an "explosion" of ART patients analogous to the perceived population explosion of 40 years ago. AIDS-affected societies and the international community must hope for and should work to facilitate the transition to a new equilibrium. In this pattern the decrease in the death rate from AIDS is followed in as short a time as possible by a

Figure 10.10. The AIDS Transition



decrease in the rate of new infections, so that the growth rate of patients on ART is again reduced. Ideally the rate of AIDS deaths would fall almost to the mortality rate of the HIV-negative population, and the rate of new infections would fall even lower, so that over time the number of people dependent on ART declines. If most societies follow this path, a large cohort of patients on ART will pass through the population, but the health sector will be only temporarily (for perhaps 10 or 15 years) dominated by AIDS treatment concerns. Once both rates are again low, AIDS will become just one of many chronic illnesses, and the health sector will increasingly resemble what it would have been in the absence of the AIDS epidemic.

The AIDS transition pattern depicted in Figure 10.10 is one of victory over the AIDS epidemic, but the mechanisms for achieving that victory are not obvious. First, reducing the death rate from AIDS to a level approaching that of the rest of the population, and keeping it there, will require continued improvement in the pharmacological properties of ART, so that fewer patients fail first-line therapy and those who do can more often be helped with second- or third-line therapies. Getting the "birthrate" of new infections to fall, as the actual birthrate did in the case of the demographic transition, will require some combination of aggressive government prevention policy and autonomous individual decisions to reduce risky behavior. With respect to the former, early evidence suggests that mar-

shalling the political will and the financial resources to offer ART to a nation's HIV-infected population will distract governments from HIV prevention programs rather than strengthen the political will to prevent new infections. For individuals the availability of ART will probably encourage voluntary counseling and testing, but it is not clear how such information will affect individual risk behavior or the consequent rate of new infections.

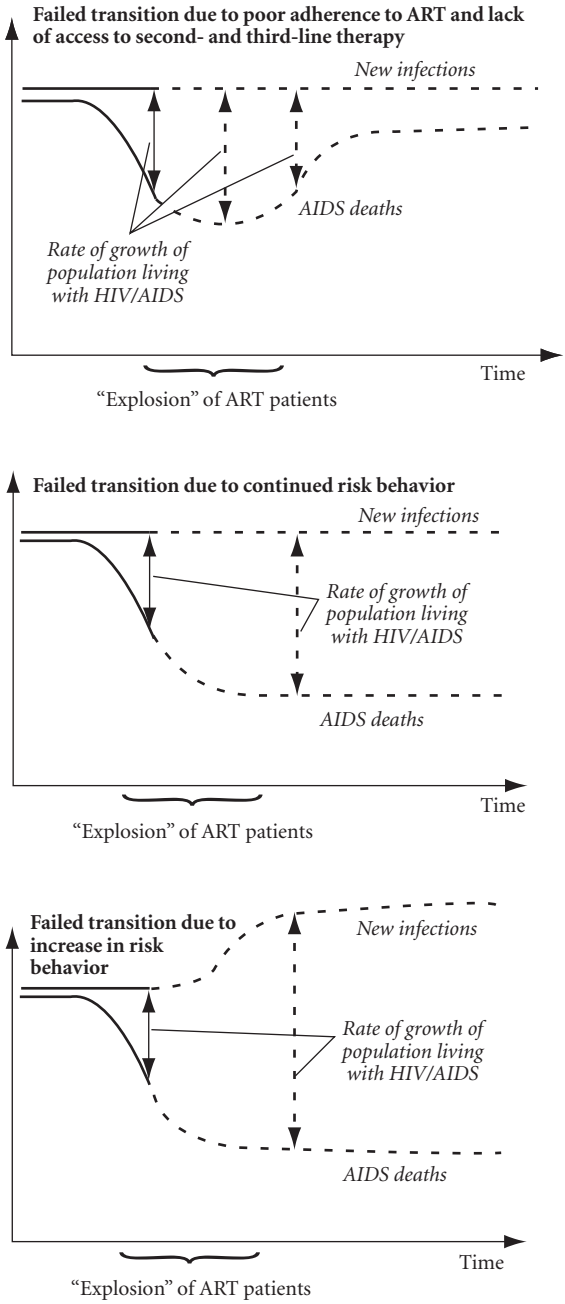
Figure 10.11 presents three alternative future patterns that are less optimistic than the AIDS transition pattern depicted in Figure 10.10. In all three (individually and in various combinations), the population undergoing treatment with ART will grow until, by the arithmetic of compound interest, it consumes an ever-growing portion of the total resources of the health sector and then of society as a whole.

