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The Impact of HIV/AIDS on Government Finance and Public Services

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HIV/AIDS is a serious challenge to economic development. Increasing mortality and morbidity reduce living standards directly and have repercussions that affect all areas of the economy. Individuals and households face increasing risks, both directly through the risk of infection, and indirectly as formal and informal social insurance mechanisms are eroded. Companies face productivity losses and increasing costs of medical and death-related benefits. At the macroeconomic level, economic growth declines as the population grows more slowly and as reduced national saving, rising costs, and declining economic prospects deter investment.¹

Against this background, this chapter examines the implications of HIV/AIDS for government finance and public services. In countries afflicted by HIV/AIDS epidemics, governments' capacities are diminished by increasing mortality, and domestic revenue slows, even as the demand for certain government services, most notably in the health sector, expands.² Along these lines, this chapter will address three broad questions:

¹For a broader discussion of the macroeconomic effects of HIV/AIDS, see Haacker (Chapter 2, this volume).

²Barnett and Whiteside (2002) also discuss the impact of HIV/AIDS on the public sector but take a wider perspective, covering the impact of HIV/AIDS on political processes in more detail. Braimah (2004) provides a much shorter discussion of the issues discussed here; his study also considers broadly the responses to HIV/AIDS from a public sector perspective.

- *What is the impact of HIV/AIDS on government employees, personnel costs, and the efficiency of public services?* Increased mortality, concentrated among the working-age population, results in disruptions to public services and, over time, will change the age composition of public servants. At the same time, governments frequently offer health and other benefits to public servants that are generous by national standards, and the costs of these benefits are likely to rise.
- *What are the implications of HIV/AIDS for public policy, and what are the fiscal consequences?* The most direct policy responses are efforts at prevention (for example, through the mass media, education, or workplace interventions) and the expansion of public health services. Through the adverse economic consequences of HIV/AIDS on individuals and households, the epidemic also creates challenges for social policy, in particular regarding the very substantial numbers of orphans. In light of the key role of education in economic development and also HIV/AIDS prevention, this chapter also discusses the impact of HIV/AIDS on the education sector.
- *How does HIV/AIDS affect government revenue, and what is the role of external finance?* HIV/AIDS has an adverse impact on the domestic tax base, and thus on government revenue. For most countries with high HIV prevalence, external grants account for a large proportion of general health expenditure and probably an even greater proportion of expenditure related to HIV/AIDS. Also, since external grants are frequently disbursed not through the government budget, but directly from the donor to the implementing agency, coordination of the various agencies active in this area is an important aspect of the government's agenda.

With data still scarce and our present understanding of the broad economic effects of HIV/AIDS still poor (at least in terms of a quantitative macroeconomic analysis), this chapter will not arrive at conclusive answers to these three questions. Instead, the aim of this chapter is to formulate an analytical framework and to synthesize the data that are available, to assist policymakers in developing a policy response to HIV/AIDS. At the same time, the fiscal repercussions of HIV/AIDS—its impact on the civil service, government expenditure, and government revenue—go far beyond what is generally subsumed under the costs of or the response to HIV/AIDS. For countries with severe epidemics, HIV/AIDS is therefore a general fiscal policy issue, and this chapter aims to contribute to an improved understanding of the consequences of HIV/AIDS from this angle as well.

The chapter is organized as follows. The first section analyzes how HIV/AIDS affects the government's human capacities through increased

mortality. Because of medical and death-related benefits and other costs related to increased attrition, the costs of public services increase for all areas of government. The losses in efficiency of public services, however, extend beyond the disruptions associated with increased attrition. For example, the age composition of government employees changes as many more die young and many fewer reach retirement age. The next four sections highlight various areas of government services or public expenditure particularly affected by HIV/AIDS: HIV prevention, care, and treatment; education; social expenditure; and pension schemes. HIV/AIDS also has an impact on government revenue. Therefore the chapter's sixth section discusses changes in domestic government revenue and the financing of general and HIV/AIDS-specific health expenditure. In many low-income countries, external grants play a very important role in financing HIV/AIDS-related expenditure, and this is the topic of the seventh section. The penultimate section discusses some issues pertaining to the impact of HIV/AIDS in the longer run. The final section concludes.

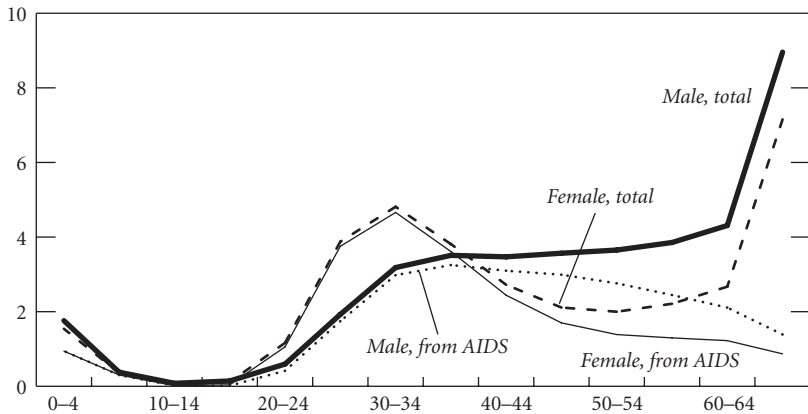
Impact on Government Employees and Personnel Costs

The HIV/AIDS epidemic affects all levels and functions of government as an increasing number of government employees fall ill and die. Beyond the disruptions to public services associated with increased attrition rates, HIV/AIDS also affects the composition of government employees in various dimensions and the level of human capital available to the government. Also, because government employees generally enjoy some form of retirement, death-related, and medical benefits, the government's personnel costs increase.

Increased Mortality

Higher mortality and morbidity affect public services through higher attrition and absenteeism of government employees affected by HIV/AIDS, and through lower productivity owing to their deteriorating health. More broadly, HIV/AIDS also results in higher absenteeism among those not infected—for example, as these workers are obliged to care for sick family members and to attend funerals. The demographic implications of the epidemic are treated in more detail elsewhere in this volume; this section therefore only briefly highlights some of the consequences for the public sector and discusses the available evidence.

Figure 7.1. Mortality Rates by Age and Sex in Namibia, 2004
(Percent)

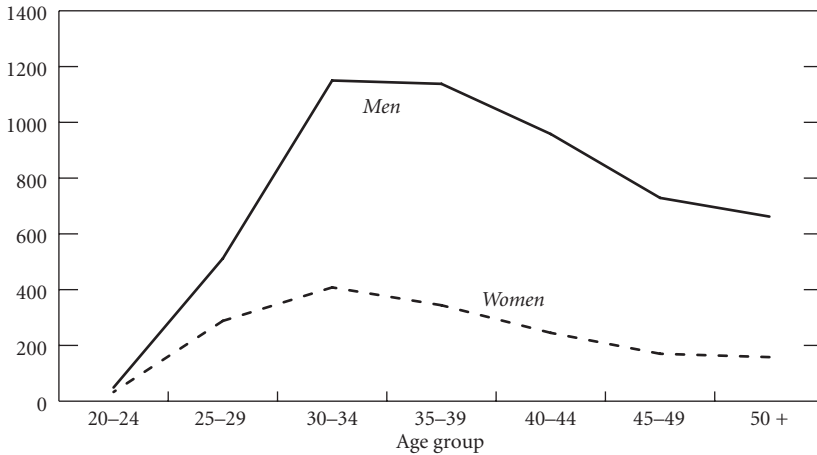


Source: International Programs Center, U.S. Census Bureau.

To illustrate the implications of the demographic impact of HIV/AIDS, Figure 7.1 shows the estimated mortality pattern by age and sex for Namibia in 2004. With an estimated prevalence rate of 21 percent, Namibia is one of the countries worst affected by HIV. Mortality peaks at 4.2 percent at ages 30–34 for females, and at 3.2 percent at ages 40–44 for males. The impact of HIV/AIDS on mortality has been discussed in more detail elsewhere (see, in particular, Epstein, Chapter 1 of this volume), and this chapter will not duplicate that discussion. Regarding the impact on the civil service, it is important to note that for ages 20–54, a range that includes most public servants, mortality averages 2.5 percent, of which AIDS accounts for 2.2 percentage points, or almost 90 percent. This means that, for this age group, mortality increases about 7½-fold for men and almost 12-fold for women. The data also show a strong sex bias, with women affected at an earlier age and suffering higher mortality overall.

One of the most thorough studies so far of the impact of HIV/AIDS on government workers covers the staff of five ministries in Malawi (Government of Malawi and United Nations Development Programme (UNDP), 2002). It shows that death-related attrition rates increased substantially between 1990 and 2000, for example, from 0.1 percent to 0.7 percent for the Ministry of Education, and from 1.1 percent to 2.7 percent for the police service. Although these data are subject to some uncertainty, the age profile of the observed mortality, peaking at ages 30–34, suggests that

Figure 7.2. Malawi: Mortality by Age and Sex in the Public Sector, 1990–2000
(Absolute numbers)



Source: Government of Malawi and UNDP, 2002.

much of it is related to HIV/AIDS (Figure 7.2).³ Vacancy rates, meanwhile, are very high, ranging from 37 to 77 percent. This suggests that government employees cannot be replaced easily and that an increase in the attrition rate may be causing serious disruptions to the affected government units.

Increased attrition, in addition to its adverse impact on current government operations, has structural effects that accumulate over the years. Most important, the age composition will change, as fewer government employees survive until retirement or to any given age. Also, in most countries with severe HIV/AIDS epidemics, women are disproportionately affected. Table 7.1 shows the probabilities of 20-year-old men and women surviving until various ages, using estimated mortality rates from Zambia (which is among the countries with the highest HIV prevalence rates worldwide) for 2003. The overall (male and female) probability of survival from age 20 until age 30 falls to about 85 percent, from about 95 percent in the absence of HIV/AIDS. The impact of HIV/AIDS in this example is so severe that, whereas only about 3 in 10 20-year-old males would be

³Figure 7.2 reports mortality in absolute numbers of deaths rather than as percentages of the public sector workforce. The higher mortality observed for men reflects the fact that most public sector employees are men. The study does not report the absolute numbers of male or female government employees over this period.

Table 7.1. Zambia: Estimated Survival Probabilities for 20-Year-Olds, by Sex, 2004
(Percent)

Age	Probability of Survival Until Indicated Age			
	Male		Female	
	Actual	In absence of AIDS	Actual	In absence of AIDS
30	87.8	94.5	82.9	96.1
40	62.8	88.4	52.2	91.0
50	41.5	80.2	37.9	84.3
60	26.7	67.7	29.3	74.3

Source: Author's calculations, based on U.S. Census Bureau estimates of mortality rates for 2004.

expected to die before age 60 in the absence of HIV/AIDS, in its presence only about three in ten are expected to *survive* until age 60. Table 7.1 also shows that women are affected more severely than men, and at an earlier age. For 20-year-old women the survival rate until age 60 declines from three-fourths to less than 30 percent, and the impact of HIV/AIDS on 20-year-old women's mortality until age 30 (an increase of 13.2 percentage points) is about twice the impact for men (6.7 percentage points).

Personnel Costs

HIV/AIDS-related personnel costs for the general civil service (as opposed to the costs of expanding certain public services, such as health, which are discussed further below) can broadly be categorized in terms of absenteeism (of the sick staff members themselves, and of other employees who will attend their funerals), sick leave, medical benefits, death-related benefits, and the additional costs of replacing staff lost due to HIV/AIDS (most notably training costs).⁴

As the health status of those infected deteriorates, and as the need to care for sick relatives increases, HIV/AIDS results in an increase in absenteeism. Because absenteeism, unlike sick leave, is characterized by informal absences, whether for extended periods or only for several hours at a time, it is very difficult to measure. For instance, the Government of Malawi and

⁴Much of the literature on the costs of HIV/AIDS to the private sector also applies; see Haacker (Chapter 2, this volume) for a discussion. However, the impact of HIV/AIDS on personnel costs in the public sector is generally larger, because benefits tend to be more comprehensive (partly because of a larger share of permanent employees in the public sector), and because the private sector is more likely to adjust benefits downward in response to rising costs. Barnett and Whiteside (2002) make a similar point.

UNDP (2002) estimate that absenteeism averages 65 days a year for employees with full-blown AIDS, and 15 days a year for those who are infected but have not yet developed the full symptoms. This means that if 2 percent of public servants have full-blown AIDS, and another 20 percent take health-related absences of 15 days each, then absenteeism will amount to 2.0 percent of all working hours (assuming 220 working days in a year).

Grassly and others (2003) estimate that absenteeism amounts to an average of 1.3 months annually per HIV-infected employee, with each infected worker experiencing 12 to 14 illness episodes before the terminal illness (Government of Malawi and UNDP, 2002). With an overall HIV prevalence rate of 20 percent, this would mean a rise in absenteeism of 2.2 percent.

When public servants become too sick to work, they can usually request sick leave at full or reduced pay for a specified period. In Zambia, for example, the Ministry of Agriculture, Food, and Forestry allows for a continuous absence of 90 days at full pay, and another 6 months at half pay. In Swaziland a public servant may take up to 6 months of sick leave at full pay, and another 6 months at half pay. Although these examples cannot be generalized (provision for sick leave differs substantially across countries), these two examples suggest that, for a country where 2 percent of public servants drop out of the service for HIV/AIDS-related reasons, about 1 to 1.5 percent of all public servants may be on sick leave at a given time as a consequence.

Apart from morbidity-related absenteeism and sick leave, another primary cause of absenteeism is attendance at the funerals of those who have died of AIDS. At the aggregate level, it is possible to draw some conclusions on the impact of HIV/AIDS-related mortality on funeral attendance. If, for example, mortality rises by 2 percentage points, 40 people attend each funeral, funeral attendance requires an absence of 2 days (including travel time), and total working time each year is 220 days, then HIV/AIDS will increase absenteeism by 0.7 percentage point. However, these aggregate numbers are likely to understate the disruptions caused by funeral attendance. As government employees die of AIDS and their colleagues attend the funeral, the work of the affected government agency can come to a standstill.

Altogether, these considerations suggest that the impact of HIV/AIDS on the productivity of government employees can be considerable. For a country with HIV/AIDS-related mortality of 2 percent, absenteeism and sick leave would absorb 2 to 3 percent of the total working time of public servants. At least in the case of informal absences (and in light of existing budget constraints), it is likely that this would not translate into additional

hiring, but instead into reduced productivity and reduced delivery of public services. Moreover, the problem of increased absenteeism will be compounded by an increase in vacancies if positions are not filled immediately. Although these increased vacancies do not directly contribute to costs (indeed, for a given number of positions, an increase in vacancies would reduce personnel costs), they are likely to exacerbate service disruptions.⁵

In countries with weak governance and nontransparent public records, the efficiency of the public service may also suffer if deceased government employees remain on the payroll, to the benefit of corrupt government officials or the surviving dependents. In this case increased mortality would result in an increase in the number of “ghost workers.”

