



IAEN ~ International AIDS-Economics Network

## State of the Art:

# AIDS AND ECONOMICS

**July 2002**

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**The POLICY Project**

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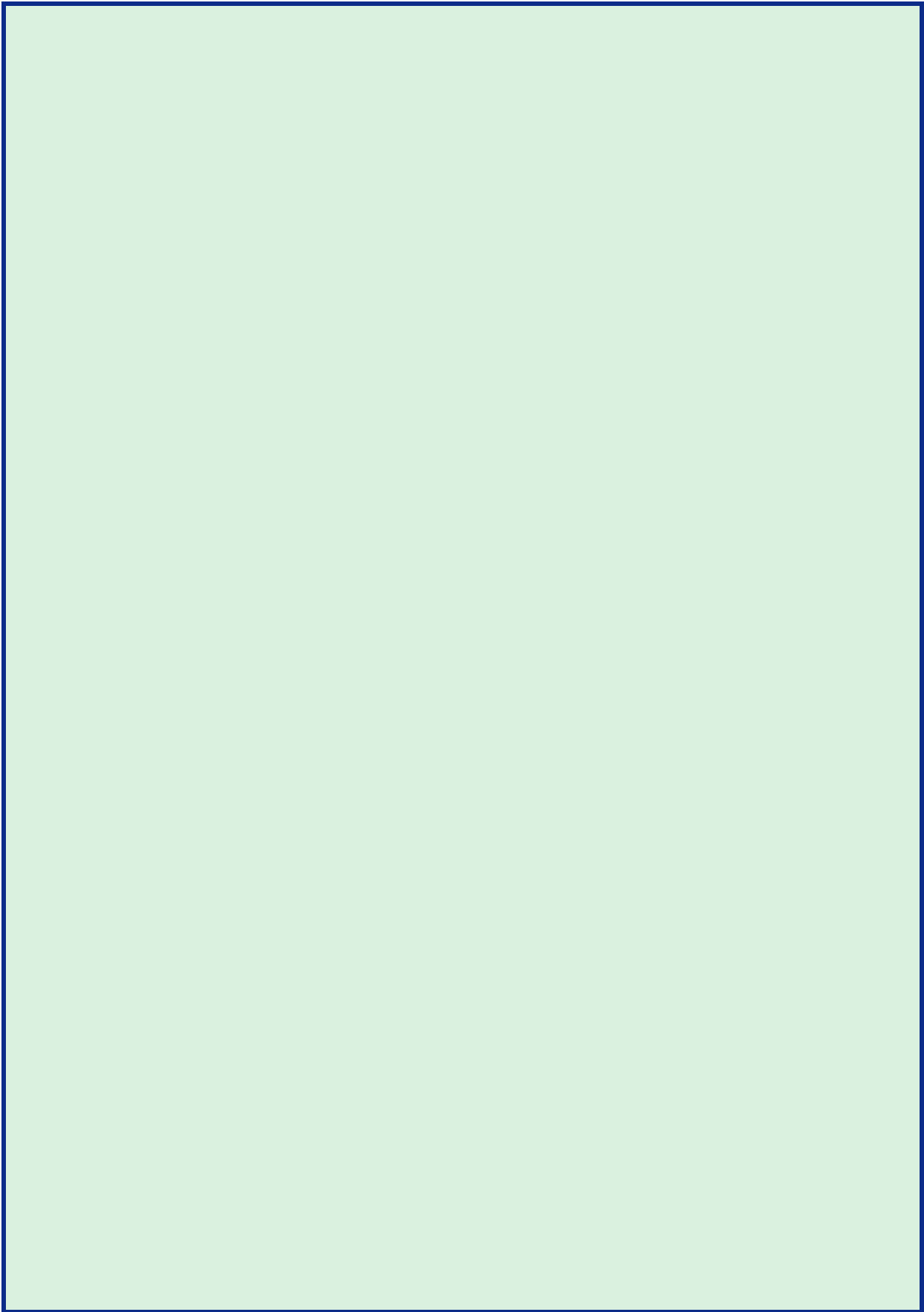
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# Executive Summary

The following document was written by a team of leading economists and social scientists in response to the question, “What is the state of the art in the field of AIDS and economics”. This question was intentionally designed to provide authors with the ability to focus on the issues that they felt were most critical. As a result, each chapter represents a unique perspective on the question at hand.

This document begins with a chapter that describes the data on the current and needed resources for HIV/AIDS programs. As Dr. McGreevey and his co-authors note, there is very little information currently available in developing countries that describes how resources are being spent on HIV/AIDS activities. However, the data that do exist suggest that the disparity between HIV/AIDS spending in Africa, Latin America and the Caribbean (LAC), and the United States is even greater than one would have expected. The authors note that spending per person living with HIV/AIDS in the US exceeds \$30,000, but is only about \$1,250 in the LAC countries and only \$8 to \$25 in sub-Saharan Africa.

Dr. McGreevey’s analysis of the data collected by SIDALAC from the LAC region is fascinating, particularly in regards to how available resources are being spent. The analysis reveals that only 7 percent of spending is focused on men who have sex with men (MSM) and intravenous drug users (IDUs), even though the epidemic in the LAC region remains concentrated in these populations.

*"Policymakers need a reasonably complete picture of resource flows from sources to uses that finance HIV/AIDS prevention, care, support and treatment. Without that picture, they risk misallocation, waste and faulty strategic planning. For now, in most parts of the developing world, the picture remains largely unpainted. Filling in the details on financing is among the key challenges to HIV/AIDS policymakers today."*

In his chapter on globalization, Professor Barnett presents an excellent discussion of some of the critical issues relating how economists perceive and define health in the age of globalization. As Professor Barnett emphasizes, current thinking in health economics may be focused too much on defining "health" rather than "well-being". As argued in this chapter, health is far too often defined on an individual basis and does not take into consideration the very significant social interactions between individuals. This argument is particularly relevant when evaluating economic tools such as cost-effectiveness, which generally do not take into consideration societal preferences and interrelationships. One could argue, for example, that while the public provision of antiretroviral therapy in developing countries may not be cost-effective, the value to society of offering such therapy may be quite significant. Professor Barnett argues that the moral imperative of offering care may be significantly undervalued through the use of "individual-focused" forms of health economics, and that we need to focus more on society and culture in evaluating the "best" ways to address the HIV/AIDS epidemic.

*"It is clear that there is a premium on pragmatism as opposed to compassion. Pragmatism tends to capture resources. Social scientists may wish to explore further the links between pragmatism, self-interest, morality and public health."*

The third chapter, by Dr. Beena Varghese at the Centers for Disease Control (CDC), discusses the important issue of structural and social interventions for HIV prevention in developing countries. Dr. Varghese begins with a discussion of some of the interventions and the ways in which they might be able to affect the course of the epidemic. This paper is unique, however, in discussing ways in which such interventions

could be evaluated. This step is critical, as it's likely that sufficient resources for interventions such as gender equity and stigma reduction will only be made available if they are demonstrated to produce good "value for money".

*"Well-designed cost-effectiveness studies that compare the costs and benefits of structural interventions to individual behavior change interventions for HIV prevention would be educative."*

Section two addresses the ways in which the impact of HIV/AIDS is being measured. In his chapter, Professor Whiteside in particular addressed the issue of impact on the health and education sectors. He emphasizes that health and education are particularly important because these sectors are where the greatest number of government workers are employed and because these sectors are most essential for the development of human capital, which in turn is essential for development. The chapter concludes by emphasizing that future work in the area of economic impact needs to be more oriented toward encouraging specific actions, rather than simply raising awareness.

*"The way ahead is simple—policy-oriented research that is published and marketed. Somehow we have to make people aware of what is going to happen and that they can and must respond."*

Chapter 5, which is written by Dr. Forsythe, discusses the various ways in which the private sector in Africa is being affected by the HIV/AIDS epidemic. This chapter discusses three types of private sector impact: (1) impact on the labor supply, (2) impact on profitability, and (3) other impacts. While describing the impacts that have already incurred and are likely to be incurred in the near future, Dr. Forsythe emphasizes that there are still opportunities to make HIV/AIDS prevention succeed in the workplace.

*"It is imperative to recognize that in most African countries, more than 90 percent of workers are not infected with HIV. In other words, despite the potentially dire consequences of HIV/AIDS, in most countries there is still time to prevent and mitigate the impact of the epidemic. Also, we now know what*

*works in terms of HIV/AIDS prevention. In countries such as Uganda and Senegal, prevention programs have succeeded in significantly reducing or limiting the spread of HIV infection."*

Chapter 6 addresses the issue of impact from the perspective of trade and commerce. Dr. Bollinger discusses the ways in which current property rights and trade practices may influence a country's ability to respond to the HIV/AIDS epidemic. This chapter provides an excellent summary of trade issues, such as compulsory licensing and parallel imports.

Dr. Bollinger also addresses the ways in which trade and commerce can be negatively influenced by the presence of HIV/AIDS. As noted in this chapter, workers in such sectors as tourism and transport are known to be particularly vulnerable to infection. While there is evidence that workplace interventions do succeed, there remain a limited number of companies that take an aggressive response to HIV/AIDS prevention and care.

*"The impact of HIV/AIDS could be devastating for certain sectors and certain countries. Yet there are policies that can be adopted that could help mitigate this impact."*

Dr. Greener, in his analysis of the research that has been conducted on the macroeconomic impact of HIV/AIDS, concludes that additional studies are probably not of much value. Most macroeconomic analyses have concluded that the impact of HIV/AIDS on per capita income will be relatively minor. However, this conclusion appears to mask the true impact that is occurring at the level of households, firms, and national governments. Macroeconomic analyses also fail to reflect the impact that the epidemic is having in causing poverty in developing countries.

*"Most studies of macroeconomic impact indicate that the range of probable impacts are well within the range of variation that could be expected from changes in economic management. It is, therefore, not likely that further studies of macroeconomic impact alone will yield useful information."*

The next section addresses ways in which economics can be used as a tool for addressing the lack of resources for HIV/AIDS prevention, care, and mitigation. In Chapter 8, for example, John Stover and Lori Bollinger discuss the issue of resource allocation. By discussing how HIV/AIDS resource allocation decisions are currently made, the authors are able to recommend an improved decisionmaking process. By using tools such as the Goals Model with a multisectoral, participatory approach, it should be possible for countries to make decisions that strive to produce the greatest impact with the available resources.

*"Resource allocation will remain a complex process involving multiple stakeholders and multiple goals. However, the current process can be improved. New mechanisms for involving all stakeholders in priority-setting decisions, such as the Country Coordinating Mechanism, can improve the process by expanding participation in these debates."*

Chapter 9 by Dr. Kumaranayake discusses the state of the art in the field of cost-effectiveness. Dr. Kumaranayake notes that cost-effectiveness has become an increasingly accepted tool for making resource allocation decisions. At the same time, the author describes a field that is, for the most part, lacking in high quality cost-effectiveness studies. In this chapter, a strong case is made for conducting additional research on the cost-effectiveness of HIV/AIDS interventions.

*"Clearly, given the limited evidence base, two key priorities are: to expand our knowledge of HIV/AIDS cost-effectiveness and the factors that influence them and to use the existing evidence-base to guide decisionmaking."*

The chapter by Marjorie Opuni and her co-authors provides an extensive summary of cost-effectiveness studies that have used randomized control trials. The authors note that, while the existing literature has been informative, the number of randomized trials is disappointingly small. Ms. Opuni presents clear arguments in Chapter 10 why this type of "gold standard" of effectiveness measures needs to be more widely pursued in developing countries.



*“Increasingly funders want to know what the return is on their investment. At the same time, to strengthen responses to the epidemic, policymakers need more information on national HIV prevention strategies and the packages or bundles of prevention interventions to be implemented. They need information about the costs and the benefits of implementing these interventions.”*

*“We have reached a turning point in AIDS where access to treatment for HIV-infected adults and children in developing countries can no longer be refused on cost grounds, lack of infrastructure, or other priorities. For the first time, there is evidence that a change in paradigm is now attainable.”*

Chapter 10 by Drs. Husain and Badcock-Walters presents a refreshing perspective on the issue of economics and HIV/AIDS. The authors move beyond the frequently referenced impact assessments and identify a multisectoral approach that can assist countries in mitigating this impact. The authors describe the experience of the University of Natal in forming mobile task teams within the ministries of Education and Health, which are designed to assess the potential impact of HIV/AIDS and identify ways in which this impact can be mitigated within these ministries.