The top panel of Figure 10.11 shows a pattern that would result if adherence rates are so low that the introduction of ART only temporarily lowers death rates, while HIV infection rates remain stable. Realization of this path would mean that the attempt to alter the course of the AIDS epidemic by expanding access to ART has not worked. There would be a "boom" in the HIV-positive population as a cohort of ART patients emerges whose lives are extended by ART, and as all HIV-infected people would experience longer life expectancy than before the ART expansion. But without a decrease in the infection rate, the gap between the growth rates of infection and AIDS mortality would be wider than before, so that the number of people dependent on ART would grow faster.

The middle panel of Figure 10.11 illustrates an ART "explosion" similar to the population explosion feared in the 1960s. The number of ART patients would grow rapidly, and compound interest would ensure that, within a decade or two, caring for people on ART would consume an impossibly high 100 percent of GDP. But the number of ART patients could grow even faster if the scenario depicted in the bottom panel of the figure should come to pass. Here the possibility of successful treatment for AIDS (as shown by the fact that the AIDS death rate falls and remains low) encourages a resumption of high-risk behavior, from which people might otherwise have abstained for fear of contracting AIDS.[3] Thus the rate of new HIV infections accelerates while that of AIDS mortality slows. The impossible outcome of 100 percent of GDP being spent for AIDS treatment arrives even sooner under this scenario.

[3]See Over and others (2004) for simulations, in the context of India, of the cost-effectiveness of ART with and without changes in risk behavior.

Figure 10.11. Possible Alternative Scenarios to a Successful AIDS Transition
(New infections or deaths per 1,000 population)



Beginning with Thomas Malthus, all who have predicted humanity's self-inflicted doom due to the arithmetic of compound interest have been proved wrong. Societies keep finding ways to avoid spending all their resources on any one sector, partly through market mechanisms (which drive up the cost of scarce resources, such as health professionals) and partly through extra-market social and political responses to scarcity (such as the apparent change in sexual mores that has reduced the rate of new HIV infections in Uganda). However, it would be irresponsible to take excessive comfort from the fact that the demographic transition has saved humankind from a modern version of the fate that Malthus predicted. To do so would be to discount, as misguided and wasted, the efforts of family planning programs and their supporters in the second half of the twentieth century. Instead governments, donors, and civil society need to work together to ensure that the second part of the demographic transition, the reduction in birthrates, finds its reflection in a reduction in new HIV infections, so that the AIDS transition does indeed resemble the previous one.

Conclusions and Policy Recommendations

The goal announced by the WHO to provide antiretroviral therapy to 3 million people by 2005 is extremely ambitious. Conservative projections of the cost of covering 3 million people in the 34 targeted countries suggest that only 8 of those countries, accounting for only 21 percent of the 3 million people, are in a situation similar to that of Brazil, with a small enough burden of AIDS patients relative to its income and its health system's capacity to put the objective of full coverage within reach. Another 11 countries, home to 41 percent of the 3 million, face a daunting challenge as they attempt to provide care for their HIV-positive populations, because they will have to expand health care spending per physician by more than 10 times their income per capita. This extra demand for health care resources will place great pressure on these countries' health care systems, driving up the price of all health care and increasing the incomes of all physicians, whether or not they deliver AIDS care. If these countries succeed, it will likely be because their economies have substantial resources, which the pressure of this new spending will bid away from alternative uses into health care generally, and into AIDS care in particular.