Government employees generally enjoy some form of medical benefits, which can take the form of medical insurance, free (and possibly privileged) access to public health services, or discretionary funds (for example, at the ministerial level). HIV prevention, care, and treatment are discussed in more detail below. However, some aspects are specific to the government’s role as an employer. In particular, workplace prevention measures (by reducing the incidence of new infections) and the provision of care and treatment (by improving the health status of government employees and reducing mortality rates) not only reduce other HIV/AIDS-related costs but also mitigate losses in the efficiency of government services, discussed below. The costs and financial benefits of HIV/AIDS workplace interventions have been discussed in some detail for the private sector, for example by Rosen and others (2004) and Simon and others (2000).⁶ One of the lessons from these studies, which also applies here, is that the financial benefits from improvements in prevention measures and medical services are significant, and they need to be taken into account when assessing the overall fiscal effects of HIV/AIDS.

Death-related benefits comprise funeral benefits, lump-sum benefits paid to surviving dependents, and pensions to surviving dependents (typically the deceased worker’s spouse and under-age children). Because public pension funds may cover the civil service only or parts of the private sector as well, this issue is treated in more detail below. Government agencies often cover the funeral expenses of their employees, whether by formal

⁵JTK Associates (2002), in a study of the impact of HIV/AIDS on three government ministries in Swaziland, emphasizes the high level of vacancies, which increases the workload of the remaining government employees. The study points out that, “should the central agencies continue growing at the same rate as in the past several years (i.e. at close to 2% [a year]), recruitment will need to double to accommodate the loss of personnel to AIDS.”

⁶See also Haacker (Chapter 2, this volume), which draws on this earlier literature.

or informal arrangement. The cost can be substantial. For instance, in a sample of households from South Africa, the cost of a funeral averaged four monthly salaries; the average cost of a single funeral to the Ministry of Education in Zambia was \$176 (in 2001 dollars), or 11 percent of an average annual salary.⁷ Thus, if all government employees are eligible for funeral grants in the range of 1 to 4 monthly salaries, and if the HIV/AIDS-related mortality rate is 2 percent, the total cost will equal about 0.2 to 0.7 percent of the total wage bill. If the government also provides funeral grants for family members of its workers, the total could be substantially higher.

Because government employees who have fallen sick or died need to be replaced, HIV/AIDS also has implications for the costs of training. Depending on the employee's job category, these costs range from small amounts for basic on-the-job training to very substantial investments involving several years of training abroad. Training costs may appear in the government budget directly (for example, when line ministries conduct training events) or indirectly (through increased allocations to general or vocational educational institutions, or informal training on the job); if the public servants lost due to HIV/AIDS are not replaced by similarly qualified staff, the primary cost will be a decline in the quality of the civil service.

The increase in training costs due to HIV/AIDS can be calculated in different ways. One way is to multiply the estimated average cost of training per person by the number of new staff needed. Another is to assess, using more aggregated data on the existing capacities and budgets of educational institutions, how much these institutions will have to expand.

Following the first approach, Grassly and others (2003) estimate, for the case of Zambia, the cost of training one teacher over two years at \$413 to \$606 (in 2001 dollars), an amount equal to about four monthly salaries. In this case, if mortality among teachers increases by 2 percent, the additional training of teachers will cost an amount roughly equivalent to 0.7 percent of the wage bill for teachers. However, for positions requiring several years of university education, the costs can be much higher. Topouzis (2003), citing another study from Zambia, reports annual costs of university education of between \$2,500 and \$3,000; professional staff at the Ministry of Agriculture, for example, usually have at least five years of university training.

⁷See Steinberg and others (2002) for South Africa, and Grassly and others (2003) for Zambia.

The primary advantage of the second approach is that it requires fewer data: in its simplest form, all one needs is data on attrition rates with and without AIDS. For example, if staff attrition is 2 percent without HIV/AIDS, and HIV/AIDS raises it by 1 percentage point, then, for every 100 public servants, three rather than two new staff members need to be hired and trained annually, corresponding to an increase of 50 percent in required training. This method can also be applied to identifying bottlenecks in the capacities of relevant training institutes.

One very important factor in determining training costs, especially in health services, is brain drain. The emigration of trained workers can greatly increase the number of people who need to be trained to replace employees who have died, or to meet the requirements of an expanded response to HIV/AIDS. Especially in low-income countries, recent graduates may leave the country to take higher-paid positions in other countries in the region or further abroad. To some extent this is presumably included in estimated rates of attrition, but such measures do not capture brain drain among new graduates. If, for example, 20 percent of graduates immediately take jobs abroad, estimates of the required costs of training using the first method described above would need to be adjusted upward by 20 percent. The second method, which applies a multiplier to the total number of people actually trained, does account for this form of brain drain, provided that the rate of brain drain does not change in response to increased HIV prevalence.

One other consideration is often overlooked in analyses of the cost of training, namely, that at the national level the number of job candidates with suitable skills is limited. In the worst-affected countries in sub-Saharan Africa, there is considerable slack in the labor market for the lower educational categories. For higher educational or skill categories, however, the labor market is much tighter, and hiring additional staff in these categories would crowd out hiring by other employers. Thus any policy to compensate for or offset the impact of HIV/AIDS on the public sector, or to expand various categories of public services, needs to be consistent with the situation in the labor market and with the country's overall development objectives.

Efficiency of Public Services

HIV/AIDS increases the number of government employees taking early retirement for medical reasons or dying in service. Increased attrition rates and absenteeism for medical reasons or to attend funerals (discussed above) cause disruptions to work processes and thus affect the efficiency of public services.

Some of the efficiency losses—those related to sick leave, increased absenteeism for medical reasons, and funeral attendance—have already been discussed in the context of personnel costs. In a private sector context these losses would result in an increase in unit costs, which can be interpreted either as an increase in production costs to achieve a given output, or as a decline in the productivity of a given number of employees.⁸

In the public sector these losses are most likely to result in a decline in the quality of services rather than additional hiring, for two reasons. First, almost all government employees are permanent employees, and the positions of those falling ill cannot be filled before they either die or retire. Thus the responsibilities of an ill employee are typically taken on by someone else in an acting capacity (who in turn usually must pass on some of his or her normal responsibilities) or shared between colleagues in the same unit. Second, staff allocations are typically driven by a centralized annual budget process, and so there is little flexibility to hire additional staff to cover bottlenecks in particular units, especially on a temporary basis.

These efficiency losses are likely to go beyond those caused by increased absenteeism. Once a government employee dies or retires, the position cannot be filled instantaneously. Many government jobs, in particular senior positions, need to be advertised, the applications screened, and candidates interviewed. The government agency then selects one or more candidates and makes offers, which may be rejected or may have to be negotiated. Once a candidate accepts an offer, the appointment needs to be confirmed. Especially for senior positions, the entire process can take several months or more to complete.

Aggregate estimates of increased absenteeism do not reflect differences in the extent to which the workload of government employees can be reallocated temporarily during episodes of sickness. Generally, those staff members who are most difficult to replace are those holding critical positions at the nodes of the government's organization or internal communications, or whose positions are endpoints in the localized delivery of services, especially in rural areas. The first group includes primarily senior government staff, who often have advanced degrees and many years of

⁸Note, however, that the increase in staff required to achieve a particular output generally exceeds the percentage of working time lost to HIV/AIDS. The reason is that labor can be interpreted as a homogeneous factor of production only in very special circumstances. More commonly, each worker fulfills a certain role within an organization, which requires certain specific skills; any replacements would have to match those skills. Since labor is not easily divisible, this matching can be hard to achieve.

experience. When these public servants fall ill, the efficiency of the government units reporting to them can be undermined. Government services in rural areas are particularly vulnerable because the units providing these services are generally smaller or more decentralized. Examples include local schoolteachers and agricultural extension workers (see Topouzis, 2003). In the smallest local government units (such as a school with one or two teachers), it is simply impossible to cover for the sickness or death of a public servant by reallocating work to co-workers. Also, because of the distances involved, supervisors are likely to be less aware of an increase in health-related absenteeism.

The change in the age structure of government employees also has implications for the efficiency of public services. Again, senior government staff are typically drawn from a pool of public servants with many years, even decades, of experience. Increased mortality means that this pool is shrinking. Assume, for example, that a minister has to be appointed, and that ordinarily there would be six candidates on the short list, all of them about 50 years of age. If the example from Table 7.1 is representative of government employees at this level, the likelihood is that, of the six candidates who would have ordinarily made the short list, three will be dead by the age of 50.⁹ Although this statistical probability may or may not affect any particular appointment, it does indicate a catastrophic loss of senior public servants in total, which would have a severe impact on the quality of management of government agencies and decision making at the highest levels.

More generally, the efficiency of an organization at any level may depend on the number of employees who “know the ropes” and who have developed their problem-solving skills through experience. By thinning out this stock of experience, increased mortality—in addition to disruptions caused by sickness and higher attrition—can have an accumulative effect. These longer-term effects are captured in the term “institutional memory.” An institution’s memory is largely embodied in its staff, and especially in those employees who have stayed with the institution for a long time. To gain a sense of the implications of HIV for institutional memory, consider its impact on the number of government employees with a tenure of 10 years. Suppose that the attrition rate, excluding HIV/AIDS-related mortality, is 2 percent and that with HIV/AIDS it rises

⁹This is calculated as the survival probability until age 50 divided by the survival probability in the absence of HIV/AIDS. The increase in attrition is higher among women than among men, reflecting the differing impact of HIV/AIDS by sex.

by another 2.4 percentage points (in line with the above example for Namibia). In the absence of HIV/AIDS, attrition over a 10-year period would be 18 percent, but *including* the effects of HIV/AIDS it is 36 percent. Equivalently, institutional memory (here measured by the number of employees remaining with the institution for 10 years) declines by 22 percent.¹⁰

Prevention, Care, and Treatment

The preceding section focused on the general impact of HIV/AIDS on the civil service and on personnel costs. This section turns to the government's activities in fighting the epidemic through the prevention of new infections, antiretroviral treatment, and other forms of care. The section begins with a discussion of the most recent estimates of global resource needs for HIV/AIDS-related activities from the Joint United Nations Programme on HIV/AIDS (UNAIDS), mapping out the various components of the global response to the epidemic. In light of the central role of prevention measures in turning back the epidemic, and their crucial role in strengthening efforts to expand access to treatment for people living with HIV/AIDS, prevention programs are discussed next. An analysis of general health expenditure and human resources in some of the worst-affected countries follows, leading into the discussion on care and treatment. That discussion takes a broad perspective, including an assessment of the macroeconomic costs and benefits of antiretroviral treatment. Finally, in most countries with severe HIV epidemics a substantial proportion of HIV/AIDS-related expenditure is financed through external grants and concessional lending, and therefore the section ends by focusing on issues related to and trends in external financing.

Estimates of Global Resource Needs

UNAIDS's latest estimates of global resource needs for an expanded response to AIDS in low- and middle-income countries, issued in June 2004 (UNAIDS, 2004b, shown in Table 7.2) provide some information on priority interventions from a global perspective. The prioritization dif-

¹⁰Let attrition without HIV/AIDS be denoted as α , and attrition owing to HIV/AIDS as β . Ten-year attrition rates are then computed as $1 - (1 - \alpha)^{10}$ and $1 - (1 - \alpha - \beta)^{10}$, respectively. (For convenience, it is assumed that attrition rates are not correlated with tenure.) The decline in institutional memory is then defined as $1 - [(1 - \alpha - \beta)^{10} / (1 - \alpha)^{10}]$.

Table 7.2. Estimated Costs of Scaling up HIV/AIDS Activities in Low- and Middle-Income Countries, 2005

Item	Millions of Dollars	Percent of Total Costs
Prevention-related activities		
General population interventions		
Mass media	96	0.8
Voluntary counseling and testing	1,101	9.5
Total for general population interventions	1,197	10.3
Programs for key populations at high risk		
AIDS education in schools	95	0.8
Outreach for out-of-school youth	633	5.5
Interventions focused on sex workers and their clients	384	3.3
Interventions focused on men who have sex with men	342	3.0
Harm reduction programs	124	1.1
Workplace prevention	505	4.4
Prevention programs for people living with HIV	34	0.3
Prevention for special populations ¹	115	1.0
Total for programs for key populations at high risk	2,232	19.3
Service delivery	2,569	22.2
Condom social marketing	147	1.3
Public and commercial sector condom provision	865	7.5
Improving management of sexually transmitted infections	660	5.7
Prevention of mother-to-child transmission	167	1.4
Blood safety	224	1.9
Postexposure prophylaxis	1	0.0
Safe medical injections	93	0.8
Universal precautions	394	3.4
Other prevention	18	0.2
Total for service delivery	2,569	22.2
Total for prevention-related activities	5,998	51.7
Orphan support		
Orphanage support	509	4.4
Community support	364	3.1
School fees	204	1.8
Total for orphan support	1,077	9.3
Treatment and care		
Palliative care	3,815	32.9
Diagnostic testing	271	2.3
Treatment for opportunistic infections	24	0.2
Prophylaxis for opportunistic infections	349	3.0
Antiretroviral therapy	114	1.0
Laboratory monitoring for antiretroviral therapy	2,875	24.8
Laboratory monitoring for antiretroviral therapy	182	1.6
Total for treatment and care	3,815	32.9
Policy, advocacy, administration, and research		
	545	4.7
Program costs		
	155	1.3
Total, all items	11,592	100.0

Sources: UNAIDS (2004b), and author's calculations.

¹Prisoners, migrants, truck drivers, and others.

fers, however, from country to country. For example, countries with low HIV prevalence at present would be advised to place more emphasis on general prevention; in countries where the epidemic is concentrated in particular subgroups, targeted prevention programs would carry a larger weight. Estimates of resource needs for treatment also reflect an assessment of how quickly access to treatment can be expanded in a given country.¹¹ Total resource needs for low- and middle-income countries in 2005 are estimated at \$11.6 billion, just over half of which (52 percent) goes toward prevention-related activities, 9 percent for social expenditure, 33 percent for treatment, and 6 percent largely for overhead expense and research.

Within the category of preventive activities, some measures aim at specific population groups, largely those at high risk of infection (such as sex workers, men who have sex with men, prisoners, migrants, and truck drivers). In order to reach young people before HIV prevalence in their cohort rises, prevention strategies for this group should include education in the classroom (at relatively low additional cost, since it is delivered through an existing service), and outreach programs for out-of school youth (who are at greater risk of contracting the virus). Workplace programs, at 4.4 percent of total costs, are an important channel for reaching prime-age adults. These measures are complemented by interventions targeting the general population, such as mass media campaigns and voluntary counseling and testing. The latter is one of the more expensive components of the total response, accounting for 9.5 percent of total costs. Whereas these measures aim primarily at education and modification of risky behavior, other prevention measures (those under the heading “service delivery”) focus on specific efforts to reduce infection risk through sexual contact (condom provision), during pregnancy or at birth, or through exposure to infected blood (blood safety protocols and safe injections).