*“To respond strategically to this challenge, it is necessary to move beyond the continuum of awareness, prevention, and care and frame a management approach that uses hard data and appropriate indicators to inform decisionmaking. The objective should be to mitigate— at all levels and in all sectors —by managing better and focusing on those issues that both drive and impede the economy.”*

Finally, Chapter 12 by Dr. Moatti and his co-authors presents a perspective and interpretation on the economics of antiretrovirals (ARVs) that is not often heard. Using economic arguments, the authors conclude that antiretroviral therapy is both affordable and cost-effective. The chapter begins with clearly defined moral and economic arguments for both price reductions and for global subsidies. Citing examples from Senegal, Uganda, Brazil, and Thailand, the authors provide a comprehensive summary of the successful introduction of these medications. The authors conclude that it is both a moral and economic imperative to provide access to ARVs in developing countries.

# Section One: The Various Roles of Economics in Addressing the HIV/AIDS Pandemic

*“The success of the struggle against HIV/AIDS will depend fundamentally on effective national leadership in the most affected countries. Recent signs of positive movement in that regard are encouraging. The recent and unprecedented actions of governments of Africa to increase their commitment to health care is one important step. The focus on HIV/AIDS within the Poverty Reduction Strategy Papers being prepared by 22 governments in the region to justify debt relief is another. International acceptance of the emergency nature of the crisis has led virtually all pharmaceutical companies to substantially reduce the barrier of high cost for antiretrovirals. Acting individually and collectively, the world’s high-income countries have also signalled that they recognize the need for an extraordinary boost to the fight against AIDS.”*

Schwartzlander, B et al. 2001. “Resource Needs for HIV/AIDS”. *Science*, 2434-2436.

# Chapter 1: Current and Future Resources for HIV/AIDS

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## Abstract

Policymakers need a reasonably complete picture of resource flows from sources to uses that finance HIV/AIDS prevention, care, support, and treatment. Without that picture, they risk misallocation, waste, and faulty strategic planning. For now, in most parts of the developing world, the picture remains largely unpainted. Filling in the details on financing is among the key challenges to HIV/AIDS policymakers today.

Limited data for Latin American and Caribbean (LAC) region countries offer virtually the only cases of adequate resource flow data outside the United States. Those countries spent a thousand dollars per person living with HIV/AIDS (PLWHA) in 2000. The U.S. federal government's Medicaid program for indigents spent 35 times as much for each AIDS patient under its care in that same year.

Low-income countries, largely dependent on donor assistance, spent far less per person and per PLWHA—as little as 31 cents per person, and eight dollars per PLWHA in sub-Saharan Africa. These enormous disparities underline a dual challenge: First, use what little money is available in poor countries very effectively; and second, demonstrate to all concerned that more resources must be forthcoming to confront the HIV/AIDS pandemic in poor countries, lest the negative effects swamp any effort to develop.

## Introduction

In the last two years, political commitment to respond to the HIV/AIDS pandemic has increased substantially. The UN General Assembly Special Session (UNGASS) on AIDS in 2001 and the recent creation of the Global Fund to Fight AIDS, Tuberculosis (TB), and Malaria are two indicators of this commitment at the global level. At the regional level, HIV/AIDS has been an issue on the agenda of the Inter-American Development Bank, the Asian Development Bank, the Organization of African Unity, and the African Development Forum, to name but a few institutions. And at the national level, low- and middle-income countries, home to over 95 percent of people living with HIV/AIDS, have made important progress in HIV/AIDS planning and program development [1, 2].

However, few countries of any level of development regularly monitor resource flows to the HIV prevention activities conducted by government and nongovernmental organizations (NGOs) within their territory. And to date, no country has developed a system that regularly tracks expenditures on HIV/AIDS care. International agencies have been most successful at documenting resource flows from donors to recipient governments and NGOs in low-income countries.

Donors report their official development assistance (ODA) to the OECD Development Assistance Committee (DAC) [3]. Most donors also respond to the annual surveys of the Netherlands Interdisciplinary Demographic Institute

(NIDI), UNFPA, and UNAIDS, on their HIV/AIDS/STI expenditures. Some developing country governments and NGOs return questionnaires on their spending for these interventions as well. NIDI also does *ad hoc* in-depth country studies [4].

The Regional AIDS Initiative for Latin America and the Caribbean (SIDALAC) and the Partnerships for Health Reform (PHR) have investigated HIV/AIDS financing in several countries using the National Health Accounts (NHA) framework [5].

For the year 2000, donor flows for HIV/AIDS/STIs of US\$ 396 million were reported to NIDI while a total of US\$ 521 million was reported to the DAC. These discrepancies illustrate the difficulties encountered in reporting even by institutions with relatively well-developed financial monitoring systems. A warranted conclusion may be that year 2000 donor assistance was almost US\$ 600 million. Similar data from 1998 and 1999 show a significant increase in official development assistance provided by these donors over the last three years [4].

In terms of data on domestic resource allocations to HIV/AIDS within developing countries, however, questionnaires usually sent to national HIV/AIDS coordinating institutions are much less efficient tools. In part, this is because regularly updated information systems do not exist and it is difficult for coordinating institutions to gather expenditure data from the many organizations implementing HIV/AIDS interventions in a country. In addition, for large portions of HIV/AIDS expenditure, data must be estimated with special studies. To estimate domestic expenditure on HIV/AIDS care, for example, detailed studies of the cost of delivering services and buying pharmaceutical and other inputs are a prerequisite to overall cost estimation. To capture out-of-pocket spending on HIV/AIDS goods and services generally requires purpose-based sampling of affected households, individuals, and clinics where and by whom spending occurs, especially for care and treatment.

Most of the studies on HIV/AIDS resource allocations using the NHA framework have been carried out in Latin American and the Caribbean [9]. In terms of average expenditure per PLWHA in the 12 countries, this translates into a little over US\$ 1,000, with over US\$ 3,000 spent per PLWHA in Uruguay and only US\$ 175 per PLWHA spent in Guatemala. An extrapolation of these country data to the region as a whole suggests that aggregate HIV/AIDS spending in the year 2000 was US\$1.4 billion, expressed in purchasing power parity conversion rates from national currencies to international dollars.

Nearly three-quarters of HIV/AIDS spending paid for care, one-quarter paid for prevention. Some 72 percent of spending on care paid for drugs, and 90 percent of that financed antiretroviral drugs (ARVs). With 60 percent of prevention expenditure on condoms and 14 percent on mass media campaigns, most of the prevention spending was spread across the general population even though HIV prevalence is concentrated among men who have sex with men (MSMs) and intravenous drug users (IDUs) [1]. Only 7 percent of prevention expenditure focused on these potential target groups. These spending shares might suggest to some readers that there has been a substantial misallocation of spending that could be corrected with more attention to the relative impact of targeted versus non-targeted interventions, and prevention versus care.

Rwanda is the only country outside of the LAC region for which we have a National HIV/AIDS Accounts estimate. A study there found annual spending of about 10 million dollars, amounting to US\$1.34 per capita and US\$25 per PLWHA [11]. In the rest of sub-Saharan Africa, for which there are no organized national data on out-of-pocket spending, the sum of government and donor outlays in the year 2000 may have been as little as 31 cents per person and eight dollars per PLWHA (see Table 1).

Spending in the LAC region looks large compared to sub-Saharan Africa but small compared to the United States. The U.S. federal government spent US\$ 10.8 billion on HIV/AIDS in the year 2000, which is over thirteen thousand dollars per PLWHA. If this amount is raised by

the same proportion as that which prevails between public and total spending on health in the United States, then total HIV/AIDS spending may have been nearly US\$ 25 billion in 2000 [13, 14]. This amount translates into nearly \$90 per capita and over \$30,000 per PLWHA.

*Table 1. HIV/AIDS Spending for Selected Population Groups, 2000, US\$*

Population Group	Population (millions)	PLWHA (millions)	HIV/AIDS Spending US\$ millions	Spending per Capita	Spending per PLWHA
Sub-Saharan Africa (excluding out of pocket spending)	655.0	24.5	200.0	0.31	8.16
Rwanda (including out of pocket spending)	7.4	0.4	9.9	1.34	24.75
Eight LAC Countries	360.0	0.9	1,131.0	3.13	1,250.00
USA, total population, federal expenditures only	280.0	0.8	10,800.0	38.57	13,500.00
USA, total population, federal and estimated private spending combined	280.0	0.8	24,545.0	87.66	30,681.00
USA, Medicaid spending for covered AIDS patients, estimated	n.a.	0.1	4,100.0	n.a.	35,965.00

Notes and Sources: UNAIDS (June 2000, pp. 124-135) for population, PLWHAs for all population groups. HIV/AIDS spending: Sub-Saharan Africa—author's estimate based on ACT Africa estimate of US\$165 million for 1998; US sum of public and private, author's estimate, assuming that the public health to total health ratio of 44 percent applies for HIV/AIDS.

SIDALAC 2000 for eight LAC region countries population and spending (Argentina, Bolivia, Brazil, Chile, Costa Rica, Mexico, Peru, Uruguay). Data for additional countries does not materially change average spending per capita or per PLWHA. Schneider and others [11] for Rwanda spending Graydon [15] for US Medicaid spending and number of patients, pp. 117-18.

A check on the credibility of this seemingly high level of spending is provided by an analysis of spending on Medicaid-covered AIDS patients that projected that expenditure would average

almost US\$36,000 per patient [15]. These observed disparities in HIV/AIDS spending are enormous:

- Spending in sub-Saharan Africa is so minuscule as to leave millions without care and support;
- Middle-income LAC region PLWHAs do far better, but poor targeting offers a less efficient service mix than might be possible;
- In the United States, spending per PLWHA exceeds that in the LAC region by a factor of 35, and it is 1,000 times higher than that in Africa.

Still, no one concerned with HIV/AIDS in the United States argues forcefully that ‘too much’ is being spent on PLWHAs. If these amounts are not too much in America, then the shortfall in Africa must be truly disquieting.

## Resource Needs for HIV/AIDS

Two major estimates of resource requirements appeared in 2001. The first, carried out in preparation for the UNGASS, estimated the cost of HIV/AIDS prevention and care needs in 135 low- and middle- income countries in 2005 [17]. The second, undertaken for the Commission on Macroeconomics and Health (CMH), estimated resources needed to scale up a package of core interventions to address HIV/AIDS and other priority illnesses in 83 low- and middle-income countries (including all of sub-Saharan Africa) by 2007 and by 2015 [16, 17].

Both studies drew on project-specific cost data for selected, effective interventions. The analysts calculated average unit costs across several projects, adjusting where feasible for likely labor cost differentials between low- and middle-income countries. The cost of each of 18 interventions was then multiplied by the number of units of that intervention to be delivered in each country. This number of units was in turn based on demographic-economic data with adjustments for feasible coverage derived from observed actual coverage of health services. Cost estimates, intervention-by-intervention and country-by-country, with contextual

adjustments for coverage, could then be summed across all 18 interventions to produce an estimate of aggregate costs for each of the 135 countries included. A key difference in approach that affected the estimates was the inclusion in the CMH study of the costs for infrastructure strengthening necessary for scaling up. There were also differences in target population coverage rates for some interventions.

The UNGASS study called for the spending of US\$ 9.2 billion on HIV/AIDS prevention and care in low- and middle-income countries by the year 2005. The CMH study produced spending requirement estimates that centered on US\$14.5 billion in 2007, and US\$23 billion in 2015.

To improve the utility of the estimates as resource allocation and strategic planning tools, UNAIDS, the Inter-American Development Bank, and the World Bank have joined an effort to review and revise national estimates of the costs of each of the interventions included in the costed package. For example, 10 LAC countries participated in a first phase of this effort (Brazil, Chile, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, and Trinidad and Tobago) [19].