Facing the greatest challenge as they attempt to deliver ART are the 14 countries of the 34 that have both low incomes and weak health care systems, where 38 percent of the 3 million targeted AIDS patients envisaged under the WHO's 3 by 5 initiative are living. Their task is to channel

into AIDS treatment resources per physician amounting to 20 to 500 times their income per capita, and their efforts are bound to encounter obstacles and bottlenecks. History suggests that attempts to direct such vast resources into new programs in poor countries will result in either failure to disburse or substantial leakage of resources into avenues not anticipated in the program design. Success will require a total transformation of these countries' health care systems, which international donors have already been working to transform since the 1960s. Given sufficient political commitment, however, such an unprecedented transformation may yet be possible.

Even if the 3 by 5 target is not reached, the effort to expand treatment to all 34 of these countries will in any event help large numbers of AIDS patients postpone for years the onset of opportunistic illnesses and death. This is a laudable outcome. But the opportunity cost to countries receiving these resource flows is likely to be largest in those countries where capacity is currently weakest. The health costs of diverting human resources from other parts of the health care system to AIDS care, the damage to health care institutions from the effort to prevent leakage to unintended uses (or from failure to prevent such leakage), and the fact that each person helped by the program will become dependent on the health care system for a lifetime supply of antiretrovirals—all these costs must be set against the expected health benefits. Vigorous national and international attention to the effects of these programs on the people and institutions of the recipient countries will be required to maximize these benefits and minimize the costs.

What policies can governments and donors adopt to maximize the benefits of new AIDS resource flows and minimize their cost? Although the specifics of those policies will differ in each country's program, lessons can be learned from applying the principles of improving public sector accountability detailed in *World Development Report 2004* (World Bank, 2003). As discussed earlier in this chapter, the report points out that health care providers in charge of administering an ART program are agents for two sets of principals: their patients, who are the consumers of their services, and their employers, who supervise, reward, and sanction the providers. The report argues that the effort and the quality of health care providers, like those of other public service providers, are affected not only by their professional training and ethics, but also by the quality of supervision they receive from both sets of principals, and by the strength of the incentives these principals can bring to bear.

The data presented in Figures 10.3 and 10.4 show that these providers are not currently performing even close to existing norms in many poor

countries. The World Bank report argues that these deficiencies in performance are due as much to poor supervision and a lack of results-based incentives as to insufficient financing. However, success stories can be found. The increased flow of public resources that arrived at Ugandan village schools after villagers were told how much was supposed to arrive shows how powerful public disclosure can be in ensuring quality performance on the part of health care agents (Reinikka and Svensson, 2004). Contracting out health care services achieves substantial efficiency and quality improvements when the contract is properly defined and adequately funded. Over the medium run and beyond, governments can follow policies that will facilitate an AIDS transition, to a regime in which AIDS mortality begins to resemble the mortality rate of HIV-negative people and the rate of new infections drops even lower. However, alternatively, much less optimistic scenarios may also materialize and may even be likely in the absence of increased government attention to prevention programs.

The challenge in expanding access to antiretroviral treatments will be for governments and donors to monitor and evaluate the treatment programs well enough to detect signs of problems early, when they can still be corrected. Multiple experimental designs of systems to deliver ART should be allowed, to increase the chances of finding the best approach. Only through heavy investment in monitoring and evaluation will sponsors be able to track and identify failures as well as successes, and to learn how to avoid the former and ensure the latter.

References

Bernstein, C.A., J.G. Rabkin, and H. Wolland, 1990, "Medical and Dental Students' Attitudes About the AIDS Epidemic," *Academic Medicine,* Vol. 65, No. 7, pp. 458–60.

Bolduc, Denis, Bernard Fortin, and Marc-Andre Fournier, 1996, "The Impact of Incentive Policies on the Practice Location of Doctors: A Multinomial Probit Analysis," *Journal of Labor Economics,* Vol. 14 (October), pp. 703–32.

Buvé, S., and others, 1994, "Mortality Among Female Nurses in the Face of the AIDS Epidemic: A Pilot Study in Zambia," *AIDS,* Vol. 8, No. 3, p. 396.