Because of the vulnerability of children in households affected by HIV/AIDS,¹² the global response to HIV/AIDS, as envisaged in the estimates of resource needs, includes provisions targeted at orphans and the households and communities who care for them; these resource needs amount to 9.3 percent of the total. Some of these measures aim at

¹¹Because some of these estimates are politically sensitive, UNAIDS does not release estimates at the country level.

¹²See also Haacker (Chapter 2, this volume), Birdsall and Hamoudi (Chapter 4, this volume), and Bell, Devarajan, and Gersbach (Chapter 3, this volume), and the section titled “Focus—AIDS and Orphans: A Tragedy Unfolding,” in UNAIDS (2004a).

improving orphans' material living standards (for example, through orphanage and community support), whereas others are directed to improving access to education (for example, through subsidies to cover school fees).

About one-third (32.9 percent) of the total estimated resource needs go toward expanded treatment and care. Within this category, antiretroviral therapy (24.8 percent) and associated laboratory costs (1.6 percent) together account for the largest share. The remainder (6.5 percent) covers the estimated costs of palliative care and treatment and prophylaxis for opportunistic infections.

Although the line items in Table 7.2 also describe the major components of an HIV/AIDS program at the country level, the mix of interventions also depends on the state of the epidemic and on the government's policy objectives: many of the interventions, especially in the areas of care, treatment, and social expenditure, are very strongly linked to the rate of HIV or AIDS prevalence in the country. The mix can also vary according to the main transmission modes of the virus, which can differ between and within countries. In designing a broad HIV/AIDS program, it is also important to acknowledge the close interrelationships between some interventions. For example, achieving and maintaining high rates of coverage of antiretroviral treatment will often be possible only if prevention measures succeed at keeping the number of new infections low.¹³ At the same time, the option of receiving treatment is a major incentive for AIDS victims to seek counseling and testing. Some sense of the range of national responses can be gleaned from countries' announced plans for their general response to HIV/AIDS. For example, Botswana's National Strategic Framework for HIV/AIDS 2003–09 is at once a national plan and a means of engaging government ministries and regional entities in the national response, requiring each to formulate its own response to HIV/AIDS (see Botswana National AIDS Coordinating Agency, 2003; see also Masha, Chapter 9 of this volume). An important feature of South Africa's Operational Plan for Comprehensive HIV and AIDS Care, Management, and Treatment (Government of the Republic of South Africa, 2003) is the strong emphasis on embedding the response to HIV/AIDS within the government's objective of broadening and improving access to health care.

¹³UNAIDS (2004a, p. 69) points out that "without sharply reducing HIV incidence, expanded access to treatment becomes unsustainable. Antiretroviral therapy providers will be swamped by demand."

From a broad fiscal perspective, three points about Table 7.2 are worth making. First, it is unclear how the analysis on which the table is based has incorporated the fixed costs of rapidly expanding HIV/AIDS-related services, especially in the area of treatment, other than through assumptions regarding feasible rates at which HIV/AIDS-related services can be expanded. Second, the strategy to improve access to treatment for HIV patients is normally part of a broader strategy for the health sector, and it is often difficult or infeasible to distinguish investments in HIV/AIDS-related services from those in health services generally. Third, in most cases the table shows only the direct fiscal costs of HIV/AIDS-related interventions. The total fiscal costs, however, also include the indirect effects (for example, higher personnel costs and reduced domestic revenue, both of which are treated elsewhere in this chapter), but these are usually not included in studies focusing on the response to HIV/AIDS.

Prevention-Related Activities

Prevention programs are the centerpiece of the public response to HIV/AIDS. The epidemic has a devastating effect not only on the individuals affected, but also on their households and, in countries with high prevalence rates, on societies (see Haacker, Chapter 2 of this volume). Improved access to treatment can mitigate these effects, but they can be avoided only if successful prevention measures bring down the number of infections. However, the broader microeconomic, macroeconomic, and social costs of HIV/AIDS are not included in standard estimates of the cost-effectiveness of prevention and treatment programs, either because they cannot easily be quantified, or because the studies focus on the financial costs of HIV/AIDS-related programs only. Nevertheless, even from this narrow perspective, some prevention measures are known to be highly cost-effective (as discussed further below), and institutions such as UNAIDS emphasize the role of effective prevention programs as a prerequisite to successfully expanding access to treatment. Against this background, the discussion here will focus on a few issues that are particularly relevant from a fiscal and general policy perspective. A comprehensive discussion of the various types of prevention measures is beyond the scope of the chapter; UNAIDS (2004a, 2004b), Global HIV Prevention Group (2003), and World Bank AIDS Campaign Team for Africa (2001) are useful starting points.

Although innovations in the market for antiretroviral drugs and enhanced political commitment have vastly increased the potential to provide, through the public sector, treatment to large numbers of people

living with HIV/AIDS, the disease remains, by a large margin, the leading cause of death in sub-Saharan Africa, and no cure yet exists. Moreover, in light of the limited capacities of providers of antiretroviral treatment, the only way to provide sustainable expanded access to treatment is by sharply reducing the incidence of HIV through expanded prevention programs (UNAIDS, 2004a). The link also runs in the opposite direction: improved access to treatment enhances prevention efforts, such as voluntary counseling and testing, by adding an incentive to get tested for HIV.

The most common “recipes” for enhanced prevention programs distinguish between low-prevalence and high-prevalence settings. In the former, prevention measures are targeted at key populations at risk (such as sex workers, injecting drug users, and men who have sex with men), to keep the epidemic from spreading through the general population. In the latter, these measures are complemented by strategies aiming at broader segments of society (UNAIDS, 2004a; see also Table 7.2). Programs targeting high-risk groups are also among the most efficient preventive interventions. For example, World Bank (2003), on the basis of assessments of alternative measures in Guatemala, Honduras, and Panama, suggests that the most cost-effective measures include free condom distribution to high-risk groups; information, education, and communication targeting these groups; as well as some measures aimed at the more general population, such as social marketing of condoms and voluntary counseling and testing. The Global HIV Prevention Group (2003) also stresses the control of sexually transmitted diseases, safe injections for drug users, and the prevention of mother-to-child transmission.

The most comprehensive studies of the costs of prevention programs, as well as of the costs of care and treatment, are World Bank AIDS Campaign Team for Africa (2001) and Creese and others (2002). The World Bank study aims at costing an expanded global response to HIV/AIDS and presents estimates in a format similar to that in Table 7.2. It also reports estimates of the underlying unit costs. Creese and others (2002) synthesize the available cost estimates at the country level; in addition to unit costs, they provide estimated costs per HIV infection averted and per disability-adjusted life year saved (Table 7.3).

Table 7.3 reinforces the points made about the interrelationships among prevention, care, and treatment in the context of a national response to HIV/AIDS. The estimated costs of preventive measures per HIV infection prevented are lower (in most cases, much lower) than the costs of care and treatment (which are discussed in more detail below) per infection. This shows clearly that prevention measures are the key compo-

Table 7.3. Cost of Selected Prevention Measures in Various Countries in Sub-Saharan Africa
(Dollars, of 2000)

Measure ¹	Cost per HIV Infection Averted	Cost per DALY ² Saved
Blood safety	18–950	1–43
Condom distribution	11–2188	1–99
Diagnosis and treatment of sexually transmitted diseases	271	12
Prevention of mother-to-child transmission ³	20–308	1–12
Peer education for sex workers	79–160	4–7
Voluntary counseling and testing	393–482	18–22

Source: Creese and others (2002).

¹The source study also covers the costs of various forms of care and of antiretroviral treatment, which are omitted here.

²Disability-adjusted life year.

³The table shows the costs of single-dose nevirapine only.

ment of an effective national HIV/AIDS program: as UNAIDS (2004a) puts it, they are the “mainstay of the response to AIDS.”¹⁴

Table 7.3 also points toward some weaknesses in the available literature on the costs of prevention programs. The unit costs reported range widely, reflecting, to some extent, the fact that several measures were subsumed under one heading. (For example, in the case of condom distribution, different measures targeted people of different risk categories.) However, much of the discrepancy related to cost differences across countries. Thus it is very difficult to make inferences regarding global resource needs from country-level studies or, vice versa, to draw conclusions regarding costs at a national level from global estimates.

Finally, the cost estimates in Table 7.3 should be interpreted as average costs in specific situations. The marginal effectiveness of spending on any specific prevention program would eventually decline, and the cost of an additional HIV infection averted would increase. Determining the optimal mix of prevention measures therefore requires a more sophisticated model, such as the GOALS model developed by the Futures Group (see Stover, Bollinger, and Cooper-Arnold, 2003).

¹⁴This conclusion is valid even from a purely financial perspective, looking at only the direct costs of prevention and treatment, but it is even more compelling when the broad economic and social impacts of HIV/AIDS are taken into account. As a practical matter, expanding access to treatment is subject to constraints, even when financing can be secured, the most notable of which are limited human resource and implementation capacities. However, these constraints themselves can be relaxed if successful prevention programs reduce the number of new infections.

Most of the literature dealing with the financial aspects of the response to HIV/AIDS (including this chapter) focuses on the costs of care and treatment, especially (over the past several years) the cost of antiretroviral treatment. This emphasis may seem to contrast with the very important role attributed to preventive measures in the global response to HIV/AIDS, as evident, for example, from UNAIDS's (2004b) estimates of total resource needs (of which preventive measures account for half), but it does not necessarily signify a contradiction. The resource requirements for prevention are estimated roughly according to the number of people at risk of contracting HIV/AIDS. Except in countries with very low HIV prevalence, the share of people at risk (and thus the resource requirements for prevention) is similar across countries, and so are the fiscal and human resource implications of expanded prevention measures. In contrast, the level of required health expenditure mirrors the number of people living with HIV/AIDS in a country, which differs very substantially across countries, so that estimates of the costs of treatment can result in very substantial shifts in health spending or in overall public expenditure. As a consequence, spending on prevention does not raise the same type of fundamental issues regarding the management of public sector financial and human resources that expanded care and treatment do. In particular, because expanded treatment draws not only on the government's financial resources (which, for most developing countries with severe epidemics, are substantially enhanced by foreign grants), but also on certain scarce human resources, such as physicians, the obstacles to achieving desired coverage rates can be complex and have therefore attracted a "disproportionate" share of research compared with the respective roles of treatment and prevention in national HIV/AIDS programs.

In some regards, however, the situation and policy challenges regarding expanded prevention measures are similar to the obstacles to increased access to treatment. This applies, in particular, to the limited coverage rates of prevention measures. In sub-Saharan Africa in 2001, only 6 percent of people had access to voluntary counseling and treatment, and only 1 percent of pregnant women had access to treatment to prevent mother-to-child transmission (Global HIV Prevention Group, 2003). Within countries, coverage of prevention is also correlated with social status (as is access to treatment); for example, fewer out-of-school youth have access to prevention programs than do youth attending school.

One important aspect of government's prevention efforts is measures targeted at public servants. The cost of increased HIV/AIDS-related mortality to the government, both in financial terms and through its adverse effect on the delivery and productivity of public services, has already been

discussed. Enhanced prevention measures help to contain these costs.¹⁵ However, because the government is instrumental in formulating and implementing the national response to HIV/AIDS, introducing awareness programs at government agencies also helps to reinforce the government's policies and thus the national response in this area.¹⁶

Health Sector Resources

The ability of the domestic health sector to cope with the HIV/AIDS epidemic and the extent of the challenge to improve treatment for HIV/AIDS—within the context of the government's development objectives for the health sector in general—are determined by the quality and coverage of existing health services, and these in turn depend on the available financial resources and health personnel.¹⁷ As a starting point, Table 7.4 provides data on the strength of the health sector—health expenditure, human resources, and access to various forms of health services—in a selection of countries affected by HIV/AIDS worldwide. The countries covered (in the table and below) include those with the highest prevalence rates overall, as well as a few countries with lower prevalence rates, to illustrate the still-significant effects of HIV/AIDS in these countries. (The United Kingdom and the United States are also included as comparators.) Total health expenditure per capita ranges from \$3 a year in Ethiopia to more than \$200 a year in Botswana, Brazil, and South Africa; these figures correspond to roughly 0.1 percent and 4.0 percent, respectively, of U.S. spending per capita on medical care.

These differences in spending on health services across countries mainly reflect differences in GDP per capita. As a percentage of GDP, the range in health expenditure is much narrower, from 3.3 percent for Swaziland to 8.6 percent for South Africa. To put it another way, whereas absolute expenditure varies across the developing countries in the table by a factor of 75, expenditure as a share of GDP differs by a factor of only 2.6.

If the purchasing power of the dollar differs across countries, because prices for services and nontraded goods are lower in lower-income countries, health spending in dollar terms is a poor indicator of the quality of

¹⁵This is discussed in more detail in Haacker (Chapter 2, this volume) in the context of the private sector.

¹⁶For example, Botswana's National Strategic Framework on HIV/AIDS includes HIV prevention policies for each ministry.

¹⁷This point is also discussed by Over (Chapter 10, this volume).

Table 7.4. Selected Indicators of the Quality of Health Services in HIV/AIDS-Affected Countries

Country	Health Expenditure per Capita, 2001		Physicians per 100,000 Population	Nurses per 100,000 Population	Hospital Beds per 1,000 Population	Access to Essential Drugs 1997, (percent of population) ²	
	Dollars at PPP ¹	Percent of GDP					
Botswana	202	516	6.6	23.8 (1994)	219.1 (1994)	1.2 (2001) ³	90
Brazil	222	559	7.6	127.2 (1996)	41.3 (1996)	3.1	40
Côte d'Ivoire	39	92	6.2	9.0 (1996)	31.2 (1996)	...	80
Ethiopia	3	29	3.4	2.9 (1995) ³
Haiti	23	93	5.0	16.0 (1995)	10.7 (1997)	0.7	30
Lesotho	21	133	5.5	5.4 (1995)	60.1 (1995)	...	80
Malawi	13	45	7.8	2.8 (1995)	...	1.34 (1998)	...
Mozambique	12	67	5.9	0.9	50
Namibia	121	499	7.0	29.5 (1997)	168.0 (1997)	0.3	80
South Africa	225	971	8.6	56.3 (1996)	471.8 (1996)	0.8 ³	80
Swaziland	39	143	3.3	15.1 (1996)	...	0.7	...
Tanzania	12	23	4.4	4.1 (1995)	85.2 (1995)	0.9	...
Thailand	69	237	3.7	24 (1995)	87 (1995)	2.0 (1995)	95
Uganda	15	88	5.9	...	18.7 (1996)	0.9	70
Zambia	20	44	5.7	6.9 (1995)	113.1 (1995)
Zimbabwe	44	142	6.2	13.9 (1995)	128.7 (1995)	0.5	70
<i>Memorandum:</i>							
United Kingdom	1,398	1,384	7.6	180 (2000)	...	4.1 (2000)	...
United States	4,956	4,956	13.9	279.0 (1995)	972.0 (1996)	3.6 (2000)	...