These countries increased the estimated resource requirement for HIV prevention by 15 percent and the estimated care requirements by 27 percent. The main differences in prevention estimates are accounted for by an increase in estimated resource needs for the social marketing of condoms and prevention of mother-to-child transmission. The main differences in care estimates were due to important differences in the expected costs for HAART. Total expected resource needs for HAART increased by 45 percent compared to UNGASS estimates.

## Next Steps

Additional LAC countries, and a group of eight European and Central Asian countries will be included in a subsequent round of costing analyses. From these efforts can emerge improved strategic planning and a more cost-effective

blend of HIV/AIDS interventions. Equally plausible will be preparation of effective proposals for presentation to the Global Fund to Fight AIDS, TB, and Malaria.

National HIV/AIDS Accounts are a critically important input for strategic planning of HIV/AIDS interventions. They may equal in importance the epidemiological surveillance efforts that have made it possible for UNAIDS to publish updated estimates and projections of the disease each year. Resource flows are an essential complement to evidence about the incidence and prevalence of the disease.

So far, only the LAC region has made good progress with HIV/AIDS accounts. A group in Asia, the Asia Pacific National Health Accounts Network (APNHAN) reports an enthusiastic readiness to begin analysis in up to 10 countries in that region. The Rwanda study, unique in sub-Saharan Africa, needs urgently to be accompanied by national HIV/AIDS accounts in many more countries of that region. As with the SIDALAC work, international specialists need to work closely with local specialists and governments. The capacity to sustain analyses and continue them over time in close association with governments is essential to success. One-off, foreigner-executed data collection efforts tend not to support the goal of sustainability.

Work on national HIV/AIDS accounts needs to be linked to ongoing work on National Health Accounts. The OECD and WHO provide guidance, toolkits, and technical assistance for NHA work, and these efforts can be readily extended

to the subset of activities required for national HIV/AIDS accounts. SIDALAC has demonstrated that the process is feasible, and other regions, with appropriate financing, can be expected to replicate that success.

Data collection and analysis for preparation of national HIV/AIDS accounts need not be excessively costly. For LAC countries, the cost has varied between US\$ 25,000 and US\$ 55,000 per year per country. Initial cost estimates from the APNHAN specialists are at the same or somewhat lower level of cost per country per year of analysis.

The decision to undertake a national HIV/AIDS accounts study must depend on both costs and benefits to be derived from the study. Experience in the LAC region, especially evidence that data there helped countries prepare strategic plans and worthy proposals to the Global Fund to Fight AIDS, TB, and Malaria, suggests that benefits far exceed costs.

Further, such data drawn from a wide selection of countries can constitute in their totality a global public good. With comparisons that can indicate whether particular blends of services yield more positive results than other blends, all supporters of HIV/AIDS interventions will be better equipped to make sound and beneficial choices on program design. Focusing on the benefits provided with invested resources would provide data critical to policymakers deciding on the distribution of resources within and across countries and sectors.

## Recommended Reading

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# Chapter 2: HIV/AIDS and Globalization—What Is the Epidemic Telling Us About Economics, Morality, and Pragmatism?

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## Abstract

Disease epidemics have been related as both cause and effect to increasing integration of human economies, societies, and cultures throughout history. It is well known that infectious diseases are not equally distributed between different societies and different sections of the same society. This is clear on a global scale where disparities in exposure to infection and access to public health provision and health care are acute.

There is a debate as to the meaning and effects of “globalization” as well as about whether it is “new” and, if so, in what ways. This paper briefly examines (a) the history of disease in relation to globalization; (b) the meanings and importance of “globalization”; (c) where and how the HIV/AIDS epidemic fits into the picture; (d) some of the theoretical and ideological implications.

## Disease, Globalization, and Integration

William McNeill (1977) was among the first to draw our attention to the role of epidemic disease in human history. Many subsequent authors have noted its importance, and most recently Jared Diamond (1998) has informatively discussed its role in the increasing integration of human society and economy over the past 13,000 years (which may be another way of talking of “globalization”). Scott and Duncan (2001), argue that the “Black Death” in medieval Europe and other plague events must be understood as events affecting “metapopulations”, a term used by ecologists to describe “populations

of populations” (Scott and Duncan, 2001:13). They note that the term is not usually applied to human populations, but that it is appropriate in relation to studies of spatial heterogeneity of disease “where individuals can be either infected or uninfected, an example of the interaction between demography and disease” (Scott and Duncan, 2001:13). HIV/AIDS is a global pandemic affecting the ultimate metapopulation—the entire human community. Its distribution is unequal: spatially, in terms of countries and parts of countries; socially, in terms of social and cultural groups; and economically, in terms of income and wealth classes. The evidence on this is not at all clear, but some patterns seem to be apparent (see for example Carael, 1995; Over, 1998; Ainsworth and Semali, 1998; Filmer 1998; Farmer, 1999; and more generally on the relationship between ill health and inequality, Wilkinson, 1996).

## Globalization: Health Promoter or Health Hazard?

There are numerous definitions of globalization (Went, 2000). They emphasize different aspects of the process and in so doing express different evaluations and ideological stances. For example:<sup>1</sup>

- The intensification of global linkages across a wide sphere—across transnational corporate business structures, international finances, people mobility (migration, tourism), global cultural exchange, global environmental issues, and technology and electronic communication.

<sup>1</sup> These definitions are taken from a very useful discussion on the internet by Tamara Hattar, Debra Berliner, and Flavio Casoy, dated October 17, 2000 and entitled Globalization: Health Promoter or Health Hazard?

- Globalization not only refers to economic processes or the development of economic institutions, but also describes the interconnection between individual life and global features; the process of increasing economic, political, and social interdependence and global integration that takes place as capital, traded goods, persons, concepts, images, ideas, and values diffuse across state boundaries. Routes of globalization are in the industrial revolution and laissez-faire economic policies of the last century.
- Globalization and liberalization are a fast, new express train and countries have been told that all they need to do is get on aboard...those that fail to get aboard will find themselves marginalized in the world community and world economy.
- Globalization is not a new phenomenon (the 16th and late 19th centuries are both characterized by the development of communication, transportation, and production systems), but the present era has distinctive features. Shrinking space, shrinking time, and disappearing borders are linking people's lives more deeply, more intensely, more immediately than ever before (Human Development Report, 1999:1).

The term refers to some or all of the following phenomena:

- Global markets that are more closely and immediately linked, de-regulated and accessible to more people than hitherto;
- Tools of communication, such as cell phones and the Internet, which enable the creation and maintenance of more flexible and responsive networks of communication—both financial and non-financial.
- New “actors” and “agents” that transcend national boundaries, for example, the World Trade Organization. Such agencies may have

or claim to have authority over governments. Indeed the role and potential for action of nation states – with the exception of the largest and most powerful, the US—may be questioned by the existence of such global organizations. Some multinational corporations have global reach and more economic power than many states. Some NGOs are able to mobilize globally in opposition to and independently of states.

## How Does Globalization Affect Health?

There are two broad views of how globalization affects health.

- There is a view that sees the increased interdependence attendant upon globalization resulting in an increased willingness of nations to work together in pursuit of improved health because this would serve their rational self-interest. This offered an optimistic analysis of the health benefits of globalization to poor countries and to poor communities in rich countries. These included: increased trade, easier diffusion of new technologies, and—at a cultural-political level—acceptance and application of common human rights throughout the world. This view argues that the increased pace of cross-national exchanges should facilitate diffusion of technological innovations, such as new and effective contraceptive methods, techniques for enabling access to clean water, inexpensive refrigeration, efficient transport and communication technologies, and new and effective systems for prevention and treatment of infectious disease.
- In contrast, the pessimistic view sees globalization as a phenomenon which because of the increasing loss of sovereignty by nation states means that states are less willing to pool resources. The result might be less co-operation and more protectionism, increased competition, and insistence in maintaining those spheres of influence that still seem intact. In

addition, the increasing concentration of the international pharmaceutical industry has been an important factor. The more ready availability of large profits from treatments of disease in rich countries and communities has meant that, for example, there has been markedly less attention to the needs of communities and countries that have less ability to express their needs through markets. It has been argued (Thomas, 2001) that pursuit of an HIV/AIDS vaccine has been of less interest to big pharmaceutical companies. These stand to profit more from development of treatments than vaccines. The debate about the TRIPS agreement and generic versions of antiretroviral drugs before, during, and most significantly after the XIII International AIDS Conference in Durban, 2000, is indicative of the kinds of challenge we confront in trying to ensure access to drugs through market mechanisms. The fate of the Global Fund for TB, Malaria and HIV/AIDS, which was an outcome of the UNGASS meeting in 2001 still hangs in the balance as the rate of commitment from the main donor countries remains disappointing.

## Neo-liberalism and Global Health

Although neo-liberal economic ideologies and the World Bank have not always been identical, they have certainly been very close during the past 20 years. The World Bank has had a profound influence on health provision in poor countries as the largest external financier of health activities in low-and middle-income countries. It has also been a major voice in national and international health policy debates and an important contributor to health policy research. Over the past two decades, the Bank has addressed the following three main health policy issues:

1. Systemic reform.
2. Targeting public sector investment.
3. Encouraging donors and governments to operate within the framework of the first two.

The thrust of these strategies was to emphasize the role of the market in health care provision. Government's role was to be mainly regulatory, by supervising the marketplace, insurance legislation, and ensuring "acceptable" levels of access.

Criticisms of the Bank's policy include the view that this is an approach that

- Ignores the social ethics of health care and defines health services as commodities to be delegated to the market sector of an economy.
- Ignores the provision of public goods, such as immunization and public sewage.
- Generally seeks to shift the larger burden of curative services to the private sector, which makes it available to foreign investment.

## Individual Health, Public Health and Well-being

"Health" is not simple. It is a cultural artifact. It appears to be a quality of our body, which is where we feel unwell, where the symptoms of disease are experienced. It appears "natural" that we should see health, or its opposite sickness, as an individual, isolated experience for which we take individual responsibility. The underlying metaphor is of a machine that we either maintain or neglect. Such ideas link with broader notions in western thought concerning the importance of the individual and his/her responsibility for her/his actions. This is where it links to markets, that are also sometimes seen as interactions between "individual" economic agents. This is not the only way to see the issue. Consider the following two problems:

- Is health really the issue or is there something broader called "well-being" which questions the purely individual and bodily nature of "health" and places more emphasis on the social and economic origins of "ill-being"?

- Do we need to understand the idea of “the individual” differently? This is not to suggest that individuals do not exist or have significance. It is to point out that the centrality of the individual as an acting and responsible entity is a product of western history and experience. Others, elsewhere, see things differently, placing the social nature of the individual center-stage.

Amartya Sen<sup>2</sup> is an important commentator on these issues. His approach to problems of poverty and well-being starts from the use that people get from their lives, how they are able to express and/or present themselves in the world. To understand the injustice of inequality, we need to see how economic, social, institutional, and cultural structures stunt people’s abilities to gain access to the resources that enable them to function as full human beings.

Sen’s “capability” approach focuses on the opportunities for choice open to people, rather than on the final outcomes they achieve. Potentially, this approach offers a way of limiting the need for contestable judgements about the nature of well-being as it notes that there can be a variety of limits to opportunity, different from one society to another. These ideas are important because they move away from the dominant western account of health and poverty as aspects of the individual. They involve a much broader perspective that spans cultures.

Sen’s is a cross-cultural perspective. It allows a variety of interpretations of what it means to be a person and to have an identity. It engages with issues beyond the western cultural tradition and conflicts with the currently dominant emphasis on “the market” and “the private” in considering the provision of public goods and services.

These ideas were foreshadowed in the work of Karl Polanyi (1945). Polanyi’s view was that in past societies the market mechanism was closely integrated with other aspects of social relations.

But in “the west” it became separated, “disembedded”, and thus uncontrolled and unmoderated by considerations of values other than price. In its most extreme manifestation, “the market” is today held up by many politicians and philosophers as the best and only “rational” way to decide on the allocation of goods and services, including health and welfare.