Chawla, Mukesh, 1993, "Physician Moonlighting in Egypt" (Ph.D. dissertation; Boston, Massachusetts: Boston University, Department of Economics).

———, 1997, "Dual-Job Holdings by Public Sector Physicians in India," Department of Population and International Health Working Paper (Boston, Massachusetts: Harvard School of Public Health).

European Commission, 1995, *Safe Blood in Developing Countries: The Lessons from Uganda,* ed. by Rex Winsbury, Development Studies and Research Series (Luxembourg: Office for Official Publications of the European Communities).

Filmer, Deon, 2003, "The Incidence of Public Expenditures on Health and Development," background note for *World Development Report 2004* (Washington: World Bank).

Floyd, Katherine, and Charles F. Gilks, 1996, "Impact of, and Response to, the HIV Epidemic at Kenyatta National Hospital, Nairobi," Report 1, April (Liverpool, United Kingdom: Liverpool School of Tropical Medicine).

Gutierrez, Juan Pablo, and others, 2004, "Achieving the WHO/UNAIDS Antiretroviral Treatment 3 by 5 Goal: What Will It Cost?" *The Lancet,* Vol. 364, No. 9428, pp. 63–64.

Lindelöw, Magnus, 2003, "Public Expenditure Tracking and Service Delivery Surveys," paper presented at the 11th International Anti-Corruption Conference, May 25–28, Seoul.

———, Pieter Serneels, and Teigesti Lemma, 2003, "Synthesis of Focus Group Discussions with Health Workers In Ethiopia" (unpublished; Washington: Development Research Group, World Bank).

Mann, Jonathan, and others, 1986, "HIV Seroprevalence Among Hospital Workers in Kinshasa, Zaire: Lack of Association with Occupational Exposure," *Journal of the American Medical Association,* Vol. 256, No. 22, pp. 3099–3102.

Mazzullo, J., and others, 1990, "Influencing Choices of Medical Students to HIV-Related Careers," Abstract no. S.D.910, Sixth International AIDS Conference, San Francisco, June 20–24.

Okero, F. Amolo, and others, 2003, "Scaling up Antiretroviral Therapy: Experience in Uganda—Case Study" (Geneva: World Health Organization).

Over, Mead, and others, 1992, "The Consequences of Adult Ill-Health," in *The Health of Adults in the Developing World,* ed. by Richard A. Feachem and others (New York: Oxford University Press).

———, 2004, *HIV/AIDS Prevention and Treatment in India: Modeling the Costs and Consequences* (Washington: World Bank).

Reinikka, Ritva, and Jakob Svensson, 2003, "Working for God? Evaluating Service Delivery of Religious Not-for-Profit Health Care Providers in Uganda," Policy Research Working Paper No. 3058 (Washington: World Bank).

———, 2004, "The Power of Information: Evidence from a Newspaper Campaign to Reduce Capture," Policy Research Working Paper No. 3239 (Washington: World Bank).

Sauerborn, R., P. Berman, and A. Nougtara, 1996, "Age Bias, but No Gender Bias, in the Intra-Household Resource Allocation for Health Care in Rural Burkina Faso," *Health Transition Review,* Vol. 6, No. 2, pp. 131–45.

Schechter, Mauro, 2004, "Lessons Learned from the Scale-up of ARV Treatment in Brazil," presentation at a Workshop on Antiretroviral Drug Use in Resource-Constrained Settings, January 27–28 (Washington: Institute of Medicine).

World Bank, 1997, *Confronting AIDS: Public Priorities in a Global Epidemic.* (New York: Oxford University Press).

———, 1999, *Confronting AIDS: Public Priorities in a Global Epidemic,* (New York: Oxford University Press, rev. ed.).

———, 2003, *World Development Report 2004: Making Services Work for Poor People* (Washington: World Bank and Oxford University Press).

———, 2004, *World Development Indicators 2004* (Washington).

World Health Organization, 2003, "Treating 3 Million by 2005—Making It Happen: The WHO Strategy" (Geneva).