Sources: WHO (2004b); WHO, *Estimates of Health Personnel*, various years; World Bank (2004b); Ministry of Health, South Africa; Ministry of Health, Botswana; country sources; and authors' calculations.

¹PPP is purchasing power parity (nominal dollars are adjusted for differences in the purchasing power of the dollar in different countries).

²Share of the population for which a certain minimum of essential drugs is available within one hour's walk.

³Public hospitals only.

services. At exchange rates adjusted for purchasing power differences (called purchasing-power-parity, or PPP, exchange rates), total health expenditure per capita ranges from \$23 a year in Tanzania to \$971 a year in South Africa, corresponding to between 0.5 and 19.6 percent of U.S. health expenditure per capita (Table 7.4).¹⁸ Although these differences are substantial, the data are likely to understate somewhat the availability of health services to the typical residents of low-income countries compared with those in industrialized countries, for three reasons. First, older people

¹⁸PPP exchange rates also have the advantage that they respond less to short-term fluctuations in the nominal exchange rate. On the other hand, PPP exchange rates are estimated from the prices of a comprehensive bundle of goods and services, which in many cases differ from the goods and services used by the health sector.

generally account for a disproportionate share of health expenditure, and the age distribution of southern African countries is tilted toward the young. Second, the official data are likely to exclude the informal sector (including moonlighting physicians; see Over, Chapter 10 of this volume), which presumably is larger in low-income countries. Third, in the lowest-income countries, those individuals who can afford it may seek treatment abroad; national data would not capture these outlays.

Another difficulty in interpreting the available national data on general access to health services is that health spending may be skewed toward spending in expensive hospital facilities, available only in few major cities and towns, rather than toward basic health services with universal coverage; the aggregate data do not show which of these is the case. However, Gupta, Verhoeven, and Tiongson (2001) find that higher aggregate public health expenditure is associated with better health status for the poor, especially in low-income countries, and Castro-Leal and others (2000) report that although public spending on health care does favor the better-off, it is nevertheless “reasonably progressive,” in that inequality in the distribution of benefits is less than that in the distribution of income. However, authors such as Filmer, Hammer, and Pritchett (2000, 2002) highlight the role of provider incentives in the delivery of health services,¹⁹ and they note the possibility of a crowding out of private markets for health care—both issues that are also relevant in the context of HIV/AIDS.

More generally, public health expenditure, in the absence of general access to private health insurance (the case in many low-income countries), provides implicit insurance, and thus mitigates the economic risks associated with sickness.

An alternative indicator of the quality of health services is the availability of skilled staff. The best-trained health workers—physicians—are extremely scarce in the poorest countries in the region. Among the countries covered in Table 7.4 Ethiopia and Malawi are at the bottom of this measure, with about 3 formally trained physicians per 100,000 people, about 1 percent of the level in the United States. However, in the poorer countries a larger range of health services is provided by staff who are not formally qualified as physicians. For example, the ratio of nurses to doctors ranges from 10 to 1 to 20 to 1 in southern African countries, whereas a ratio of 3 or 4 to 1 is more common in industrialized countries.

¹⁹World Bank (2004a) and Over (Chapter 10, this volume) provide a more thorough discussion of some of these issues.

In addition to data on financial and human health resources, Table 7.4 includes two indicators of access to health services. The availability of hospital beds serves as a measure of the availability of health services at the high end. It is also relevant because one of the frequently reported consequences of HIV/AIDS is rising occupancy rates of hospital beds by HIV patients. Although differences between countries on this measure are less pronounced, the *quality* of hospital beds, in terms of the available facilities and services, and in light of the data on health expenditure, is likely to differ substantially across countries. Access to essential medicines (defined as the share of the population for which a minimum of essential drugs are available within one hour's walk; World Bank, 2001) ranges from 30 to 95 percent and is more indicative of the geographical coverage of basic health services. However, limited geographical coverage also translates into higher costs of accessing health care, which creates a barrier to access, especially for the poor.

Impact of HIV/AIDS on the Health Sector

The impact of HIV/AIDS on the health sector and the challenges countries face in implementing their response to the epidemic depend on the scale of the epidemic, but also on the available health resources relative to the scale of the epidemic (Table 7.5).²⁰ Some inferences can be drawn from the estimated increases in mortality. Although HIV/AIDS reduces the prevalence of certain diseases, since many individuals do not live long enough to be afflicted by those diseases related to old age,²¹ the overall health status of the population declines, and the demand for health services expands. Moreover, that demand is likely to increase more than proportionally with the spread of HIV, because it affects primarily individuals of working age, who account for a disproportionate share of health expenditure (see Over, Chapter 10 of this volume). Also, the treatment of AIDS and the opportunistic infections that accompany it tends to be more costly than that of many other common diseases (see, for example, Hansen and others, 2000).

In 5 of the 15 countries covered in Table 7.5, HIV/AIDS accounted for more than half of all deaths in 2000. Following the increase in HIV preva-

²⁰Also relevant are the available financial resources in the health sector and how these relate to the estimated costs of treatment. This financial dimension is discussed in some detail later in the chapter.

²¹This is a reason why the difference between deaths from all causes and AIDS-related deaths narrows in countries with high HIV prevalence.

Table 7.5. Selected Indicators of the Impact of HIV/AIDS on the Health Sector in Sub-Saharan Africa*(Percent except where stated otherwise)*

Country	Mortality, All Ages, 2004		Mortality, All Ages, Projected 2010		Share of Hospital Beds Occupied by HIV Patients, Various Years ¹	Number of AIDS Patients per Physician ²
	Total	From AIDS	Total	From AIDS		
Botswana	2.9	2.5	2.9	2.6	60–70	156.7
Côte d'Ivoire	1.5	0.4	1.4	0.5	...	77.8
Ethiopia	1.5	0.2	1.4	0.3	...	151.7
Haiti	1.3	0.3	1.1	0.3	...	38.1
Lesotho ³	1.5	0.6	2.5	1.7	...	535.2
Malawi ³	2.2	1.0	2.4	1.4	30–80	507.1
Mozambique	2.1	0.7	2.2	1.0	30	...
Namibia	1.8	1.3	1.9	1.5	...	72.2
South Africa	2.0	1.3	2.3	1.6	26–70	38.2
Swaziland ³	2.0	1.0	3.2	2.4	50–90	257.0
Tanzania	1.7	0.6	1.5	0.5	40–70	214.6
Uganda	1.3	0.3	1.1	0.2	50	...
Zambia	2.1	1.0	1.9	0.9	60–80	239.1
Zimbabwe ³	2.2	1.7	3.2	2.7	50–80	177.0

Sources: U.S. Census Bureau and as noted below.

¹Estimates obtained from various websites and news agencies.²See text for an explanation of how this indicator has been calculated.³For countries indicated, estimated mortality refers to 2002 rather than 2004, and projections are based on data available in 2002.

lence in many countries over the last several years, mortality rates are expected to rise further: by 2010, HIV/AIDS will account for more than half of all deaths in 11 of the 15 countries covered in Table 7.5.²²

Table 7.5 also reports two indicators relating the demand for HIV/AIDS-related health services to the available resources. One of these is a frequently reported measure of the impact of HIV/AIDS, namely, the share of hospital beds occupied by patients with HIV/AIDS-related diseases. Especially in the worst-affected countries, hospital occupancy rates may understate the impact on health facilities, because hospitals may operate above capacity yet reported rates do not exceed 100 percent, and because reported rates may mask a deterioration in the overall quality of health services, if hospitals respond to increased demand by rationing. On

²²Since the issue of expanding treatment to HIV patients is discussed just below, it should be noted that, in terms of the health sector response, mortality rates are endogenous. Countries that succeed in rolling out access to antiretroviral treatment—a possibility not included in the above projections—would see a slowdown in the increase in mortality.

the other hand, the numbers reported generally refer to clinical beds; in surgical and pediatric wards the share of HIV patients is lower.

Table 7.5 relates HIV prevalence to the available human resources of the health sector. The indicative estimates of the numbers of AIDS patients per physician are based on the assumption that 10 percent of HIV-positive individuals seek the services of a trained physician. Although this figure is admittedly arbitrary, it is more meaningful than the simple ratio of the number of HIV-positive individuals to physicians, because many infected persons are asymptomatic and do not know they are infected. The estimates illustrate that, in order to expand health services and treatment for HIV patients, it is crucial to overcome the existing shortages in human resources. In only two of the countries with prevalence rates over 20 percent (Namibia and South Africa) is the ratio of HIV patients to doctors lower than 100 to 1. At the other extreme, it exceeds 500 to 1 for Lesotho and Malawi.²³ Looking forward, the number of health personnel required will also depend on (or, if the targets for training and hiring additional staff are missed, constrain) the response to HIV/AIDS. Although successful prevention programs contribute to keeping down the number of people requiring treatment, ongoing efforts to substantially expand access to treatment will also, all else equal, increase the number of patients, mostly because successful antiretroviral treatment extends life expectancy.

By highlighting the existing human resource constraints, Table 7.5 illustrates the potentially severe consequences of increased attrition of health personnel themselves, whether due to higher mortality rates among them or to brain drain. It was shown above, in a more general public sector context, that the implications of increased mortality for the required number of newly trained staff can be substantial. The consequences of increased mortality for the functioning of the health sector are presumably even more severe than for the public service in general, because the demand for health services is increasing sharply at the same time that supply is shrinking.

Especially in countries with very low income per capita (and thus low salary levels), brain drain is another source of losses of qualified personnel. Some of these highly skilled workers may move from one to another of the countries covered in Table 7.5, but others will leave the region altogether. For Zimbabwe, a country ravaged both by HIV/AIDS and by a severe economic crisis, Noguera and others (2003) report that only 18 per-

²³As indicated in Table 7.2, some of the available data on health personnel are almost 10 years old. The lack of timely data obviously introduces a substantial margin of error.

cent of available pharmacist posts at Harare Central Hospital were filled, and that vacancies for nurses ranged from 27 percent (at Harare Central) to 50 percent (at Bulawayo city health clinics). To the extent that the HIV/AIDS epidemic worsens a country's economic prospects and creates poorer working conditions for health personnel, competing demands for health personnel in other, more affluent markets will likely result in further losses of skilled personnel.

Fiscal Effects of an Expanded Effort at Treating HIV/AIDS

The discussion now turns to an assessment of the financial costs of expanding treatment. Most of the earlier literature distinguished between the treatment of opportunistic infections, on the one hand, and antiretroviral treatment, which attacks the virus causing AIDS directly, on the other. The main reason for this dichotomy was that antiretroviral treatment was very expensive: a year's treatment frequently cost several times GDP per capita in countries with severe epidemics, and many times average health spending per capita. Antiretroviral treatment was therefore not considered a viable option for public health services in many low- and middle-income countries. However, prices of antiretroviral treatment have come down markedly in recent years (partly as a result of efforts to broaden access to treatment), and this approach to treatment has therefore become a central component of national and international strategies to fight the epidemic and mitigate its impact. Many countries have started to offer antiretroviral treatment through their public health services. Access remains limited in low- and middle-income countries, however: WHO (2004c) estimates that only 440,000 people in these countries were receiving this form of treatment as of mid-2004.

Opportunistic infections occur as HIV suppresses the immune system and people living with the virus become more susceptible to infections. Some of these diseases, such as tuberculosis, are relatively common even in the absence of HIV/AIDS, but HIV has resulted in a substantial increase in their incidence, both directly, because people living with HIV/AIDS are more likely to become infected, and indirectly, as the resulting higher prevalence of tuberculosis means that more people who are not HIV-positive also get infected.

Various studies have estimated the costs of expanding treatment for opportunistic infections on the basis of case histories of HIV-positive patients and the unit costs of different treatments. One of the more comprehensive studies, that by the World Bank AIDS Campaign Team for Africa (2001), estimates the cost of care for an opportunistic infection and

its related symptoms at between \$247 and \$359 for a low-income country, and between \$471 and \$698 for the higher-income countries in sub-Saharan Africa. Creese and others (2002) synthesize the studies available at the time of their writing and provide indicators of the cost-effectiveness of various forms of treatment. Hansen and others (2000) assess the costs of treatment of HIV-positive and HIV-negative patients in hospitals and find that the costs per stay were about twice as high for the former. Although the cost per inpatient day did not differ substantially between the two groups, HIV-positive patients stayed longer in the hospital. The most common conditions presented by HIV-positive patients were tuberculosis, pneumonia, and meningitis. Since these are known to be three of the most common opportunistic infections among patients with AIDS, it is likely that most of these infections were for HIV/AIDS-related conditions.

If indeed the costs per inpatient day are similar for HIV-positive and HIV-negative patients, it is possible to draw certain inferences regarding the costs of HIV/AIDS-related treatment from the reported data on hospital occupancy rates by HIV patients, most of whom are presumably being treated for opportunistic infections (see Table 7.5). This would allow one to attribute a certain percentage of the total costs of hospital care to HIV/AIDS. Observed hospital occupancy rates, however, indicate in the first place the impact of HIV/AIDS on limited health sector resources. If a very high proportion of hospital beds are occupied by HIV patients, in the absence of a very substantial increase in the number of beds, this means that hospitals are dealing with the increased demand for their services by rationing, admitting patients only at a later stage of HIV infection than before. Thus the quality of health services declines as existing resources are overwhelmed by increased demand.

Substantial reductions in the price of antiretroviral drugs have opened the door to greatly increased access to highly active antiretroviral therapies (HAARTs): for example, the 3 by 5 initiative of the World Health Organization (WHO) aims to provide HAARTs to 3 million patients by 2005. However, given the limited health resources in many countries and the heavy toll the HIV epidemic is taking on the health sector, increasing access to antiretroviral drugs on this scale poses substantial challenges, in terms of the required financial resources, the available health facilities and distribution channels for medical supplies, and the training of health personnel.