Polanyi’s perspective engages with a question that takes us beyond the conventional perspective of the “individual”. While the western medical tradition deals with “individuals” and even dissects individual’s complaints into “specialisms”, this question locates individuals in their social field. It asks whether social relations can be considered as ends as well as means. In other words, whether social relations should themselves be considered as part of well-being. If this were to be the case, then the social relations of making a living, living with other people, and rearing children, would have to be taken seriously as components of “well-being” in ways that are not currently the case in the “health” industry.

We live our lives in our minds but also through and in our bodies. We guard and worry about our health. *Our* health, *our* individual body, *our* well-being or *our* ill-being. Medical doctors deal with our individual health. We pay them or make public provision for them to be paid. But is this really what health, well-being, and ill-being are about? These questions confront us with the necessity to consider how we relate to each other in an era of increasing globalization.

These social relations are all-important aspects of public health inasmuch as the perspective that identifies “health” with “medicine” implies a much more individualistic version of a “person” than does that which identifies “health” with “public health”. In the process, of course, the issue of whether or not social relations can be considered ends as well as means links once again to the notions of social cohesion, solidar-

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<sup>2</sup> These ideas have been developed in a variety of publications over the past 25 years. See for example: Sen, 1985; Sen, 1997; Sen and Sengupta, 1983; Drèze and Sen, 1989.

ity, and public goods and their location and guardianship in a globalized world.

Social relations contribute to well-being.<sup>3</sup> They may be “relational goods” (Gui, 2000), or goods that have characteristics of being “public” or “common” like, for example, transport infrastructure.

It may not be possible to supply the former category of good through markets, depending on whether a relationship, which is the good, is provided through a market. For example, a foster parent provides care and support, a parent provides love as well. Can money buy love; can you cost a cuddle? The latter is not supplied or is under-supplied by markets because individuals and corporations have little incentive to supply those goods. Relational goods can be final consumption goods (i.e., valued for themselves) and/or intermediate goods (e.g., certain social relations may facilitate co-operation and trust). Social relations can be a source of value in themselves (Sugden, 2000; Bruni and Sugden, 2000). Social capital, social cohesion, or community connectedness, make a huge difference to many facets of human life. Putnam (2000:290) argues that “social capital makes us smarter, healthier, safer, richer, and better able to govern a just and stable democracy.”

Such ideas are rich in their implications for thinking about public health in general. They also draw attention to some of the questions posed by the HIV/AIDS epidemic – perhaps the first global epidemic of which there has been a global political and public consciousness. The most important possibility that needs to be considered is that public health should be seen as a communal process. That it has elements of both a public good and a *relational good*: the good is consumed and enjoyed but the relationships through which it is provided are in themselves a “good”. This “good” is one that demonstrates care for others, an aspect of living with others. The problem is to develop an institutional locus for provision of such goods. These ideas

about public health, health, medicine, and the individual confront us with both challenges and opportunities in an era of “globalization”. Discussion of these issues is, perhaps, one important “good” that might arise from the HIV/AIDS epidemic.

## Irony and Pragmatism

It is ironic that at a time when the importance of past epidemics is increasingly recognized and discussed by historians, there is very little appreciation of how AIDS impact is already affecting many societies now and into the future. There is much talk of “emerging” and “re-emerging” diseases. HIV/AIDS is a harbinger of the global public health crisis.

Epidemics, such as HIV/AIDS, and their impact do not take place in isolation. They need to be related to other events—changes in political regime, new ideas, global warming, the global distribution of power. We cannot deal with these events in isolation from each other. We live in a world where perception of inter-related multiple long-wave events must be on the agenda of every politician and policy-maker. We can no longer deal with issues piecemeal and sincerely claim that we have given them our full attention. As social scientists, we may engage with the AIDS epidemic for many reasons: Because it is an interesting phenomenon; because of a pressing desire to help those in distress now and in the future; because it makes a mockery of international development goals and prospects for progress in some countries; because resulting poverty may be a threat to the national security of the USA; or yet again because of a fear that “AIDS refugees” may flood the countries of the north in a search for treatment—a “therapeutic pilgrimage,” which is a small but significant component of the enormous body of migration which characterizes this period of globalization. It is clear that there is a premium on pragmatism as opposed to compassion. Pragmatism tends to capture resources. Social scientists may wish to explore further the links

<sup>3</sup> Thanks to Richard Palmer-Jones, Cecile Jackson and Robert Sugden for their helpful discussion of these ideas in an unpublished document circulated in the School of Development Studies, 2000.

among pragmatism, self-interest, morality, and public health. After all, economics was once described as a “moral” science!

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# Chapter 3: The Economics of Social and Structural Interventions for HIV Prevention in Developing Countries

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## **Abstract**

HIV/AIDS prevention efforts have generally focused on individual behavior change, although in most of the developing countries, socioeconomic and cultural factors, and gender inequities have contributed significantly to the spread of HIV. Structural interventions that influence these factors might be important for the prevention of HIV in developing countries. Some examples include increasing educational and financial opportunities for women, access to clean needles, and family-friendly work place policies. Economic evaluation may be a valuable tool in increasing acceptance of these programs and to assess the costs and benefits of structural interventions compared to individual level interventions.

## **Introduction**

The HIV/AIDS epidemic is often viewed as a health problem that occurs at an individual level, influenced by risk behaviors of the individual. Changing individual risk behavior, therefore, has been at the core of most HIV prevention programs, both in industrialized as well as in the developing countries [1-3]. These models assume that individual risk-taking is by choice and within the control of the individual; therefore, information, education, and motivations to change behavior can influence individual behavior.

The spread of HIV, however, has been greatly influenced by socioeconomic and structural factors like poverty, urban migration, unemployment, underemployment, and gender inequity—factors outside the control of the individual [2,4,5]. These factors not only increase

the risk for sexually transmitted diseases (STD) and HIV infection by increasing vulnerability of individuals, especially women in developing countries, but probably also affect the demand and adoption of HIV prevention programs [2,5]. In spite of the relatively large and compelling literature on the structural and environmental factors that affect the spread of the epidemic, very little effort has been put into either developing structural or social interventions or understanding how these factors affect and interact with HIV prevention programs.

Funding for HIV prevention and care programs in developing countries has been increasing substantially. Therefore, it is important to ensure that new resources are used most effectively and efficiently to have the maximum impact on the HIV/AIDS epidemic. Effectiveness of most of the current individual HIV prevention programs including voluntary counseling and testing in preventing HIV is often not known [6,7]. Also, the feasibility of translating individual-level effects to population-level impacts is not clear [6]. Usually, cost-effectiveness studies use mathematical models to translate behavior change to cases of HIV prevented [8-10]. Most of these studies are from industrialized countries [8] and depend on numerous assumptions on HIV incidence, number of partners, sex acts, condom use, and so forth. Translating these to developing countries with different cultural and socioeconomic factors involves even more assumptions.

Even in industrialized countries, studies have shown that competing social problems among inner-city residents in the United States, not only decreased the relevance of HIV/AIDS but also was also likely to interfere with HIV prevention efforts [11]. Another study reported that inner-

city STD clinic patients in the United States ranked concern about HIV/AIDS below employment, drug abuse, crime, discrimination, and teen pregnancy concerns. HIV/AIDS ranked the same with transportation and general health-care concerns [12]. However, neither the public health structure in the US, nor donor agencies (for programs in developing countries) have focused much attention on the role of structural or social factors in HIV prevention interventions.

This paper has two objectives. First, to present a short review of different plausible structural and social interventions for HIV prevention in developing countries in light of successful structural interventions in other areas of public health. Second, to explore the importance of economic evaluation of these interventions for developing countries.

### **Structural Interventions— Examples From Other Areas**

Structural /social interventions are defined as “those that work by altering the context in which health is produced or reproduced” [13]. These are often long-term in nature and hard to evaluate, however, examples of successful interventions in other areas such as tobacco control, highway safety, water fluoridation, and fortification of food exist [1,13]. These interventions work at different levels. Some are targeted to individuals and seek to modify risky behavior through changes in laws or policies. These are generally focused on either increasing the cost of risky behavior (taxation policies, ban on smoking in public places, waiting period for firearm purchases) or increasing the benefit of safer or desirable behavior (monetary incentives for car pooling or public transportation, automobile and home insurance discounts for safety provision or practices). Others focus on affecting the functioning of institutions or organizations through laws or policies which increase the responsibility of the institutions toward public health (increasing liability of tobacco companies, non-smoking sections in restaurants, auto-in-

dustry safety regulations). Finally, some bring about changes at a population level by creating an environment conducive to public health (restricting federal funds for highway construction to reduce air pollution, water fluoridation, work place safety regulations) [1,13].

### **Implications for HIV Prevention**

Examples of successful structural interventions from other areas of public health clearly demonstrate the potential for success with HIV prevention. However, a clear understanding of the differences and similarities between HIV prevention and other disease prevention is important for the development of appropriate structural or social HIV prevention interventions. Socioeconomic factors (like poverty, underdevelopment, urban migration), structural factors (like laws and policies on commercial sex, sodomy, injection drug use), and environmental factors (like working conditions), all influence risk taking and the risk for HIV infection. Some examples of potential structural interventions at individual, institutional, and environmental levels for HIV prevention are described as follows:

#### **Sex Worker Interventions**

Behaviors that are public and within the control of the individual are more amenable to legal sanctions and enforcement (like seatbelt and helmet laws). Generally, behaviors that increase the risk for HIV are private and, in the case of sex workers, illegal. The success of Thailand’s 100 percent condom use policy [14] increases optimism, however, it is unclear if it is transferable to countries with a different political structure or where prostitution is illegal and is not brothel based. For example, Bhawe and others [15] have reported that sex workers and madams in India were concerned about losing business if they insisted on using condoms. A recent study at the Sonagachi “red light” district in Calcutta, by Rao and others estimated almost a 44 percent compensating differential for condom use [16].

Most HIV prevention interventions for sex workers are supply-driven (i.e., focus on increasing the supply of protected sex without trying to affect the demand for protected sex by their clients). For many sex workers, the decision to have unprotected sex is perhaps more influenced by the current economic incentive for not using a condom than the future risk of a disease like HIV. However, peer education programs and provision of clinical services for sex workers and clients, when combined with support from the bar/hotel/brothel owners, have led to some success in increasing condom use and reducing STD and HIV incidence in Zaire and Calcutta [2]. Complementing these with programs that increase awareness of HIV/AIDS among clients through mass media, work place interventions, or through other social services may increase the demand for protected sex. As the demand for protected sex increases, men will be willing to pay more for protected sex and thus increase the incentive to supply protected sex.

Another potential intervention that changes the risk-taking environment for sex workers and women in general is increasing financial opportunities for women through micro-credit programs, vocational training, and education. The Grameen Bank in Bangladesh is an excellent example of increasing financial independence among women. Participation in the program was associated with increased contraception, suggesting that economic empowerment would facilitate control of personal decisions including contraception [17]. These interventions increase opportunities for women and raise the opportunity cost of risk-taking behaviors. However, initial funding from donor agencies would be essential to start and sustain such long-term development programs.

## **Injection Drug User (IDU) Interventions**

Criminalization of drug use and disruption of distribution routes have been among the most common interventions for reducing drug use. It is unclear if these are successful in reducing

drug use; however, some of the negative externalities of these policies include the potential for increased risk of HIV transmission [18]. As Des Jarlais [18] pointed out, suppression of opium smoking may have increased injection drug use; incarceration of drug users may have increased high-risk injection practices in prisons; criminalization of distribution and possession of injection equipment may have increased sharing among drug users.

Some of the commonly suggested structural interventions include providing legal access to sterile injection equipment through pharmacy sales and syringe exchange programs. Syringe exchange programs not only increase access to clean needles, they also provide safe disposal of infected equipment and can be a point of care for drug users needing other medical and social services. These programs appear to have had a significant impact on prevalence of HIV among drug users in France, Scotland, Australia, Connecticut, and New York [18]. These studies suggest the possibility of replication of these programs in developing countries where injection drug use is an important risk for HIV transmission. However, there might be significant political and social barriers for legalization of drugs or interventions for drug users. Also, these interventions do not directly address the sexual risk among IDUs. To increase acceptance, proposals for such interventions could model the cost-effectiveness of these interventions compared to no interventions.

## **Work Place Interventions**

Some companies in the developing world have begun to recognize the HIV/AIDS epidemic as a serious threat to productivity and profitability and are providing prevention (education and STD and HIV testing clinics) and care options (drug benefits) to its employees [19]. Collaborations between private industries and the public sector (national governments) with support from donor agencies would be extremely important in both preventing and mitigating the impact of the HIV/AIDS epidemic. Potential

structural changes include laws or policies that require the provision of family housing, changes in truck routes to increase visits to family, and family friendly migration policies. These might be more acceptable to private industries if some of the initial cost burden could be shifted to the public sector (with help from donor agencies). This could be justified, as both the private and public sector would benefit from averted morbidity and mortality costs.

Previous studies have detailed the impact of HIV/AIDS on the private sector in terms of the costs of prevalent infections, including direct costs (health benefit claims, provident fund contribution, death and disability benefits,) and indirect cost (absenteeism, loss of productivity, employee replacement cost) [20]. Quantifying the costs of averted incident infections or increased productivity among HIV-infected persons on different care options might be beneficial for greater acceptance of these interventions.

### **Evaluating Structural Interventions: Role of Economic Evaluation**

The goal of all HIV prevention interventions is to prevent new infections. Whether this goal is realized or not is determined by the evaluation of the intervention. A randomized controlled design is probably the gold standard for evaluation of effectiveness. However, few of the individual-level HIV interventions that are more amenable to this method have been tested that way [7]. Structural interventions would be much more difficult to evaluate using randomized control trials (RCT), but the potential for population-level impact might be greater. Short-term evaluations could probably focus on changes in behavior; however, lack of evidence would be an issue just as for the evaluation of individual-level interventions.

In the long term, changes in HIV prevalence (for example, Thailand) or possibly HIV incidence could be used to better evaluate these interventions. Some of the interventions such as increas-

ing financial opportunities for women, legalizing sales of injection equipment, or family-friendly work policies, would be hard to implement (due to economic or political barriers) and evaluate. Economic evaluations could contribute significantly to the acceptance and implementation of structural interventions. Well-designed cost-effectiveness studies that compare the costs and benefits of structural interventions to individual behavior change interventions for HIV prevention would be educative. The cost of achieving long-term and large-scale reduction in HIV incidence through many of the current individualized interventions may be so large that donor agencies, national governments, and researchers may be willing to explore alternative ways of HIV prevention in the coming decades.

### **Conclusion**

There are some perceived and some very real difficulties in developing, implementing, and evaluating structural and social interventions. However, the potential benefits from altering social conditions even slightly might make it worth the effort. Increasing investments in education, job opportunities (especially for women), family-friendly work policies, prevention and access to treatment for common illnesses, and low-cost care options for HIV-infected persons would increase general welfare and increase the incentives for valuing future health. Economic evaluation could be a valuable tool for assessing the cost-effectiveness of these interventions in preventing HIV and improving health.

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## Biography of Author

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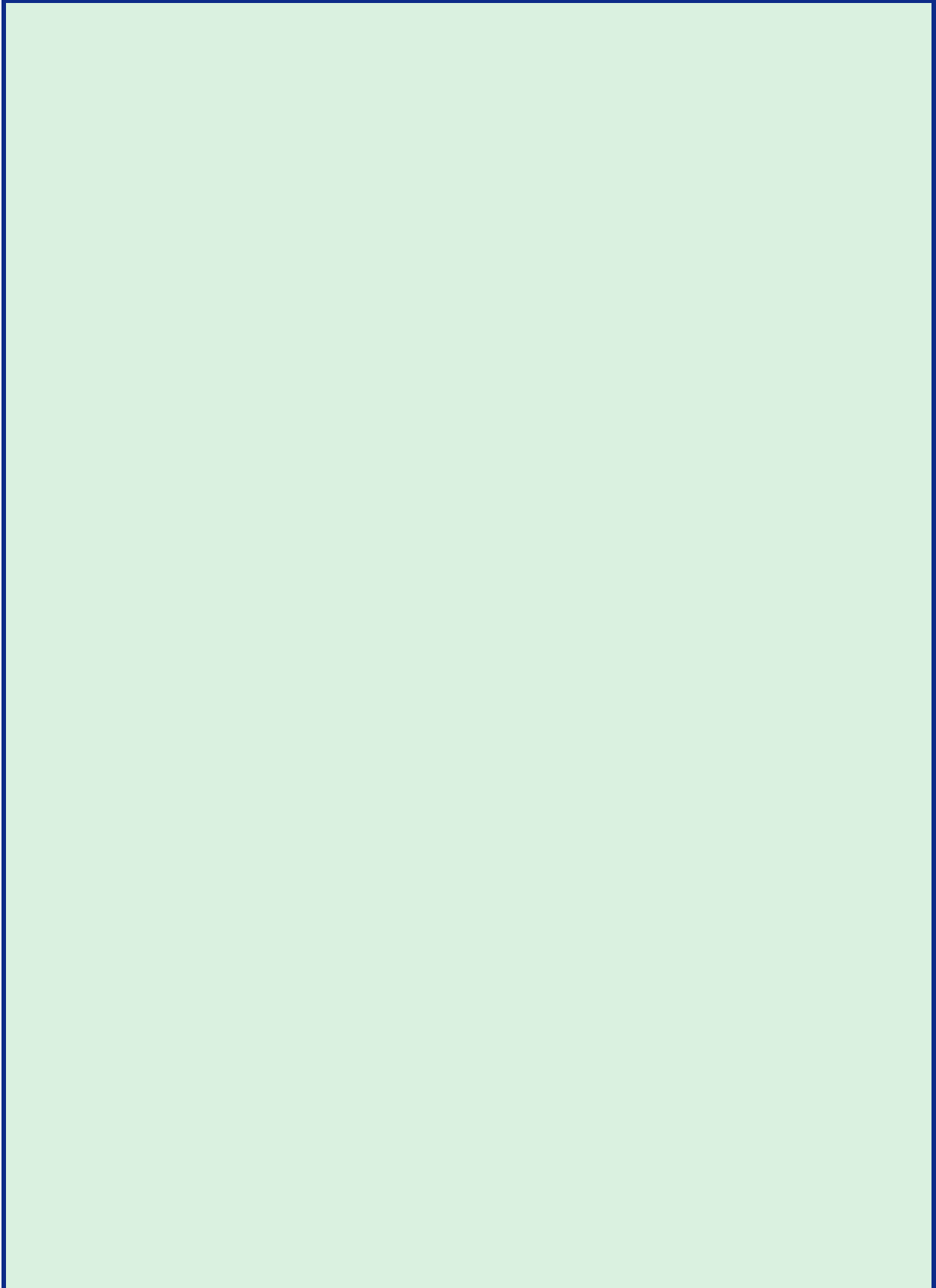
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## Section Two: Understanding the Impact of HIV/AIDS

*“New and reemerging infectious diseases will pose a rising global health threat and will complicate US and global security over the next 20 years. These diseases will endanger US citizens at home and abroad, threaten US armed forces deployed overseas, and exacerbate social and political instability in key countries and regions in which the United States has significant interests.”*

Noah, D. and G. Fidas 2000. “The Global Infectious Disease Threat and Its Implications for the United States.” Washington, DC: Central Intelligence Agency.

*“We have to conclude that the disease will have long-term adverse effects and that these are neither understood nor appreciated. Furthermore, we are only at the beginning of the impact...Economics shows an impact, but we suggest that this reflects only part of the picture. It cannot measure the true misery that this disease is causing, and will cause. Finally, while prevention remains the target, the reality is that impact is not properly measured and no serious attempts are being made to respond to impact on a national level.”*

Whiteside, A. 2001 “Demography and Economics of HIV/AIDS.” *British Medical Bulletin* 58: 73-88.



# Chapter 4: HIV/AIDS, Health, and Education

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## Introduction

The HIV/AIDS epidemic is recognized as a crisis for much of the developing world. Or is it? Certainly the rhetoric would seem to indicate this. The figures that are thrown about imply a crisis: 60 million people infected since the epidemic was first recognized just over 20 years ago; 40 million currently living with HIV/AIDS; many millions of orphaned children. Reading the AIDS listserves, one would get the impression that AIDS dominates much of the thinking in global capitals, development agencies, and international fora.

The truth is, yes, people are concerned about the epidemic, but they are also concerned about trade, terrorism, global warming, and a myriad of other issues. Indeed one of the key indicators of the relative importance is the allocation of resources (not rhetoric). The Global Fund for AIDS, TB, and Malaria has about \$2 billion pledged in total; what it needs is about three times this every year. Of the US\$73 billion spent annually on health research, less than 10 percent is spent on health problems of the developing world, yet this is where 85 percent of the world's population lives and where 92 percent of the global disease burden is found. (UNICEF, UNAIDS, and WHO, 2002). People are not putting their money where their mouths are!

Perhaps we can understand the rich world not engaging with health in the developing world, but we would expect AIDS and its consequences to be high on the agenda of planners, politicians, and policymakers in the worst affected countries. Again the data are common knowledge. According to UNAIDS (2000), the adult HIV prevalence rate in Botswana was 35.8 percent—over 10 percent higher than the next highest country, Swaziland, which has a HIV rate of 25.3 percent. South Africa probably has the greatest

number of people infected, over 4 million in a population of 40 million.

We know what the demographic consequences will be: falling life expectancy, changing population structures, growing numbers of parentless children. We can predict mortality and morbidity and know that social and health services will face greatly increased demand. In this environment, surely AIDS and its consequences must be factored into planning, we ask. Unbelievably, this is not the case. In this brief review of the health and education sectors, we will ask why this is the case and what needs to be done. The health sector is obvious: people who are sick will seek care, and in most countries, the public sector is expected to provide that care. The education sector is relevant because it will see the impact on both teachers and students, and because here HIV/AIDS interventions are essential and could have the greatest effect. But there are two other reasons for focusing on these sectors:

1. It is here where the greatest number of government employees are employed.
2. There is a growing appreciation that 'human capital' is essential to development and economic growth. The education sector adds value to human capital, whereas the health sector maintains it.

## The Health Sector

Globally 5.5 percent of GDP is spent on health, 2.5 percent through public spending and 2.9 by the private sector. In low-income countries, the relative percentages are 2.8 percent public and 1.2 private. In Africa, the percentages are closer, 1.5 public and 1.8 private (World Bank, World Development Indicators, 2000, table 2.14). People use their own resources to visit health care providers, including traditional healers. As

these resources are exhausted, people look to the public sector to provide care.

### ***Demand for services***

People with HIV/AIDS have a range of health care needs. Most HIV-related conditions can be managed effectively at the primary care level, and basic treatment and care can improve the quality and length of life. As the disease progresses, demand changes. Care is needed both for acute, treatable illnesses and terminal conditions. In settings where antiretroviral drugs are available (such as Mexico and Brazil), new systems are required to manage complex therapies and ensure adherence to treatments.

Increased demand is from people who are not normally users of health care: young adults. In one relatively well-resourced South African province, projections indicate that HIV/AIDS alone will more than double the required number of hospital medical beds between 1997 and 2006.

The scale of this additional demand is particularly problematic. Health sectors already have difficulty in meeting basic medical care needs. If only a proportion of needs are met, HIV/AIDS will consume a substantial share of public health budgets. By 1995, HIV/AIDS care accounted for 27 percent of public health care spending in Zimbabwe and 66 percent in Rwanda. The World Bank estimated the cost of care per person with HIV/AIDS was roughly 2.7 times per capita GDP for all countries (World Bank, 1997). As the demand increases, the human and financial resources decrease.

The challenge is to manage the burden on the formal public health care system without shifting an unsustainable burden to individuals, families, and communities. For example, home-based care may reduce the impact on public systems, but unless families are provided with adequate support they may be overwhelmed. Home-based care may become home-based neglect (Foster, 1996, p 83).