This chapter is concerned with health policy primarily from a fiscal perspective and in the context of the government's overall development objectives. In light of the broad macroeconomic repercussions of rolling out

Table 7.6. Economic Costs and Benefits of Highly Active Antiretroviral Treatment

Costs	Benefits
Drugs	Delay in costs of treatment of opportunistic infections
Human resources	
Health facilities and other infrastructure	Gain in productive capacity of economy
	Increased fiscal revenue
	Favorable indirect and long-term macroeconomic effects
	Increased individual welfare

access to antiretroviral treatment (discussed, for example, in Haacker, Chapter 2 of this volume), it is therefore necessary to take a more comprehensive perspective, taking into account the indirect fiscal and macroeconomic consequences. Table 7.6 illustrates the costs and benefits of antiretroviral treatment from a public policy perspective. The costs of treatment are discussed in more detail below; here the focus is on the costs of the drugs themselves, the required health personnel, and the costs of the required infrastructure—for example, distribution systems and medical laboratories. The most direct fiscal effects stem from delays in the need to treat opportunistic infections. However, the fiscal gains go well beyond this. As mortality declines and the loss of skills is mitigated, the productive capacity of the economy is strengthened. Looking further ahead, much of the delayed impact of HIV/AIDS on the economy (for example, through accumulated losses of human capital) is also mitigated. As a consequence, the domestic tax base improves, and so therefore does government revenue. Masha (Chapter 9, this volume), looking at Botswana, suggests that these indirect fiscal gains can offset a significant proportion of the costs of a program to improve access to antiretroviral treatment.

At the most general level, the government has a broad mandate to enhance welfare, and public expenditure is ultimately a means to this end. In the context of HIV/AIDS, some authors (for example, Crafts and Haacker, Chapter 6 of this volume) suggest that the primary effects of HIV/AIDS on welfare derive from increasing mortality rather than changes in income. From a somewhat different angle, the International Crisis Group (2001) emphasizes the impacts of HIV/AIDS on economic risk and security in general.

As the government, possibly with substantial external support (as discussed below), sets out to expand access to antiretroviral treatment, it needs to take into account not only the financial cost of purchasing the drugs, but also the cost of delivering the services: these include the financial costs, the health personnel required, and the necessary infrastructure

(laboratories, distribution channels, and so forth). In the wake of substantial reductions in the costs of antiretroviral drugs and the required laboratory tests, widespread access has become a real possibility. In 2001 the Harvard Consensus Statement (Harvard University, Individual Members of the Faculty of, 2001) estimated the total cost per patient of antiretroviral treatment in low-income countries at \$1,123, of which \$650 was for the drugs themselves (at the average price). WHO estimates the average drug cost of first-line treatment in low-income countries (the average cost of four commonly used combination therapies as of April 2004) at \$488 a year. That cost is likely to come down further; for example, WHO (2004a) reports that one form of treatment is now available at a cost of \$168 a year, and the Clinton Foundation has developed a program that makes two forms of antiretroviral treatment available at only \$140 a year.²⁴ These first-line treatments are frequently complemented by more expensive second-line treatments, to be used if the first-line treatment fails. As a consequence, the average drug cost for the whole program, including second-line treatments, will be higher.

In estimating the total cost of antiretroviral treatment, it is necessary also to include the cost of monitoring tests, as well as personnel and overhead costs. In addition to the Harvard Consensus Statement, which includes a comprehensive estimate of the cost of treatment, several studies have estimated the total cost of treatment for individual countries.

A study from Zambia (Kombe and Smith, 2003) puts the annual cost per patient at \$488 in 2003 (including \$277 for drugs and \$178 for monitoring tests) and \$1,752 for second-line treatment; these numbers exclude most personnel costs, which the study treats in the context of overall human resource constraints. A subsequent study (Kombe and Smith, 2004), reports similar costs of first-line treatment for Uganda of \$483 a year. Kombe, Galaty, and Nwagbara (2004) estimate the total annual cost per patient in Nigeria at \$742; this estimate includes somewhat higher drug costs than in the Zambia and Uganda studies, as well as \$161 in labor costs, which the other two studies excluded.

A study of the cost of antiretroviral treatment in Mexico (Bautista and others, 2003) takes a broader perspective. Focusing on the total utilization of health facilities by patients receiving treatment, both before and after initiation of antiretroviral therapy, this study also captures such indirect effects as declines in the cost of care for opportunistic infections. After ini-

²⁴This price, however, applies only in the context of a comprehensive program to expand access to treatment. The arrangement is also discussed in more detail below, in the context of changes in the international market for antiretroviral drugs.

tiation of antiretroviral therapy, the cost per patient increased from about \$1,000 a year to between \$3,000 and \$4,000 a year, with drugs accounting for three-fourths. Other cost components, such as the costs of hospitalization and of outpatient visits, did not decline, suggesting that any indirect financial effects associated with improvement in patients' health are small and, even within these line items, offset by the additional requirements of antiretroviral treatment.²⁵

Among country policy documents, South Africa's Operational Plan is noteworthy for including very detailed budget estimates. It envisages increasing the number of patients receiving antiretroviral treatment to about 1 million in fiscal year 2007/08, at a cost of 4.5 billion rand, the largest components being the costs of drugs (about one-third), personnel costs (somewhat less than one-fourth), and monitoring tests (close to one-fifth). For fiscal year 2004/05, projected costs per patient are 1,955 rand for drugs, and 806 rand for laboratory tests (about \$300 and \$125, respectively).

In addition to the costs of drugs and laboratory tests, antiretroviral treatment will place heavy demands on available health personnel. Kombe and Smith (2003) estimate that treating 10,000 patients will require 13 trained physicians, 13 nurses, 32 laboratory technicians, and 15 pharmacists. In this example, achieving full coverage of antiretroviral drugs, with 100,000 patients in the first year and 330,000 patients in the fifth year, would require 130 physicians and 316 technicians in year one, rising to 429 physicians (about 50 percent of Zambia's current physician workforce) and 1,043 technicians (more than twice the number of technicians in Zambia) by year five.

These examples show that a strategy to expand antiretroviral treatment, in addition to securing the financial requirements, needs to be carefully planned in terms of the human resource requirements, identifying potential bottlenecks well in advance and addressing them through training.²⁶ WHO's 3 by 5 initiative, for example, acknowledges this need and includes a very substantial training component (WHO, 2003b, 2004a). Looking ahead, the number of patients receiving antiretrovirals, for any given cri-

²⁵This study differentiates between highly active antiretroviral treatment (triple therapy) and simpler forms of antiretroviral treatment (monotherapy and double therapy), which were available earlier. In this chapter, "antiretroviral treatment" refers to highly active antiretroviral treatment.

²⁶However, for the poorest of the countries facing severe epidemics, this task is complicated by the potential for brain drain, as trained health personnel are attracted by higher salaries abroad.

Table 7.7. Indicative Estimates of the Costs of HIV/AIDS-Related Health Services
(Percent of GDP except where stated otherwise)

Country	Costs of HIV-Related Health Services, 2010		Total Health Expenditure, 2001	Total Health Expenditure, 2001 (dollars per capita)	Public Health Expenditure, 2001	Total Government Expenditure, 2001	Domestic Government Revenue, 2001
	Total	For anti-retroviral treatment					
Botswana	0.8	0.6	6.6	202	4.4	40.8	41.9
Côte d'Ivoire	1.4	1.0	6.2	39	1.0	16.6	17.0
Ethiopia	9.7	7.0	3.6	3	1.5	29.1	18.8
Haiti	0.8	0.6	5.0	23	2.7	10.0	...
Lesotho	3.8	2.8	5.5	21	4.3	43.0	40.8
Malawi	7.8	5.7	7.8	13	2.7	33.1	18.4
Mozambique	6.6	4.8	5.9	12	4.0	34.6	13.3
Namibia	1.4	1.0	7.0	121	4.7	30.1	31.9
South Africa	0.6	0.4	8.6	225	3.6	26.8	24.3
Swaziland	1.3	1.0	3.3	39	2.3	30.7	26.9
Tanzania	2.5	1.8	4.4	12	2.1	16.1	11.4
Uganda	2.2	1.6	5.9	15	3.4	19.8	10.9
Zambia	3.9	2.8	5.7	20	3.0	32.1	19.1
Zimbabwe	3.3	2.4	6.2	44	2.8	37.6	27.1

Sources: WHO (2004a); IMF World Economic Outlook/Economic Trends in Africa database; and author's estimates.

teria for starting antiretroviral therapy, will increase sharply over the first years of the program.

At the onset of antiretroviral therapy, the health status of the patient typically improves markedly, making him or her less susceptible to opportunistic infections such as tuberculosis and cryptococcal meningitis. This will result in some savings in treatment costs, both directly and indirectly through reduced spread of these infections. These financial gains, however, are likely to taper off, because antiretroviral treatment only delays rather than halts the progression of the disease.

Table 7.7 provides some indicative estimates of the financial resource requirements for expanding the treatment of opportunistic infections and improving access to antiretroviral treatment. Actual coverage rates for the different forms of treatment presumably differ among these countries, as does the ability of each country's health services to expand medical care. The purpose of the table, however, is to compare the financial implications of attaining a given standard of health care. The estimated costs are therefore based on a coverage rate for the care for opportunistic infections of 10 percent in 2003, rising to 50 percent by 2010. For antiretroviral treatment it is assumed that the number of patients receiving the treatment

through public health services is negligible in 2003 and that coverage rises to 50 percent by 2010. (These assumptions regarding coverage rates are similar to those made by the Commission on Macroeconomics and Health (2001), which assumes that, by 2015, coverage rates will rise to 70 percent for treatment of opportunistic infections, from an initial 10 percent, and to 65 percent for antiretroviral treatment, from less than 1 percent.) Patients are assumed to receive treatment for opportunistic infections for the two years before death. Antiretroviral treatment starts at the same time but extends life (and thus delays the period through which patients need treatment for opportunistic infections) by an additional three years. The assumed cost of treatment of opportunistic infections is \$400; the cost of antiretroviral treatment is assumed to fall to \$450 by 2010; this is consistent with drug costs of around \$150 and personnel and other costs of \$300. This approach may understate the costs for some countries with higher income per capita (such as Botswana and South Africa) covered in the table, relative to the lower-income countries, for two reasons.

First, about one-fourth to one-third of the costs of expanded access to treatment are commonly attributed to personnel costs. These can be expected to be higher in countries where average income is higher. In the absence of wage data, one way of accommodating this in the estimates is to assume that personnel costs are proportional to income per capita. However, income per capita also depends on many other factors, including the size of the formal sector; therefore, simply scaling up wage rates for health personnel in line with income per capita does not necessarily yield more reliable results. It is also worth noting that the estimated cost of treatment in the Operational Plan for South Africa (the country with the highest income per capita in Table 7.7), discussed above, is not much higher than for the other countries for which detailed estimates were available. Although this could also reflect differences in methodologies, it suggests that the bias introduced may not be large.

Second, to obtain consistent indicators for the challenges countries are facing as they expand access to treatment, the estimates presented here are based on coverage rates that are equal across countries. Because lower-income countries generally find it more difficult to achieve these targets, the result may be lower coverage rates in these countries. (Over, in Chapter 10 of this volume, discusses the challenges to expanding antiretroviral treatment in more detail.) As a result, the gap in actual health expenditure as a percentage of GDP (rather than expenditure required to achieve uniform coverage rates) may turn out to be lower.

Table 7.7 summarizes estimates of the costs of attaining the specified targets in coverage rates of treatment of opportunistic infections and

antiretroviral treatment. The latter accounts for the bulk of expenditure (around three-fourths in most countries), because increased life expectancy owing to antiretroviral treatment means that a larger number of patients will receive this form of treatment.²⁷ Overall, the costs are substantial for all the countries covered in the table, ranging from 0.6 percent to 9.7 percent of GDP. These differences in cost stated as a percentage of GDP partly reflect differences in income per capita. Therefore, two of the countries with very high HIV prevalence, Botswana and South Africa, are among those that could conceivably finance substantially expanded access to treatment. However, even for these countries the financial burden is daunting, corresponding in South Africa to 17 percent of the health budget and over 2 percent of total government expenditure in 2001. On the other hand, the required expenditure exceeds 5 percent of GDP for three countries (Ethiopia, Malawi, and Mozambique) and exceeds total public health expenditure (as a percentage of GDP in 2001) for these and four other countries (Côte d'Ivoire, Tanzania, Zambia, and Zimbabwe).

A key obstacle to an enhanced response to HIV/AIDS is existing capacity constraints, the most serious of which relate to the shortage of human resources.²⁸ Even if sufficient financing were available, a shortage of trained personnel could mean that the available funds would not be spent, or that they would not be spent effectively because the quality of the program is compromised. UNAIDS (2003b), in its Progress Report on the Global Response to the HIV/AIDS Epidemic, reports that in one-third of the countries covered a lack of human resources hampered the response to HIV/AIDS. For Botswana and South Africa, which are among the wealthiest countries in sub-Saharan Africa and have relatively well-developed health sectors (see Table 7.4), the report notes that “[in Botswana] the shortfall in human resources has become a major concern” and that the “main challenge [in South Africa] to implementation relates to capacity, especially with respect to health workers’ clinical skills.” For the same reasons, WHO’s strategic framework for the 3 by 5 initiative, which aims at substantially improving access to antiretroviral treatment, stresses the

²⁷For example, if 0.5 percent of the population start antiretroviral treatment each year (at our target coverage rate of 50 percent, consistent with an overall prevalence rate of around 10 percent, or a prevalence rate for the working-age population of about 20 percent, as for example in Namibia or South Africa), our assumptions mean that about 2.5 percent of the population will eventually receive treatment. Treatment for opportunistic infections, which may or may not be concurrent with antiretroviral treatment, last two years, and, at coverage rates of 50 percent, only 1 percent of the population would receive it.

²⁸A point also made by the Commission on Macroeconomics and Health (2001, p. 50).

need for additional financial resources for health systems in general, improvements in the physical infrastructure, programs to address the increased mortality and morbidity of health workers, improved procurement and distribution systems, and measures to stimulate demand through community mobilization (WHO, 2003a).

Education

The public education sector is one of the focal points of a broad policy response to HIV/AIDS, primarily reflecting the role of education in prevention. More generally, “education is a major engine of economic and social development” (World Bank, 2002), and it relates directly or indirectly to several of the Millennium Development Goals. From a macroeconomic perspective, education and the accumulation of human capital are a key ingredient to achieving sustainable growth (as discussed in more detail in Birdsall and Hamoudi, Chapter 4 of this volume). In countries afflicted by HIV/AIDS, however, the capacity of the education sector is weakened through increased teacher mortality. On the other hand, HIV/AIDS also results in lower birthrates and increased child mortality, so that the number of children (and thus the demand for education) grows more slowly. Finally, orphans and children living in households affected by HIV can find their access to education impaired; public policy has a role in mitigating the adverse consequences of HIV/AIDS for these children.

Education contributes to HIV/AIDS prevention in two major ways. First, education in general facilitates access to information, thus contributing to HIV prevention while also raising health standards and improving living conditions. By reducing girls’ economic dependency, education can also reduce their vulnerability to HIV/AIDS. Second, public education is an important channel for delivering HIV prevention efforts to young people, promoting lower-risk sexual behavior, and thus avoiding HIV infections as young people become sexually active. Using an existing infrastructure (the public education system) also lowers the cost of these efforts.²⁹ However, the role of public education in HIV prevention also reinforces the need to ensure access to education for children affected by HIV/AIDS.