### ***Capacity to deliver services***

HIV/AIDS compromises capacity for health care through its direct and indirect impacts on employees. Of particular significance are:

- Health workers are at risk of HIV infection. The greatest risk is through sexual exposure, although there is a small occupational risk. In Lusaka in 1991-2, HIV prevalence was 39 percent among midwives and 44 percent among nurses. In Kinshasa, hospital workers were shown to have levels of HIV infection similar to the general community (Mann et al., 1986). In two Southern Zambian hospitals, mortality rates among nurses rose from 0.5 percent per annum in 1980 to 2.7 percent in 1991 due to HIV/AIDS (Buve et al., 1994). The death rate of Malawi health care workers was 3 percent in 1997, a six-fold increase on levels before the epidemic (Government of Malawi, 1998). Increased absenteeism among nurses was already observable in Zambia in the early 1990s (Foster, 1996: 94-96)
- Health workers risk other infections, particularly tuberculosis. This is most serious for those who are HIV positive. Annualized incidence of TB cases among health staff has increased five-fold over five years in certain high HIV prevalence areas, with up to 86 percent of tested cases being HIV infected (Harries et al., 1997).
- Impacts of HIV/AIDS on morale are particularly marked in the health sector. Workloads increase dramatically; stress and burnout are exacerbated by factors such as high mortality among children, young adults, and colleagues and perceived risk of infection. (Foster, 1996: 103)

The most detailed study of the impact of AIDS on a national hospital looked at Kenyatta hospital in Nairobi (Arthur, Bhatt, and Gilks, 2000). HIV prevalence among patients rose from 19 percent in 1988/89 to 39 percent in 1992 and 40 percent in 1997. Bed occupancy rose from 100

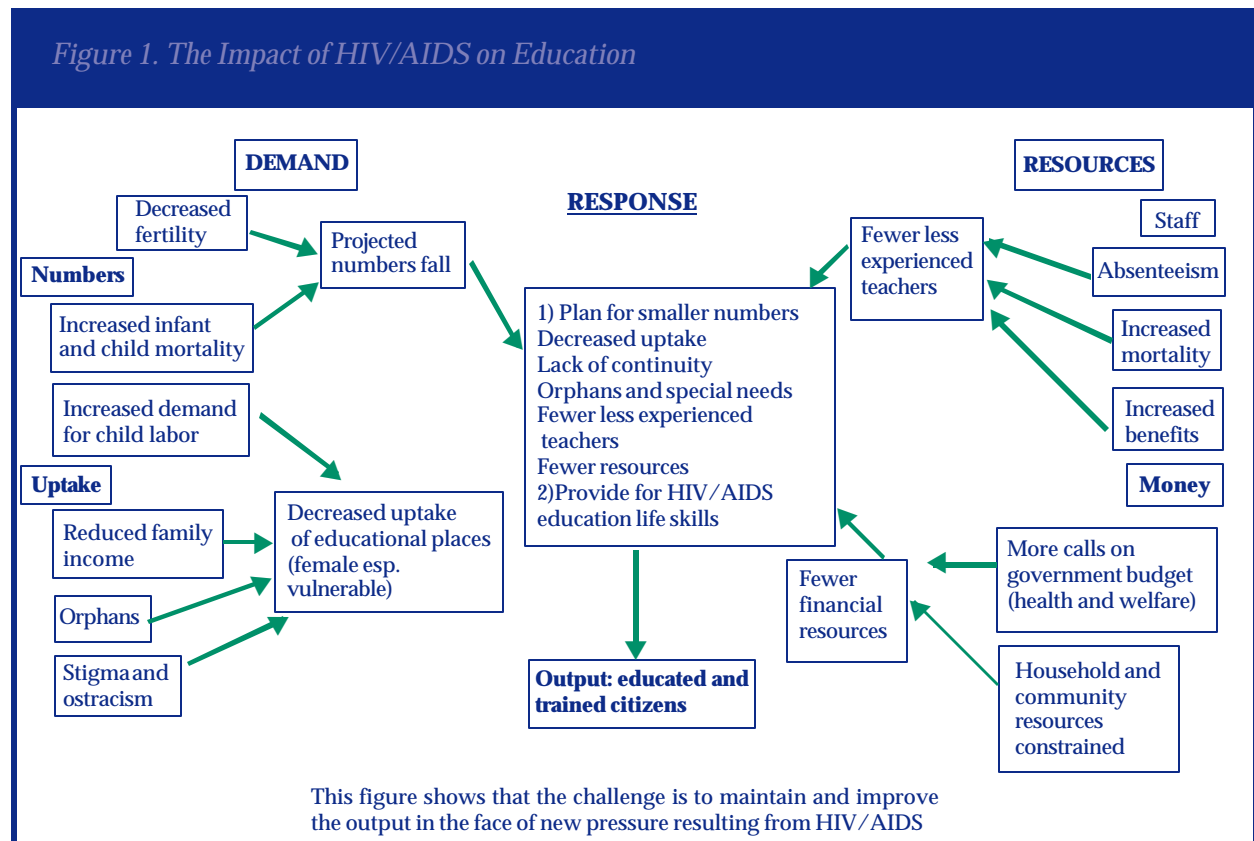
percent in 1988/89 to 190 percent in 1997. The stabilization in demand between 1992 and 1997, although AIDS cases and deaths were rising, was attributed to a change in health-seeking behavior by people with advanced illness. They did not go to the hospital. The reasons might have been stigma; a belief and realization that government hospitals can do little for the chronically sick. This study concluded, “an increased throughput of patients can be accommodated without seeming to compromise outcome and mortality ... (but) ... the sad fact is that twenty years into the HIV/AIDS epidemic, there really are so few data about the impact on African health-care systems” (Arthur et al ; 2000: 14).

In Ministries of Finance, Health, and Economic Planning, the increased demand and reduced capacity is receiving little attention. Why is this and what is needed to make people sit up and take notice of AIDS? The paper by Arthur and others is still one of the few studies to look at the demand for treatment services.

## The Education Sector

The largest cadre of government employees are those concerned with education, including teachers, administrators, and ancillary staff. Education is crucial. It is argued that a large part of the East Asian miracle can be attributed to investment in human capital. The World Bank places great importance on education. In their publication *Can Africa Claim the 21<sup>st</sup> Century?* (World Bank, 2000), four areas are identified as crucial: governance and leadership; investment in people—both health and education; reducing high costs and risks in the business environment; and reassessing the role of aid. They say education is “the key to higher incomes, both for individuals and countries. But especially in an agriculture-based region, better health and nutrition are also likely to have major effects on labor productivity and income growth” (World Bank, 2000: 86).

Education faces both supply and demand side impacts as illustrated in Figure 1.



## **Impacts on demand**

Demographic impact results in smaller numbers of children needing education: fewer children are born and many HIV-infected infants do not survive to school age. In Swaziland by 2016, there will be a 30 percent reduction in the size of the primary school population for each grade, with somewhat lower, but still substantial, reductions in needs for secondary and tertiary education (Government of Swaziland, 1999). Enrolment may be further affected by household economic difficulties and the need for children's labor.

AIDS means there are students at all levels with new special needs:

- Orphans;
- Children exposed to infectious diseases and emotional trauma because they live with and care for family members with HIV/AIDS;
- Children who are discriminated against or isolated because they or their families are infected; and
- Children in households where a parent is ill or has died, or where orphans have been taken in.

Work being done by HEARD in KwaZulu-Natal (South Africa) points to some of the complexities of the problem. Up to 1998, the number of students entering the first year of schooling was increasing at a few percent per annum. This was consistent with constant, but slowing, population growth. In 1998 and in every year subsequently the number of children enrolling for grade 1 has been well below what we would expect. By 2002 enrolment was about 275 000, well below the approximately 370 000 in 1998. We do not know why these children are not enrolled, but there are two possible reasons:

- They are alive but not attending school because their care givers can not afford the school fees, book fees, and uniforms; the children's labor is needed at home; there is no one to send them to school; or they feel stigmatized.
- These children are not there because they died in infancy or were simply never born.

The policy implications of these two reasons are dramatically different and yet we do not know which is the reason for the absence of thousands of children.

## **Impact on supply**

All teachers are at risk of HIV infection. There are some indications they may be at greater than average risk. Their status and income create opportunities for high-risk behavior. Zambia's Ministry of Education reports that 2.2 percent of teachers died in 1996. This was more than the number produced by all teacher training colleges. This death rate is expected to triple by 2005 (Kelly, 1998).

Education is most severely impacted by AIDS because:

- Death or absence of even a single teacher is particularly serious, it affects the education of between 20 and 50 children.
- Loss of key individuals at the leadership level including planners, school inspectors, and principals may further compromise quality and efficiency of the education system.

Again, an as yet unpublished work from HEARD gives an indication of the magnitude of the problem. KwaZulu-Natal has approximately 75,000 teachers employed at present. Obviously there is a natural attrition rate—probably about 4 percent per annum—due to teachers retiring, dying or leaving the profession for other reasons. We estimate that this will double

due to HIV/AIDS and be made even worse by an outflow to the developed world (which is actively recruiting staff). The end result will be that by 2010, the province will have lost approximately 65,000 of the current cohort. Short-sighted planning meant that all provincial teacher training colleges have been closed and we will be lucky to produce 700 new teachers per annum.

## **Conclusion**

The briefing for this paper asked for a literature review asking what does the literature tell us and how will impact change in the future. The reality is that there is not much literature and that is perhaps the first and most important conclusion. There may be grey literature—reports and studies, but they are not out in the public domain. Certainly much of the work done at HEARD still needs to be written up and published.

However, it is also clear that we do need studies. One of the reasons why there is so little action is that government officials simply do not believe the scope and scale of the problem they

are facing. And it is not enough to point at the work in say Kenya—after all, say the Batswana or South Africans, ‘Kenya is different’. What is needed is local studies. But most important is that these studies need to capture the dynamic nature of the epidemic and that impact will be felt in waves, the first is HIV infections, the second is AIDS cases, third are the deaths, and finally, come the consequences. Whatever we face today in Southern Africa, it will be worse over the next few decades.

The way ahead is simple: Policy-oriented research that is published and marketed. Somehow we have to make people aware of what is going to happen and that they can and must respond. For the last five years, I have felt as the Mozambican weather forecaster and hydrologists must have felt a couple of years ago. They knew that the rain in Malawi, Zambia, Zimbabwe, and South Africa meant the Limpopo and Zambezi were going to cover large tracts of low-lying coastal Mozambique. How could they convince the villagers living under sunny skies of the impending catastrophe? The AIDS epidemic is like that.

## Recommended Reading

Tony Barnett and Alan Whiteside, *AIDS in the Twenty-First Century: Disease and Globalisation*, Palgrave Press, 2002.

Report of the Commission on Macroeconomics and Health, *Macroeconomics and health: Investing in Health for Development*, WHO, Geneva, 2001

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Alan Whiteside is the Director of the Health Economics and HIV/AIDS Research Division of the University of Natal, where he is also a Professor. He has been working on HIV/AIDS impact for 12 years and has written extensively, most recently "AIDS in the Twenty-First Century: Disease and Globalization" - with Professor Tony Barnett.

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# Chapter 5: How Does HIV/AIDS Affect African Businesses?

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The Futures Group International

## Introduction

For African businesses to attract new investors, they must demonstrate a competitive advantage. In much of the developing world, businesses already have a competitive advantage because labor is abundant and affordable. African countries inevitably compete against one another to attract investors. In turn, investors seek to locate their businesses in a country that has the most productive, lowest-cost workforce.

There are several mechanisms by which HIV/AIDS affects the international competitiveness of businesses in African nations:

**1. Labor Supply:** AIDS deaths lead directly to a reduction in the number of available workers. These deaths occur predominantly among workers in their most productive years. As younger, less experienced workers replace experienced workers, worker productivity is reduced, which in turn results in a decline in international competitiveness.

**2. Profitability:** AIDS reduces the profitability of African businesses by both increasing the cost of production and decreasing the productivity of African workers. The loss of profitability clearly will reduce Africa's competitive advantage.