²⁹World Bank (2002) provides a thorough discussion of the role of public education in HIV prevention.

Table 7.8. Zimbabwe: New Teachers Required to Maintain Given Pupil-Teacher Ratios

Year	Number of New Teachers Required				Increase in New Teachers Required (percent)	Number of New Teachers Required as Percent of Graduates		Increase in Share of Graduates Becoming Teachers (percent)
	In presence of AIDS					In presence of AIDS	In absence of AIDS	
	Total	As replacements for AIDS deaths	For other causes	In absence of AIDS				
2005	6,655	3,452	3,204	5,478	21.5	2.1	1.6	29.0
2010	6,695	3,610	3,085	6,227	7.5	2.3	1.8	23.2
2015	6,507	3,401	3,105	6,837	-4.8	2.6	2.1	22.3

Source: Author's calculations using U.S. Census Bureau estimates of mortality rates for 2003.

Maintaining a Sufficient Number of Teachers

While the increased mortality of teachers means that more teachers need to be trained to replace those lost to HIV/AIDS, HIV/AIDS also affects birth rates and infant mortality, thereby reducing the size of the school-age population. To estimate this impact, numerous studies have assessed the change due to HIV/AIDS in the number of new teachers who need to be trained in order to maintain some given pupil-teacher ratio (see, for example, Malaney, 2000; and Birdsall and Hamoudi, Chapter 4 of this volume). Table 7.8 shows the results of such an exercise for Zimbabwe.³⁰ By 2005 the number of new teachers required rises from 5,478 to 6,655, or 21.5 percent. More than half of these teachers (3,452) would replace teachers who have died for HIV/AIDS-related reasons. However, the number of new teachers who do not replace those who have died of AIDS, reflecting the slowdown in the young population, declines very substantially (to 3,204, a decline of about 40 percent). By 2015, as the school-age population stagnates, the number of new teachers required actually declines by 5 percent, despite much higher teacher mortality, compared with projections excluding the impact of HIV/AIDS.

³⁰The calculations are based on demographic projections from the International Programs Center at the U.S. Census Bureau and on data on the numbers of pupils and teachers in primary and secondary education from UNESCO's *World Education Report 2000* (UNESCO, 2001; see also Haacker, 2002). In the absence of HIV/AIDS, teacher attrition rates are assumed to be 5 percent. Although these are lower than the attrition rates frequently reported, the latter are gross rates (excluding teachers who are rehired), whereas the analysis here is interested in net attrition.

These results match estimates from other studies, indicating that the impact of HIV/AIDS on the number of new teachers required is small and may actually decline. This is no source of comfort, however. Fewer students also means that the pool from which new teachers are drawn shrinks. Although, in the example above, the absolute number of teachers who need to be trained in 2015 declines by 4.8 percent, their share of the population at age 19 (roughly the population from which new teachers are drawn) increases from 2.1 percent to 2.6 percent (by no means all of whom would have the required educational background), or by 22.3 percent. Thus, in order to meet the need for teachers, an increasing share of educated individuals would have to become teachers, leaving fewer skilled people to work in other sectors of the economy. Moreover, the earlier discussion of the disruptions to public services caused by increased mortality and morbidity applies to teachers as well. Increased absenteeism among teachers and a larger number of vacancies in teacher positions would imply that a constant pupil-teacher ratio would actually signify a decline in the quality of education. This problem is probably most relevant for rural and small local schools, where, as noted previously, the loss or sickness of a teacher cannot be temporarily covered by colleagues.

Securing Access to Education

HIV/AIDS can impede access to education for children living in affected households and for orphans. Households with sick members are likely to suffer income losses, either directly, if household members are too sick to work, or indirectly, if other household members divert time from other productive activities to the care of sick relatives. If these households can no longer afford to send children to school, or if children have to contribute to household income or help care for sick relatives, their access to education is compromised. Orphans are likely to be even worse off, because they tend to live in poorer households and may suffer discrimination in favor of the head of household's biological children.³¹

Table 7.9 sheds some light on the impact of HIV/AIDS on children in seven African countries. HIV/AIDS has increased the number of orphans substantially in all of these countries: in several, about one-sixth of the

³¹For an in-depth study focusing on South Africa, see Case, Pakson, and Ableidinger (2002).

Table 7.9. Orphans in Selected Sub-Saharan African Countries

Country	Orphans as Share of Young Population, 2003 (in Percent) ¹		Average Dependency Ratio ²		Ratio of Orphans to Nonorphan Children Attending School
	All orphans	AIDS orphans	Households with orphans	Households with children but no orphans	
Botswana	15.1	10.6	1.4	1.7	0.99
Côte d'Ivoire	13.3	6.2	1.4	1.5	0.83
Ethiopia	13.2	3.4	1.5	1.6	0.60
Malawi	17.5	8.7	1.5	2.0	0.93
South Africa	10.3	4.5	1.4	1.7	0.95
Uganda	14.6	7.5	1.7	2.3	0.95
Zimbabwe	17.6	13.5	1.4	2.2	0.85

Sources: UNAIDS/UNICEF/USAID (2004); and UNICEF (2003).

¹Children are defined as persons aged 0–17.

²Number of dependents of all ages divided by the number of working-age adults in the household.

child population were orphans in 2001, more than half of whom were AIDS orphans. Reflecting increasing mortality among adults, the share of orphans is expected to rise further in some of the worst-affected countries, to more than 20 percent by 2005 in Botswana and Zimbabwe. Estimated increases in dependency ratios suggest that orphans frequently live in lower-income households. For example, the dependency ratios for Zimbabwe (1.4 for nonorphan households with children, 2.2 for orphan households) suggest that income per capita among households with orphans may be 20 percent lower than among other households with children.³² Among the countries covered, the difference in school enrollment rates between orphans and nonorphans ranges from a rather low 1 percentage point in Botswana to 40 percentage points in Ethiopia. In general, countries with high enrollment rates overall (which tend to be those countries whose education systems cover a substantial proportion of the poor) show small declines in enrollment rates for orphans.

Although the impact of orphanhood on school enrollment seems to be smallest in countries with universal or near-universal education, some microeconomic evidence suggests that income and wealth have an important role in mitigating the adverse effects on orphans, and that financial assistance can have a highly favorable impact on orphans' enrollment rates. For example, data reported by Ainsworth, Beegle, and Koda (2002)

³²This assumes that the share of income earners among working-age household members, and their incomes, do not differ systematically between the two groups of households.

suggest that enrollment rates among orphans living in households receiving financial assistance were much higher than among orphans outside of such households. For single-parent orphans, enrollment rates were 20 percentage points higher with financial assistance, whereas for orphans who had lost both parents the difference was close to 50 percentage points.³³

Thus, to protect access to education in general and to mitigate the impact of HIV/AIDS on the life prospects of orphans, governments face three challenges. First, they need to minimize the disruptions to education caused by increased absenteeism and mortality, especially in rural areas. Second, they need to ensure that a sufficient number of teachers are trained to compensate for increased attrition. Third, they need to set up support mechanisms (such as subsidies to school fees) to offset orphans' disadvantages in access to education. As the preceding section showed, this generally means that although the *absolute* number of teachers trained may not have to increase (because the number of pupils declines at the same time), an increasing *share* of graduates will have to become teachers. Casual observation might suggest that failure to meet the third objective would facilitate meeting the other two. This apparent trade-off, however, is shortsighted: even though a declining enrollment rate might make it easier to meet a given targeted pupil-teacher ratio, it also means that the number of children receiving an adequate education—the key output of the education sector—would decline. The number of educated people (and thus the pool from which teachers are drawn) would shrink, and the share of graduates who would have to become teachers to achieve target enrollment rates would increase.

In several countries with severe epidemics, the orphan population is projected to increase to more than 15 or even 20 percent of the young population (ages 0 to 17) by 2010. Securing unimpeded access to education for orphans can therefore represent a significant logistical and fiscal challenge. Consequently, national governments (see, for example, Botswana's National Strategic Framework on HIV/AIDS), international agencies like UNAIDS, and bilateral donors (as evident, for example, from the first round of grants under the U.S. President's Emergency Plan for AIDS Relief, or PEPFAR) have made programs to improve the situation of orphans a key component of their policy frameworks on HIV/AIDS.

³³The numbers for nonorphans, paternal orphans, maternal orphans, and two-parent (full) orphans are 57.3, 49.0, 47.1, and 25.6 percent enrolled without financial assistance, and 62.0, 68.3, 70.8, and 73.2 percent enrolled with financial assistance, respectively (Ainsworth, Beegle, and Koda, 2002).

Social Expenditure

The categories of social expenditure most directly affected by HIV/AIDS are public health expenditure (interpreted as a form of social insurance), spending targeted at orphans (including income support and subsidies for school fees), and various forms of income support for other affected persons. This paper will touch on only the most important issues (Chapter 8 of this volume, by Plamondon, Cichon, and Annycke, provides a more comprehensive discussion, including coverage rates of social insurance schemes in the worst-affected countries and a quantitative assessment). Especially in countries where health insurance coverage is low, public health expenditure, discussed above, plays an important role in mitigating the economic burden of disease on the affected households. However, as HIV/AIDS weakens and eventually kills a household's income earners, or as other household members have to reallocate time to their care, household income declines and some of the remainder must be diverted to cover the costs of care and treatment. The loss of family members dying for HIV/AIDS-related reasons has further implications for poverty, as assessed by Greener (Chapter 5, this volume). Thus outlays related to social assistance schemes for poor households are likely to rise. Because it primarily strikes young adults, HIV/AIDS is associated with an increase in the number of orphans, as already discussed; they are particularly vulnerable because even a temporary episode of poverty can compromise their access to education. The government may also operate social insurance schemes providing pensions or lump-sum benefits for the elderly, surviving dependents, or disabled persons. Because most of these schemes are contributory, so that HIV/AIDS affects revenue as well as expenditure, pension schemes are covered separately below.

Coverage of formal, contributory social security schemes in most countries facing severe epidemics is limited, but some provide various forms of income support from the general budget. For example, in Botswana residents over age 65 are entitled to a monthly pension of 151 pula (about \$30), and in South Africa male residents over age 65 and female residents over 60 are entitled to a means-tested pension of up to 640 rand (about \$100) a month (for details see U.S. Social Security Administration Office of Policy, 2003). With fewer residents reaching old age, the cost of public income support to the elderly declines, but the fiscal cost of disability benefits rises: for example, South Africa's pension is also extended to the permanently disabled. More-comprehensive social security programs are generally contributory, which implies that often they are accessible to permanent employees in the public and formal private sectors only. However,

HIV/AIDS affects the number of poor households, so that social expenditure targeted at the poor, such as destitution allowances or any form of means-tested grants, is likely to rise.

Orphans are likely to experience at least temporary hardship during the sickness of their parents or other household members, and their access to education can be impaired if they have to care for sick relatives or are discriminated against in their foster families.³⁴ For these reasons UNAIDS and major donors have included orphan support as one of the focal points of their comprehensive HIV/AIDS programs (see Table 7.2). Having already discussed the impact of HIV/AIDS on orphans in some detail, in the context of access to education, this discussion will merely add some notes from a social policy perspective. First, universal access to education is a powerful weapon for fighting poverty in general. Since the decline in orphans' enrollment rates tends to be lowest in countries with high overall enrollment (indicative of an education system that is accessible to the disadvantaged segments of the population), such systems are also likely to be more effective at keeping orphans in school. However, orphans are also likely to experience a decline in their material living standards. Case, Paxson, and Ableidinger (2002), for example, provide evidence on this score from South Africa, which is also supported by the available data on dependency ratios in orphan versus nonorphan households (Table 7.9). Given the large numbers of children being orphaned by HIV/AIDS, mitigating the impact on their living standards and securing their access to education will become the key challenge for social policy in countries with severe epidemics, if it is not already.

Pension Schemes

Pension schemes encompass many different institutional arrangements, some operated directly by the government, and others operating independently but with some government oversight and a government guarantee, explicit or implicit, of the pension fund's obligations.³⁵ Coverage may

³⁴Case, Paxson, and Ableidinger (2002, abstract) "find that orphans in Africa on average live in poorer households than non-orphans, and are significantly less likely than non-orphans to be enrolled in school. However, orphans' lower school enrollment is not explained by their poverty: orphans are equally less likely to be enrolled in school relative both to non-orphans as a group and to the non-orphans with whom they live."

³⁵For a survey of social security issues in sub-Saharan Africa, see Barbone and Sanchez (1999). The most comprehensive and up-to-date survey of existing pension arrangements is U.S. Social Security Administration, Office of Policy (2003).

extend to government employees only, or to the private sector, or to the general public. Although increased mortality results in a decline in the number of recipients of old-age pensions, outlays on pensions for surviving dependents (the spouse and any under-age children) may increase. Quantitatively, the impact of HIV/AIDS on pensions can amount to a very substantial proportion of the cost of the epidemic.³⁶ JTK Associates (2002) finds that, to accommodate the impact of HIV/AIDS, contributions to the Swazi public employee pension fund would have to increase by between 2 and 4 percent of the government's payroll. Since the pension fund is contributory, the costs of HIV/AIDS may accrue either to the government, through increased contributions to the pension fund from general revenue, or to government employees, through increased contributions or reduced benefits.

A distinction is commonly made between defined-benefit pension schemes and defined-contribution schemes (the latter including provident funds). Pension benefits under a defined-benefit scheme are typically calculated using a formula based on the duration of contributions and on the contributor's salary or contribution level during his or her last years of work. Because benefits are not tightly linked to accumulated contributions, such schemes are more vulnerable to the demographic shifts associated with HIV/AIDS. In addition to old-age pensions and survivor benefits, defined-benefit schemes typically provide disability benefits, funeral grants, or other death-related lump-sum benefits. Outlays on these benefits are strongly affected by HIV/AIDS, because they rise essentially proportionally with HIV prevalence or mortality.

Under a defined-contribution scheme, participants' contributions are credited, after certain deductions, to their individual accounts within the scheme. At retirement, participants are entitled to receive back their accumulated contributions plus accrued interest, either as a lump sum or as an annuity. If the participant dies before retirement, the accumulated amount is paid out to the heirs. Most defined-contribution schemes also include some elements of defined-benefit schemes, for example to cover the risks of death in service and of disability. The costs of these risk benefits, as well as a share of administrative costs, are subtracted from the contributions. As a consequence, either the accumulated amount available at retirement is smaller than it would be without these benefits (see, for example, Sanlam, 2004), or contribution rates must be adjusted upward to pay for the

³⁶This is discussed in some detail in Haacker (Chapter 2, this volume), in the context of the private sector.

benefits. Increased HIV/AIDS-related mortality has little impact on participants' balances under a defined-contribution scheme, because all contributions (net of administrative costs and any risk benefits) credited to any individual account are eventually paid out.³⁷ However, with increased mortality the total funds administered by the scheme are likely to decline, as contributors (or their surviving dependents) tend to withdraw their accumulated balances earlier than they would have otherwise.