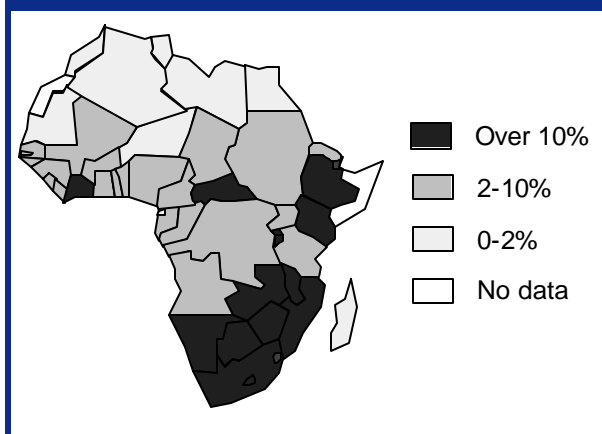
**3. Other Impacts:** AIDS can also affect African businesses in many ways that are difficult to quantify but that nonetheless can significantly affect competitiveness. For example, AIDS affects worker morale, labor relations, demand for output, and so forth.

Each of these impacts is discussed in greater detail on the following pages.

## How Does HIV/AIDS Affects the Labor Supply?

As already indicated, the objectives of promoting trade and increasing investment in Africa can be reached only if African businesses have an adequate supply of trained workers. Figure 1 shows the percent of adults in Africa infected with HIV. It is currently estimated that at least one in 12 workers in sub-Saharan Africa is infected; for some African businesses, the ratio is as high as one in three. Most infected workers will become ill and die within seven to 10 years of becoming infected. The impact from losing so many workers will vary greatly as will the response of companies with several infected workers.

Figure 1. Percent of Adults Infected with HIV in Africa, 1999



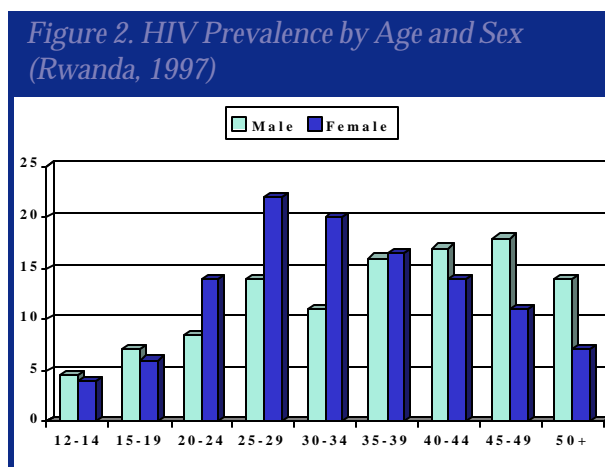
Source UNAIDS, 2000

Most African businesses that have more than 10 employees have already seen at least one employee die of HIV/AIDS or currently employ infected workers. In some countries, the number of HIV infected employees has been devastating. For example:

- In a sugar mill in South Africa, 26 percent of all tested workers were infected with HIV. Infected workers incurred, on average, 55 additional days of sick leave during the last two years of their life.<sup>1</sup>
- In Botswana, it has been estimated that 35 to 40 percent of all teachers are infected with HIV.<sup>2</sup> One study in Kenya on a sugar estate found that 25 percent of the estate's workforce was infected with HIV.<sup>3</sup>
- Even in countries such as Ghana, which has a more moderate prevalence of HIV, businesses report significant numbers of both AIDS deaths and known HIV infections.<sup>4</sup>

If businesses are to succeed financially, they require a steady supply of adequately skilled labor. For companies requiring skilled workers, it is likely that HIV/AIDS will present a particularly significant problem. Professionals are in short supply, and the costs required to train a new worker are often significant. One study demonstrated that firms took, on average, eight times longer to replace a deceased professional than a skilled worker.<sup>5</sup>

Figure 2 illustrates the average age and sex of persons infected with HIV in Rwanda. This shows that the bulk of infections are occurring among young people who are just entering the workforce. This should be particularly worrisome to businesses, as it demonstrates that the future supply of laborers and managers are likely to be the ones most affected by HIV/AIDS. At the same time, this figure shows the critical importance of spending money on HIV/AIDS prevention among young people. In order to safeguard the future labor supply, it is necessary to stress prevention programs for youth today.



## How Does HIV/AIDS Affect Profitability?

HIV/AIDS can affect a company's profitability by either increasing expenditures or decreasing revenues. During the early stages of infection, managers may observe an unexplained increase in the number of sick days taken. The employee, his or her spouse, and children may incur higher health care costs, many of which are reimbursed by the employer. The productivity of the worker may decline, particularly when opportunistic infections such as tuberculosis (TB) become more common.

As the epidemic progresses, managers may observe within their workforce an increase of diseases, such as TB, sexually transmitted infections (STIs), skin rashes, diarrhea, and possibly even malaria. (Some evidence suggests that HIV-infected individuals are much more susceptible to serious bouts of malaria as a consequence of their suppressed immune system.)

<sup>1</sup>Morris, C., D.R. Burdge, and E.J. Cheevers. 2001. *Economic Impact of HIV Infection on a Cohort of Male Sugar Mill Workers in South Africa from the Perspective of Industry*. Vancouver, Canada, and Durban, South Africa: University of British Columbia and Illovo Sugar.

<sup>2</sup>"Education in Africa Threatened by AIDS." 2001. [www.allAfrica.com](http://www.allAfrica.com). 7-27-0001.

<sup>3</sup>Roberts, M., B. Rau, and A. Emery. 1996. *Private Sector AIDS Policy: Business Managing HIV/AIDS*. Arlington, VA: Family Health International/AIDSCAP.

<sup>4</sup>Nabila, J.S., P. Antwi, K. Yeboah, and S.O. Kwankye. 2001. *A Study of the Economic Impact of HIV/AIDS on Selected Business Organizations in Ghana*. Accra, Ghana: Policy Project.

<sup>5</sup>Abt Associates and HEARD. 1999. *AIDS Toolkits: HIV/AIDS and Welfare*. Pretoria and Durban: Abt Associates and HEARD.



*“NamWater, the largest water purification company in Namibia, announced recently that HIV/AIDS is ‘crippling’ its operations. They report high staff turnover due to AIDS-related deaths, increasing absenteeism, and a general loss of productive hours. The firm plans on examining the impact of the epidemic through a survey, and then designing further policies to mitigate the impact. The company already distributes condoms to their workforce and has trained 60 peer educators.”<sup>6</sup>*

There is likely to be a corresponding increase in health care costs and sick days. Employees who are identified as being infected may be retained, moved to a less demanding position in the company, or fired outright (with or without compensation) depending on corporate policy.

A loss in revenues attributable to HIV/AIDS can occur when infected workers take leave due to illness, the need to care for other infected family members, or the need to attend the funerals of co-workers or loved ones — in north central Namibia, for example, it has been estimated that extension staff spend at least 10 percent of their time attending funerals.<sup>7</sup> Productivity can also decline when workers in poor health come to work but are unable to produce at their normal levels.

The extent to which people living with HIV/AIDS will continue to be employed depends on the type of work performed and the existing policies of the relevant company. Presumably, employees involved in heavy manual labor will be less likely than desk workers to maintain their jobs when they become infected. Certain companies are required (by government mandate or union contract) to continue offering benefits. However, other companies are able to shift the burden to the government or the families of the employee living with HIV/AIDS.

There are various ways in which expenditures are likely to increase when African businesses are affected by HIV/AIDS. An increase in health care costs is likely to be one sign that a company is experiencing the effects of the epidemic.

Companies with private health insurance policies may find that their premiums are increasing. Other companies with in-house health care services may find an increased need for services that may not immediately be identified as HIV-related.

Factors Leading to Increased Expenditures
Health care costs
Burial fees
Training and Recruitment
Factors Leading to Decreased Revenues
Absenteeism due to illness
Time off to attend funerals
Time spend on training
Labor turnover
Reduced worker productivity

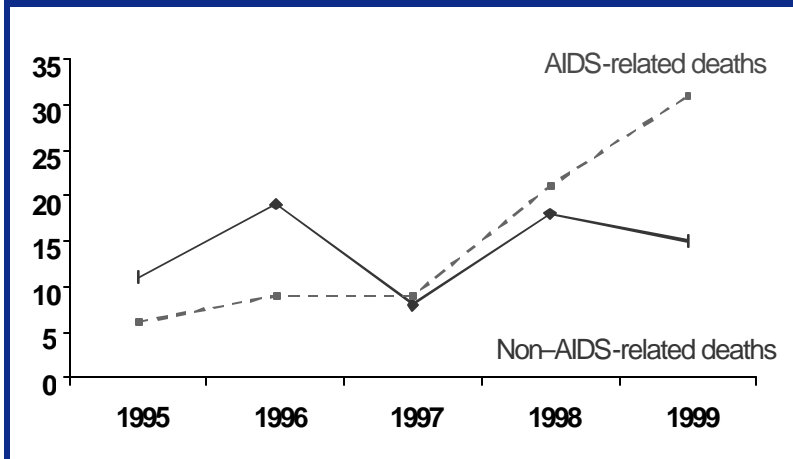
Figure 3 indicates how quickly the number of AIDS-related deaths can increase. As more workers die of AIDS, it is likely that the private sector in Africa will observe increased costs in terms of death benefits. When a worker dies, many larger African companies offer a death benefit to the surviving family. In some cases, these death benefits equate to as much as three years of salary plus funeral-related expenses. Some companies also pay workers a death benefit if their spouse or children die. With the advent of the HIV/AIDS epidemic, companies have tried to mitigate the impact of benefit costs in various ways. For example, some African companies have reduced the amount of their contribution to funerals. Other companies have required funerals to be conducted on weekends to minimize the disruption to work.

The cost of recruiting and training new workers may also be substantial. The cost of replacing unskilled workers may be small, particularly when the rate of unemployment in the community that houses the business is high. As a result, most unskilled workers can be replaced

<sup>6</sup> Angula, C. 2000. “NamWater Joins AIDS Fight.” *The Namibian*. July 20.

<sup>7</sup> Engh, I.E., L. Stloukal, and J. du Guerny. 2000. “HIV/AIDS in Namibia: The Impact on the Livestock Sector.” Rome: Food and Agricultural Organization.

Figure 3. Death Rate on a Sugar Estate in Swaziland



- prevalence of HIV;
- cost of training and providing benefits;
- availability of prevention activities; and
- extent to which the company can shift the economic burden of the disease from itself to workers, their families, and the public sector.

within a week with little or no cost of recruitment. However, many African countries have a shortage of experienced senior managers. In this case, positions may be left unfilled for months or even years, which represents a significant cost to the company. Some companies even have had to resort to hiring highly paid expatriates following the death of senior managers.

As with recruiting, the cost of training and of general human resource development depends on the education and skill level required for the position as well as on the capacity of the pool of available workers. Training in finance, marketing, accounting, or sales, however, can be significant, particularly as such training is typically performed overseas. One international company, for example, trains its African senior managers in Europe over a period of four weeks. That same company indicated that when a managing director is lost due to AIDS or other reasons, the company incurs costs of \$100,000 to recruit and train a replacement.

In the end, HIV/AIDS is likely to have a variable impact on expenditures depending on the:

It should be noted that the data on the extent of the impact of HIV/AIDS on profitability remain controversial. Studies completed in South Africa<sup>8</sup> and Kenya<sup>9</sup> suggest that the economic impact of HIV/AIDS on profitability is likely to be substantial. Studies in Zambia<sup>10</sup>, Malawi<sup>11</sup>, and Botswana<sup>12</sup>, however, indicate that the impact of HIV/AIDS on profitability was not substantial at the time those studies were carried out. Nonetheless, the loss of profits due to HIV/AIDS may be substantial for some African business. Therefore, it is critical that businesses become aware of the HIV/AIDS problem and take immediate steps to mitigate its impact. Such steps should include workplace peer education programs, condom distribution, voluntary counselling and testing, STI treatment, and treatment for HIV-related opportunistic infections.

### What Other Impacts Does HIV/AIDS Produce?

The indirect impacts associated with HIV/AIDS are much more difficult to quantify but can nonetheless be an important factor in influencing investment decisions. The indirect impact

<sup>8</sup> Morris et al. *Economic Impact*.

<sup>9</sup> Roberts et al. *Private Sector*.

<sup>10</sup> Smith, J. and A. Whiteside. 1995. *The Socioeconomic Impact of HIV/AIDS on Zambian Businesses*. London: The BEAD Group and the Commonwealth Development Corporation.