Assessing the net financial impact of HIV/AIDS on the costs of pensions is a complex undertaking. Although fewer contributors reach retirement age and draw retirement pensions, those dying of HIV/AIDS often leave behind young spouses (who may be infected as well) and dependent children, who may be eligible for survivors' pensions. A full quantitative analysis would require complex demographic modeling and therefore is beyond the scope of this chapter. Among the more detailed studies extant, Plamondon, Cichon, and Annycke (Chapter 8, this volume), using a hypothetical example of a country in sub-Saharan Africa, find that HIV/AIDS raises pension outlays by 0.5 percent of GDP by 2015 (from 1.7 percent of GDP without AIDS to 2.2 percent, or by 29 percent). This reflects a 16 percent decline in the number of old-age pensioners, offset by increases in the numbers of disability pensioners (by 64 percent), widows (also by 54 percent), and orphans (which almost treble). The net impact on the fiscal balance or required social security contributions would depend on whether the contributor base remains unchanged (because workers dying of AIDS are replaced) or shrinks. The study examines scenarios along both lines.

Government Revenue and the Financing of Health Expenditure

HIV/AIDS affects domestic government revenue through its adverse effects on the macroeconomy and thus the tax base. Fiscal policy needs to take these changes into account, both in terms of the medium-term fiscal framework and in the context of resource mobilization in the fight against HIV/AIDS. The first part of this section therefore discusses some of the implications of HIV/AIDS for domestic government revenue. In light of the key role of the health sector in mitigating the impact of the epidemic,

³⁷However, if the quality of the pension fund's portfolio is low, increased mortality would drain the funds available for such investments and could accelerate the pension fund's eventual insolvency. If the government, explicitly or implicitly, guarantees the obligations of the pension fund, it may have to bail the fund out, at a considerable cost.

and the substantial role of private and external financing, the second part provides a more detailed discussion of the financing of health expenditure. External grants, an important source of health financing in low-income countries, are considered in the context of the international response in the next section of the chapter.

Domestic Government Revenue

Essentially all macroeconomic studies of countries with severe HIV epidemics agree that GDP growth will slow, leaving GDP substantially lower than what might have been expected before the epidemic escalated.³⁸ As a consequence, growth in the domestic tax base, and thus in domestic government revenue, also slows, complicating the government's efforts to cope with the increased demand that the epidemic places on its services. As the present discounted value of tax revenue declines, it also becomes more difficult to service a given level of public debt.³⁹

The components of domestic revenue most likely to be adversely affected by HIV/AIDS are income taxes and import duties. Corporate income tax revenue declines as increased expenses for training, medical and death-related benefits, and lower employee productivity raise personnel costs for a given level of output. To the extent that companies can pass on these costs to their employees (by cutting benefits or salaries), this will result, all else equal, in a decline in personal income tax revenue. Import duties decline to the extent that the increased demand for health services causes imported medical products, which tend to have reduced or even zero tariff rates, to crowd out other imports on which full duties are paid. Privately financed health expenditure is particularly likely to have such an effect. The government could respond by mobilizing additional resources, for example by raising taxes. Zimbabwe, for example, financed increasing HIV/AIDS-related expenditure through a 3 percent surcharge on payroll taxes, earmarked toward an HIV/AIDS fund. However, in light of the substantial burden of HIV/AIDS on the private sector, the scope for raising additional revenue from this source is limited.

For many countries in sub-Saharan Africa, royalties from various forms of resource extraction (such as oil, minerals, and timber) account for a large share of domestic revenue. There are reasons to believe that these

³⁸The macroeconomic impact of HIV/AIDS is discussed in much more detail in Haacker (Chapter 2, this volume).

³⁹In a different context, Easterly (2001) suggests that failure to respond to the growth slowdown after 1975 was an important cause of the debt crises of the 1980s and 1990s.

activities may be less vulnerable to the HIV epidemic. One reason is simply that a large share of the sector's value added derives from economic rents on the extracted resources rather than from labor. Second, large-scale resource extraction is often conducted by multinational firms, who bring in expatriates to staff key positions and are thus less vulnerable to HIV/AIDS-related shortages in the supply of certain skills; their high value added per employee may also make it profitable for these firms to provide expensive medical treatment to key employees. Third, if these companies pay comparatively high wages to employees with lower skills, they will be able to replace employees lost to HIV/AIDS relatively easily. However, these companies, too, face disruptions to production associated with increased attrition, and, for permanent employees, higher coverage rates of various forms of benefits (medical, pension, and other) mean that the impact on personnel costs is relatively high.

With respect to health expenditure, patient contributions provide another potential source of domestic financing. However, the still-substantial cost of antiretroviral treatment relative to most households' incomes means that high co-payments will effectively exclude poor households from treatment. To achieve equitable access to treatment, co-payments would have to be means-tested, adding to the administrative costs of the program. More broadly, in countries without a well-functioning private insurance sector, public health services are an essential element of social insurance, and substantial user fees would add to the economic costs of HIV/AIDS for the affected households.

Financing of Health Expenditure

Table 7.10 summarizes available information on the financing of health expenditure in some countries affected by HIV/AIDS. In principle, health expenditure can be financed from government general revenue, public social insurance, external grants, or private insurance, or directly by the individuals or households affected.

The share of public expenditure in total health expenditure varies considerably across African countries, from 16 percent in Côte d'Ivoire to 79 percent in Lesotho. Virtually all public health expenditure is financed by either taxation or external resources; with the exception of Thailand, public health insurance does not play a significant role in any of the countries covered. Especially for countries with relatively low income per capita, external assistance is an important source of financing; in Malawi it accounts for fully 87 percent of public health expenditure, and 41 percent of total health expenditure.

Table 7.10. Financing of Health Services in Selected HIV/AIDS-Affected Countries, 2001

Country	Total Financing		Public Financing as Percent of Total	Public Excluding External Resources as Percent of Expenditure	All private as percent of total financing	Private Financing			Prepaid as percent of private expenditure
	Per capita (dollars)	Percent of GDP				Percent of total financing	Out of pocket	Percent of private expenditure	
Botswana	202	6.6	66.2	0.6	33.8	11.9	35.3	64.7	
Brazil	222	7.6	41.6	1.2	58.4	37.4	64.1	35.9	
Côte d'Ivoire	39	6.2	16.0	20.0	84.0	75.3	89.7	10.3	
Ethiopia	3	3.6	40.5	84.7	59.5	50.4	84.7	15.3	
Haiti	23	5.0	53.4	80.3	46.6	21.1	45.3	54.7	
Lesotho	21	5.5	78.9	7.6	21.1	21.1	100.0	0.0	
Malawi	13	7.8	35.0	75.7	65.0	28.4	43.7	56.3	
Mozambique	12	5.9	67.4	54.7	32.6	12.8	39.3	60.7	
Namibia	121	7.0	67.8	5.6	32.2	5.8	17.9	82.1	
South Africa	225	8.6	41.4	1.0	58.6	13.0	22.1	77.9	
Swaziland	39	3.3	68.5	11.5	31.5	31.5	100.0	0.0	
Tanzania	12	4.4	46.7	63.2	53.3	44.3	83.1	16.9	
Thailand	69	3.7	57.1 ¹	0.2	42.9	36.5	85.0	15.0	
Uganda	15	5.9	57.5	43.1	42.5	22.7	53.4	46.6	
Zambia	20	5.7	53.1	91.7	46.9	33.7	71.8	28.2	
Zimbabwe	44	6.2	45.3	17.2	54.7	28.6	52.2	47.8	

Source: WHO (2004b).

¹ Includes 26.8 percent of total public health expenditure financed by the social security system.

Although some African countries with large shares of private health expenditure feature some form of private health insurance, in many the share of private out-of-pocket health expenditure is high by international standards, especially as a proportion of total private health expenditure. This likely reflects the relatively minor role of private health insurance in many low-income countries. Correspondingly, for Botswana, Namibia, South Africa, and Zimbabwe—countries with a relatively well-developed insurance sector—private out-of-pocket health expenditure is less of a factor. In some countries the lack of private health insurance appears to be compensated by public health expenditure.

Detailed data like those presented in Table 7.10 are not available for the financing of HIV/AIDS-related health expenditure specifically. However, Martin (2003) analyzes the financing of HIV/AIDS-related public expenditure in Botswana, Lesotho, Mozambique, South Africa, and Swaziland.⁴⁰ Her findings show that the role of external finance for HIV/AIDS-related expenditure is even more pronounced than that for general health expenditure. With the exception of South Africa, which receives very little external aid, external financing accounted for between 79 and 85 percent of HIV/AIDS-related public expenditures in these countries.

External Finance and the International Response

External finance plays a very important role in the financing of HIV/AIDS-related expenditure, but the fiscal implications of the international response to HIV/AIDS are much broader. Most important, changes in the international market for drugs have facilitated the import of cheaper generic versions of patented drugs for countries facing a health emergency. Partly as a response to these developments, a regulated market for generic versions of antiretroviral drugs is emerging, with the aim of making these drugs available to low-income countries at the lowest possible cost. As a consequence, the emphasis of the international response has broadened from an early focus on prevention to a strategy that includes substantially expanded access to antiretroviral treatment.

At the same time, international donors—governments, multilateral organizations, and nongovernmental organizations (NGOs)—have substantially increased their funding of HIV/AIDS-related projects. Complementing the above discussion of the financing of health expenditure at

⁴⁰The study also covers Zimbabwe, but data on HIV/AIDS-related expenditure were not available for this country.

the country level, this section will therefore look at global trends in the financing of HIV/AIDS-related expenditure. The management of substantial aid flows, whether they go through the budget or are directly disbursed to NGOs working in the affected countries, poses challenges to the host government and the donor agencies. For example, the activities of the various government agencies and NGOs need to be coordinated, or else the country's limited human resources may be overwhelmed. (The macroeconomic impact of large aid flows on the current account is discussed in Chapter 2 of this volume.) Looking ahead, there is the potential for a "maturity" mismatch between expenditure and its funding: whereas grants are typically short-term (although often with the expectation that they will be renewed) and may be subject to delays in disbursement, HIV/AIDS-related spending—especially investments in treatment—involves longer-term financial commitments.

Changes in the International Market for Antiretroviral Drugs

In 2001 the TRIPs (Trade-Related Aspects of Intellectual Property Rights) agreement of the Doha round of World Trade Organization negotiations formalized trade rules governing patented goods. This is highly relevant for the international market in pharmaceutical products: because research and development costs in the pharmaceutical industry are high, companies can only recover these costs by charging sizable markups over production costs while the products are under patent. Importantly in the context of HIV/AIDS, the TRIPs agreement formalized rules whereby a country facing a public health emergency could grant a "compulsory license," requiring a foreign pharmaceutical firm to license a domestic producer to produce generic versions of its patented medicines for domestic consumption. However, many African countries do not have any domestic pharmaceutical industry to speak of. Partly reflecting growing international concern over the escalating HIV/AIDS crisis, the agreement was therefore subsequently extended to allow countries without domestic production capabilities to import generic versions of patented drugs.

Besides opening the door to the import of generic drugs to combat AIDS, this option also improves the bargaining power of countries facing HIV epidemics when negotiating with the original producers of the drugs. Major reductions in the prices of antiretroviral drugs have already been achieved by individual agreements between pharmaceutical companies—the patent holders or producers of generic versions—and governments of affected countries.

However, changes in the international market for antiretroviral drugs, together with the associated fall in the prices of these drugs for developing countries, have resulted in and are being reinforced by the emergence of a more regulated market, in which NGOs or government agencies act as intermediaries. For example, the Clinton Foundation has established a program that aims to reach 2 million people in four African and several Caribbean countries by 2008. It was able to secure low prices for some types of antiretroviral treatment (about \$140 a year) by securing the commitment of the participating countries to substantially roll out antiretroviral drug treatment programs, and by helping to raise funds to cover the costs of the program. The companies involved were able to reduce the price of the drugs because the program guarantees the drug makers a high and predictable volume of sales, and because the arrangement allows companies to save on marketing and distribution costs.⁴¹ Other major initiatives, including PEPFAR, which have a broader HIV/AIDS agenda, also involve bulk purchases of antiretroviral drugs.

Global Financing of HIV/AIDS-Related Expenditure

HIV/AIDS-related spending and funding have increased sharply over the last several years. Estimates of household spending on HIV/AIDS are available for only a few countries (and, where available, are frequently based on small samples). Therefore most of the available data relate to spending by national governments or to sources of financing. Such institutional spending has risen considerably over the last several years for low- and middle-income countries, from about \$300 million in 1996 to \$4.2 billion in 2003 (see Summers and Kates, 2003). Accounting for most of these increases are increases in national spending (from \$20 million in 1996 to \$1.0 billion in 2003) and in bilateral grants (from \$160 million to \$2.0 billion over the same period). The largest contributor at present is the United States, which today accounts for about 20 percent of global funding.

The patterns of financing differ very substantially across regions and countries. According to the HIV/AIDS national accounts published by the Regional AIDS Initiative for Latin America and the Caribbean (SIDALAC), external finance plays a relatively minor role in the Latin America and Caribbean region, accounting for only 1.7 percent of total funding,

⁴¹WHO (2004a, p. 25) suggests, however, that the guarantees that participating countries or programs need to provide to benefit from this low price are “difficult to provide given the relatively small size of their antiretroviral treatment programmes and uncertainty about long-term funding.”

Table 7.11. Estimated Funding for HIV/AIDS Spending in Low-Income Countries by Source, 2003

Source	Millions of Dollars
Total	4,232
U.S. government bilateral	852
Other government bilateral	1,163
Global Fund ¹	547
U.N. agencies	350
World Bank ²	120
Foundations and other NGOs	200
Governments of affected countries	1,000

Source: Summers and Kates (2003).

¹HIV/AIDS spending only.

²Grant component of concessional loans.

whereas the domestic public sector accounts for 84.6 percent of HIV/AIDS spending.⁴² In sub-Saharan Africa, although data are available for only a few countries, it seems clear that external finance is the most important source of funding.⁴³ For example, Martin (2003) estimates that external finance accounted for between 79 and 85 percent of all HIV/AIDS spending in Botswana, Lesotho, Mozambique, South Africa, and Swaziland in 2002. UNAIDS (2004b) reports that external financing in Ghana accounted for 74 and 59 percent of all HIV/AIDS-related expenditure in that country in 2002 and 2003, respectively.

Summers and Kates (2003) estimate that total HIV/AIDS-related funding in low-income countries, excluding private health expenditure, amounted to \$4.2 billion in 2003 (Table 7.11). This estimate was based on budget allocations for HIV/AIDS-related grants. Actual disbursements on HIV/AIDS-related activities were somewhat lower, because not all the budgeted grants were disbursed in 2003. As a consequence, Summers and Kates's estimates are about \$600 million higher than those provided by UNAIDS (2004b).⁴⁴ The largest discrepancies between funding and spending relate to the activities of the Global Fund to Fight AIDS, Tuberculosis, and Malaria, contributions to which are counted as funding, whereas grant

⁴²Data from UNAIDS (2004b). More detailed data are available on SIDALAC's website, www.sidalac.org.mx.

⁴³The most notable exception is South Africa, which does not receive substantial amounts in external grants, because of its relatively high income per capita.

⁴⁴UNAIDS (2004b) estimates total expenditure of \$4.7 billion, including \$2.1 billion from within-country sources (unlike the Summers and Kates data, these include private expenditure). Excluding within-country sources from both sets of estimates yields expenditures of \$3.2 billion and \$2.6 billion, respectively.

disbursements are counted as spending. Since the Global Fund disbursed only about 17 percent of what it received in that year, there is a discrepancy of about \$400 million.⁴⁵ Similar discrepancies can and commonly do arise as bilateral grants that are pledged are not disbursed, either because the recipient does not meet some formal condition attached to the grant, or because capacity constraints prevent the recipient from implementing the funded project.

UNAIDS (2004b) estimates, on the basis of existing funding commitments, the emergence of major new multilateral and bilateral donors (such as the Global Fund and PEPFAR, respectively), and current trends, that HIV/AIDS funding in low- and middle-income countries will increase to just over \$8 billion in 2005 and about \$10 billion in 2007. Reflecting the important and growing role of the Global Fund (which received \$1.4 billion in contributions in 2003) and PEPFAR (which may provide up to \$15 billion over five years), multilateral and bilateral sources account for most of this increase.⁴⁶ The largest share of these resources (43 percent) will be needed in sub-Saharan Africa. However, even this lion's share is much lower than the region's share of people living with HIV/AIDS worldwide: sub-Saharan Africa is home to 66 percent of all HIV-positive individuals worldwide. This discrepancy may reflect the fact that expenditure on prevention is spread more evenly across countries than expenditure on care and treatment, that unit costs for some interventions are lower in Africa than in other regions (in line with its lower income per capita), or that the expansion of services in Africa is impeded by capacity constraints in the short run.

These estimates can be compared against projections of global resource needs (UNAIDS, 2004b) of \$11.6 billion in 2005 (as discussed in some detail above; see Table 7.2), and \$19.9 billion in 2007. The WHO's 3 by 5 initiative, which is more narrowly geared toward medical interventions (palliative care, treatment of opportunistic infections, and antiretroviral treatment account for about 70 percent of total costs), is estimated to cost between \$3.1 billion and \$3.8 billion, depending primarily on what prices are assumed for the various forms of antiretroviral treatment used (see Gutierrez and others, 2004). Now somewhat outdated in terms of its finan-

⁴⁵The low ratio of disbursements to receipts largely reflects the fact that the Global Fund typically commits its funds over several years and is only starting operations. Grants committed accounted for 80 percent of contributions received in 2003, according to the Global Fund's financial statements (Global Fund to Fight AIDS, Tuberculosis, and Malaria, 2004).

⁴⁶For a more comprehensive profile of PEPFAR and the Global Fund, see UNAIDS (2004b).

cial projections, but still very valuable for its broad assessment of the linkages between macroeconomics and health and its articulation of a broader strategy for investment in health for human development, is the study by the Commission on Macroeconomics and Health (2001). That study estimated that an additional \$14 billion would be needed by 2007, and around \$22 billion by 2015, to scale up the response to HIV/AIDS in 83 low- and middle-income countries.

By all these accounts, the amounts available to fund the response to HIV/AIDS fall well short of the projected resource needs. According to the estimates by UNAIDS, the projected gap between resource needs and available resources amounts to \$3.3 billion in 2005—a shortfall of about 30 percent. On the basis of current commitments and funding trends, UNAIDS projects that this gap will grow, both in absolute and in relative terms, to \$9.7 billion by 2007.

In the absence of increased funding, this emerging (and, according to current projections, growing) resource gap will raise serious political and ethical questions. The most immediate is one of rationing: what will be the appropriate mix of interventions if the required levels of funding are not attained? It may turn out that some countries are successful in planning and implementing a comprehensive response to HIV/AIDS, and attract sufficient funding, while others fail to overcome obstacles to an expanded response. Since countries with a well-functioning health infrastructure in place and a broader human resource base are in a better position to implement such a program, allocating HIV/AIDS funds primarily according to medical criteria could intensify existing inequities between countries, in terms of access to health care and key development indicators such as life expectancy. Rationing can also affect inequities within countries, if, for example, treatment for HIV patients is offered only at a limited number of health facilities located primarily in urban areas. On the other hand, availability of funding may prove not to be the binding constraint to expanding access to treatment, if only a limited share of the population seeks HIV/AIDS-related services, such as voluntary counseling and testing, and the uptake of treatment remains low.

Managing HIV/AIDS-Related Aid Flows

As the global response to HIV/AIDS unfolds, many countries will experience substantial increases in health and other HIV/AIDS-related expenditures, largely financed by external grants. For some countries, especially those with very low income per capita, the additional requirements for an adequate response to HIV/AIDS exceed current health expenditure. This

means that health services need to be expanded very rapidly in order to achieve significant coverage rates for treatment and other HIV/AIDS-related interventions. Challenges to the government include formulating a comprehensive strategy that optimizes the allocation of HIV/AIDS-related funds and is consistent with overall health and development objectives, and coordinating the activities and programs of various donors and implementing agencies—public sector, private sector, and NGOs.⁴⁷

Managing this substantial and rapid increase in health services and coordinating among the various government agencies, donors, and implementing agencies and NGOs poses a difficult challenge. However, many countries affected by HIV/AIDS already start from a situation in which public health services and health facilities operated by various NGOs coexist, and external grants play a key role in enhancing the quality and expanding the geographical coverage of their health services. As external grants are used to strengthen existing health services eroded by increased HIV/AIDS-related demand, to make treatment available to more patients (often using existing health facilities), or to increase the availability of health services, this will strengthen these countries' mixed system of health facilities operated by the government, NGOs, and private providers. Depending on the national strategy on HIV/AIDS or donor objectives, however, the mix of public and private providers may change. (Bennett and Fairbank, 2003, also stress the impact on procurement and distribution of drugs and related commodities.)

There is a need for coordination at the national level—among the government, donors, implementing agencies and NGOs, and civil society—to ensure that the national response to HIV/AIDS is consistent with overall health and development objectives, and to avoid duplication of activities. By developing a strategic framework, the various participants can ensure that the response to HIV/AIDS is adequate at all levels and that the available funds are allocated optimally. Close coordination between the various agencies and civil society would also enhance accountability and complement the oversight and financial control mechanisms of the government and donors.

One area where potential trade-offs exist is the often-limited availability of trained personnel.⁴⁸ As the international response has evolved to include

⁴⁷Bennett and Fairbank (2003) provide a thorough assessment of the health “system-wide effects of the Global Fund to Fight AIDS, Tuberculosis, and Malaria.” Although their discussion goes beyond HIV/AIDS-related activities, the issues they raise apply directly to the discussion here.

⁴⁸On the issues raised in this paragraph, see also Over (Chapter 10, this volume).

substantially enhanced access to antiretroviral treatment, and as this has increasingly become financially possible, major initiatives to expand access to treatment have addressed the lack of human resources in two ways. The first is by developing forms of treatment that minimize the demands on highly trained health personnel. The second is by focusing on training and retaining a sufficient number of health personnel to achieve targets for increased access to treatment (see, for example, WHO, 2003a, 2003b).⁴⁹ Especially for countries with relatively low income per capita, this may also involve increasing salaries for health personnel, to reduce brain drain and absenteeism. Nevertheless, the expected increase in the demand for qualified health personnel is substantial, and the government, in cooperation with the various donors and implementing agencies, needs to ensure that increases in HIV/AIDS-related health services do not create bottlenecks elsewhere. Although trade-offs in the allocation of a given number of health personnel exist in the very short run, they can be resolved in the longer run. Major initiatives like the WHO's 3 by 5 initiative, as well as many country proposals submitted to the Global Fund, include provisions for the training of additional health personnel. To the extent that this training is synchronized with the expansion of HIV/AIDS-related services, there will be no adverse effect on other areas of health service provision.

For health services that are largely financed by grants, the sustainability of financing—and thus, in many cases, of the funded services—is an issue. Establishing new health services often implies a political commitment on the part of the government, which cannot easily be reversed should funding dry up. (For example, the closure of hospitals is often a hotly contested political issue.) Outside the HIV/AIDS context, many grants finance investments in infrastructure, with government bearing some of the investment costs and all the operating costs. For these grants (provided that the government decides that it can sustain the operating costs), sustainability is less of an issue, since the time frame of the grant is similar to that of the project, and delays in disbursements can frequently be accommodated simply by delaying the project. HIV/AIDS-related grants, however, are primarily applied to the current costs of programs, and increased access to treatment—treatment that is cost intensive in terms of medical supplies and human resources—will reinforce this trend. Once these health services are established, scaling them down in response to shortfalls in aid flows would be very difficult, not to mention undesirable from a

⁴⁹Over (Chapter 10, this volume) provides a thorough discussion of the changes in the demand for and supply of health services.

public health perspective, and would leave the government financially and politically vulnerable.

Impact of HIV/AIDS in the Longer Run

There are three key areas in which an assessment of the impact of and the response to HIV/AIDS highlights fundamentally different challenges in the longer run. One is that coping and prevention strategies are less affected in the longer run by preexisting capacity constraints. Whereas the emphasis in the short run is on optimizing the response given institutional, physical, and social constraints, in the longer run these constraints are endogenous. Another is that most of the analysis of the adverse impact of HIV/AIDS focuses on the disruptions caused by HIV/AIDS-related morbidity and mortality. However, some of the impact of HIV/AIDS may accumulate over time. Examples include the effects of HIV/AIDS on institutional memory, discussed above, and the implications for investments in physical and human capital. The third is the indirect effect on the fiscal balance of the government's response to HIV/AIDS, if it succeeds in bringing down HIV prevalence and mitigating the macroeconomic impact.

The government's response to HIV/AIDS is subject to financial constraints and existing capacity constraints, both in terms of human resources and in terms of physical infrastructure. For example, with trained health personnel in short supply, a given increase in health spending may fail to achieve a commensurate increase in health services coverage. Strategies to improve access to treatment for HIV patients, in addition to the financing of drugs, therefore emphasize investments in health personnel and facilities. The WHO's 3 by 5 initiative, for example, includes a strong training component.

Most of the literature on the economic and developmental impact of HIV/AIDS, whether on the macroeconomy, on the public service, on the private sector, or on households, focuses on current disruptions caused by increased mortality and morbidity. However, much of the adverse impact of HIV/AIDS may become evident only in the longer run. One example, discussed above, is institutional memory. An institution may be able to accommodate the loss of an additional 2 or 3 percent of its staff in a given year, replacing them through internal reassignments or newly recruited staff with similar skills. Replacing an additional 25 percent of its staff over 10 years, however, may prove much more difficult and damaging to the organization's efficiency, as institutional memory is weakened and the range and depth of the staff's experience deteriorate.

To the extent that the government succeeds in reducing HIV prevalence rates and mitigating the macroeconomic effects, the fiscal balance will improve. For example, reduced HIV prevalence results in lower personnel costs, reduced health expenditure, and reduced social outlays. It will also mitigate the slowdown in GDP growth, and thus in the growth of the domestic tax base. Masha (Chapter 9, this volume) shows that a sound HIV/AIDS policy framework can yield both savings on some types of HIV/AIDS-related expenditure and improvements in domestic revenue, which can offset a significant proportion of the costs of implementing the framework. These gains, however, derive largely from reduced mortality and morbidity. Thus, given the long time it takes for preventive measures to reduce the incidence of HIV infection, these financial gains have little impact in the short run. Yet even though the macroeconomic effects do not appear immediately, including a macroeconomic assessment in a policy framework on HIV/AIDS can help in informing the choice of policy targets.

Conclusions

HIV/AIDS poses a huge challenge to governments facing severe epidemics. Even as the demand for certain categories of public services (most importantly, health services) increases substantially, the capacities of governments to cope with the epidemic are eroded, in part because of increased mortality and morbidity among government employees. The analysis in this chapter shows that the impact of HIV/AIDS on government employees goes far beyond the disruptions and increased costs associated with increased attrition owing to HIV/AIDS. As mortality among young adults increases, the age composition of the civil service changes. Fewer public servants survive to an age when they might normally be candidates for higher managerial positions; as a result, some of these positions must be filled with less qualified or less experienced people, and the quality of decision making is likely to deteriorate.

The most visible impact of HIV/AIDS on governments' operations has been on health services and expenditures. With antiretroviral treatment initially out of reach for all but a few AIDS victims, the emphasis in the health sector was on palliative care and the treatment of opportunistic infections. The existing health services had insufficient capacity to cope with the increased demand, and health facilities responded by reducing access to care for less urgent medical conditions. Following the dramatic decline in the prices of antiretroviral treatment, and with financial support from the international community, much of the emphasis has shifted toward

improving access to that treatment. Given the still-limited availability of health personnel and the toll that HIV/AIDS is taking on government employees, providing antiretroviral treatment in a way that makes the most efficient use of trained staff is an integral part of the approach.

Grants from international and bilateral donors play a critical role in the financing of HIV/AIDS-related expenditure. UNAIDS estimates that, in 2003, more than three-fourths of public expenditure on HIV/AIDS in developing countries worldwide (including the activities of NGOs) was financed by external grants. Thus a government that presents to potential international donors a sound policy framework for fighting the epidemic and mitigating its impact may be able to cover most of its costs through grants. However, such grants typically finance only those expenditures that directly relate to HIV/AIDS. Most of the more indirect costs of HIV/AIDS—increasing personnel costs, rising social expenditure, and a decline in domestic revenue as the tax base is eroded—would still be covered by the government from its own resources, and the analysis in this chapter has shown that these costs can be substantial.

The analysis presented here grew out of the experience of providing economic policy advice in countries facing severe HIV/AIDS epidemics. Considering the impact of and the response to HIV/AIDS from a fiscal policy perspective is important for a variety of reasons. First, in countries with severe epidemics, HIV/AIDS affects all areas of public services and the domestic tax base, and it forces substantial increases in spending in some services. In these circumstances, one simply cannot conduct responsible fiscal policy without taking into account the broad impact of HIV/AIDS on government employees and the budget. Second, efforts to fight the epidemic and mitigate its impact have important consequences for the budget and the management of public services, in the form of increased expenditure, increases in required personnel, and the need to coordinate the activities of international donors. Finally, a successful HIV/AIDS policy, by reducing the number of new infections and improving the health status of people living with HIV, can mitigate the impact of HIV/AIDS on the economy as a whole, and thus soften the impact on public services and the government budget.

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