<sup>11</sup> Jones, C. 1996. *Makandi Tea and Coffee Estates Limited: The Microeconomic Implications of HIV/AIDS*. Norwich, England: University of East Anglia.

<sup>12</sup> Greener, R. 1997. *Impact of HIV/AIDS and Options for Intervention Results of a Five Company Pilot Study*. Botswana National Task Force on AIDS at the Workplace. BIDPA Working Paper No. 10.

incurred by African businesses refers to those outcomes that cannot be directly attributable to an increase in revenues or a loss in expenditures over the short term, but that still can create a significant burden for a company. For example, HIV/AIDS can result in a substantial decline in morale among workers. As employees watch many of their co-workers die of AIDS, they may adopt a generally fatalistic attitude toward life and work.

One indirect effect of absenteeism is that it results in extra work for other healthy employees who have to stand in for sick colleagues. In some companies, healthy employees were increasingly working extra hours to compensate for the time lost by their absent (sick) colleagues.

In so doing, not only did companies pay more in terms of overtime, but interviewed workers also pointed out that they were overworked and exhausted. According to the engineering manager of one of the companies, working longer hours produced stress among employees and was responsible for a decline in both the quantity and quality of the final product (sugar). The spread of the epidemic can also contribute to worsening labor relations. If employees do not feel that their employers are providing adequate prevention or care services, the relationship may degenerate. In some cases, workers demand the dismissal of their colleagues when learning of their colleagues' illness.

*"...Knowledge or even suspicion that one of their colleagues has HIV/AIDS is likely to trigger certain negative attitudes and behavioural responses towards that individual and how they perform their own tasks."<sup>13</sup>*

Managers may not always be aware of the ways in which HIV/AIDS is affecting their business. One way to address the indirect effects of HIV/AIDS is to establish a workplace policy that explains how the needs of infected workers should be addressed. Such a policy should promote a

positive relationship among infected workers, their employer, and their colleagues.

HIV/AIDS can also result in a significant decline in the demand for some products. HIV/AIDS is known to be a disease that tends to impoverish families, particularly because infected individuals are often the main income earners in the household. As a result, families end up earning less but spending more on health care, leaving few resources available to purchase other goods. Thus, most businesses are likely to observe at least some decline in demand for their products, especially the "luxury" goods that consumers can forego during difficult economic times. An article by Alan Whiteside, for example, noted that a South African furniture manufacturer (JD Group) projected an 18 percent reduction in its customer base as a result of HIV/AIDS. The study went on to conclude that consumers would incur a significant decrease in demand for furniture due to HIV/AIDS and its corresponding impact on household consumption.<sup>14</sup>

## **How Does HIV/AIDS Affect Economies?**

In addition to the impact of HIV/AIDS on particular businesses, HIV/AIDS can influence national economies. Such an impact can be particularly devastating to the objective of increasing investment, for investors seldom invest in countries with declining economies.

Various methodological issues and features of developing country economies make detection of macroeconomic impacts difficult. Initial studies regarding the potential impact of HIV/AIDS on macroeconomic growth have generally not been conclusive, with some studies in

<sup>13</sup>Ching'ambo, L.J., K. Mwanza, D.H. Kalyalya, M.F. Phiri, and S.W. Kunkhau. 1995. *The Socioeconomic Impact of HIV/AIDS on Selected Sectors and Industries in Zambia*. Swedish International Development Agency, World Health Organization, and Ministry of Health of the Republic of Zambia.

<sup>14</sup>Whiteside, A. 2001. "Demography and Economics of HIV/AIDS." *British Medical Bulletin* 57.

Impact on Investment
Uncertainty over the impact of HIV/AIDS causes investor reluctance
Decrease in the pool of national entrepreneurs
General economic picture
Impact on Trade
Reduced production due to increased costs to firms
Decrease in workers with experience in export markets
Transport of export products to marketplace

Botswana<sup>15</sup> and Tanzania<sup>16</sup> showing that the change in per capita income would be minor.

However, as the epidemic has progressed, economists have tended again to raise questions about the potential macroeconomic impacts of HIV/AIDS. A Kenyan analysis indicated that HIV/AIDS would produce a significant impact, with predictions that HIV/AIDS would leave the Kenyan economy one-sixth smaller than it would have been in the absence of HIV/AIDS.<sup>17</sup> A study of African countries in 2000 suggests that HIV/AIDS has reduced the growth of per capita income by 0.7 percent per year; in malarial countries, the rate of growth was further lowered by 0.3 percent. For countries with HIV/AIDS prevalence levels above 20 percent, GDP is estimated to be 2.6 percentage points less per year. The most recent economic analyses have therefore indicated that the epidemic may be affecting growth to a much greater extent than earlier predicted.<sup>18</sup> A recent study found that the

impact of the AIDS epidemic in South Africa could be “substantial”. By the year 2010, the level of GDP could be lower by 17 percent due to HIV/AIDS while the level of per capita GDP could be lower by 7 percent. About half of the decline is attributable to the increase in current government spending to pay for health care associated with the epidemic; another third of the decline is attributable to lower productivity.<sup>19</sup>

It appears that many African economies are already being affected by HIV/AIDS. Decision makers must be prepared to pursue policies at the national level that can mitigate social and economic impacts. This may include promoting policies that increase savings and encourage investment in specific types of human capital that might be in short supply (e.g., teachers, doctors, and so forth).

## Conclusion

African nations have a potential competitive advantage over other regions of the world. Businesses and governments must protect the vast majority of workers who are uninfected, offer appropriate support and services to those who are infected, and ensure that the impact of HIV/AIDS is mitigated.

Since HIV/AIDS tends to affect people in their prime working ages, the spread of the disease can prevent some nations from meeting their labor needs, particularly for businesses that require workers with significant training or work experience. The loss to HIV/AIDS of even one critical employee can cause a business to lose its competitiveness.

The spread of HIV/AIDS has resulted in the loss of profitability among African companies. This

<sup>15</sup>Greener, R., K. Jefferis, and H. Siphambe. 2001. “The Macroeconomic Impact of HIV/AIDS in Botswana.” *AIDS Analysis Africa* 11(5): 4-6.

<sup>16</sup>Cuddington, J. 1993. “Modelling the Macroeconomic Effects of AIDS with an Application to Tanzania.” *World Bank Economic Review* 7(2): 173-189.

<sup>17</sup>Forsythe, S. and B. Rau. 1996. *AIDS in Kenya: Socioeconomic Impact and Policy Implications*. Arlington, VA: Family Health International.

<sup>18</sup>Bonnell, R. 2000. *HIV/AIDS: Does It Increase or Decrease Growth in Africa?* Washington, D.C.: World Bank.

<sup>19</sup>Arndt, C. and J.D. Lewis. 2000. *The Macro Implications of HIV/AIDS in South Africa: A Preliminary Assessment*. Paper prepared for the International AIDS Economics Network (IAEN) Symposium on “The Economics of HIV/AIDS in Developing Countries,” Durban, South Africa, July 7-8, 2000.

loss is attributable to increased expenditures on benefits such as health care, sick leave, and death benefits as well as to the additional cost of retraining new employees. In turn, revenues have been shown to decline when many workers become infected and their productivity declines. African businesses have also been affected more indirectly as a result of HIV/AIDS. For example, as workers become ill, companies have experienced a decline in morale, labor relations, and demand for the company's products. Lost profitability among African businesses may already be thwarting efforts to encourage foreign businesses to invest new money in the African continent.

Strong macroeconomic prospects are particularly important to investors who want assurance that they are investing in a country with a stable currency and a growing demand for their prod-

ucts. The most recent economic studies indicate that HIV/AIDS can negatively affect a nation's overall economic growth, which in turn is likely to hinder the success of trade and investment initiatives by limiting the number of businesses that are willing to invest in Africa.

To conclude, it is imperative to recognize that in most African countries, more than 90 percent of workers are not infected with HIV. In other words, despite the potentially dire consequences of HIV/AIDS, in most countries there is still time to prevent and to mitigate the impact of the epidemic. Also, we now know what works in terms of HIV/AIDS prevention. In countries such as Uganda and Senegal, prevention programs have succeeded in significantly reducing or limiting the spread of HIV infection. Finally, there are now unprecedented levels of commitment globally to addressing the issue of HIV/AIDS.

## Recommended Reading

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Simon, Jonathan; Rosen, Sydney; Whiteside, Alan; Vincent, Jeffrey; Thea, Donald M. The Response of African Businesses to HIV/AIDS. *HIV/AIDS in the Commonwealth 2000/01*, London: Kensington Publications, 2000.

## Biography of Author

Dr. Steven Forsythe is the Director of Planning and Finance for the POLICY Project's HIV/AIDS programs at The Futures Group International. Dr. Forsythe received a PhD in health economics from the Liverpool School of Tropical Medicine, based on his thesis "The Costs and Benefits of HIV/AIDS Programs in Kenya". He was a lecturer in Liverpool and worked on DFID's HIV/AIDS Work Programme. Prior to working for POLICY/The Futures Group International, Dr. Forsythe worked as the Health Economics Officer with FHI's Impact Project. Dr. Forsythe also has an MBA from the University of Chicago.

# Chapter 6: HIV/AIDS and Its Impact on Trade and Commerce<sup>1</sup>

Lori Bollinger

The Futures Group International

## Introduction

The role that the trade and commerce sectors play in an economy are crucial to the overall development of a country, whether defined as increases in economic well-being or social indicators. The impact of HIV/AIDS on these sectors could be substantial, in turn affecting economic and social development. This is particularly true for developing countries, where the vast majority of HIV/AIDS cases are located. For example, although total world trade has tripled in the last two decades, reaching almost US\$13 billion by 2000, sub-Saharan Africa total trade increased by only 10 percent in the same time period. This is the result of many factors, including weakening economic performance, decreases in commodity prices, war, famine, and drought. Yet HIV/AIDS has played and will continue to play a role, as sub-Saharan Africa contains approximately three-quarters of the world's HIV positive population [1, 2].

The interaction between the HIV/AIDS epidemic and the trade and commerce sectors of different economies occurs in a number of different ways:

*Intellectual Property Rights:* The questions of compulsory licensing and parallel importing as they relate to the provision of HIV/AIDS drugs are complex, yet important in understanding whether these drugs are to become available for developing countries. For example, understanding the role of intellectual property rights in stimulating research and development is critical. Patents can also encourage both domestic and foreign direct investment.

*Restrictive Trade Practices:* Certain trading patterns, such as tariffs and delays at border crossings, may be altered to mitigate the impact of the epidemic.

*Tourism:* Although tourism is an important source of foreign exchange for many countries, the epidemic may be exacerbated by activities that take place during tourist visits. The industry itself may be vulnerable to perceptions of higher risk on the part of incoming tourists.

*International World of Work:* The workplace offers a unique setting to provide prevention and care programs. The recent International Labor Organization's (ILO's) Code of Practice on HIV/AIDS gives guidance on how to implement such programs in the workplace.

*Effect on Competitiveness:* Through different mechanisms, including increasing unit labor costs and decreasing investment flows, HIV/AIDS may affect a country's international competitiveness.

Each of these issues is discussed in detail below.

## Intellectual Property Rights

*"Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time" [3].*

As part of the World Trade Organization's overall agreement, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement lays out the international standards of protection for intellectual property rights, including patents. The general rule affecting patents is that both product and process inventions in all fields of technology can be patented, and thus protected under the agreement. There are certain types of exceptions to these patent rights, such as the following:

<sup>1</sup> An earlier version of this paper was prepared for the AGOA Forum Plenary Session on HIV/AIDS, Washington DC, October 2001.

- When the exception does not unreasonably conflict with normal exploitation (i.e., if the patented invention will be used in research);
- When compulsory licensing is allowed under certain conditions; or
- When parallel imports are allowed under certain conditions.
- An effort must be made to obtain voluntary use of the license, unless there is a national emergency, other circumstances of extreme urgency, government non-commercial use, or anticompetitive practices.
- Remuneration must be made to the right patent holder.

Since drugs that treat HIV/AIDS are relatively new, most are still under patent as defined by the TRIPS Agreement, particularly in developed countries. Patent protection has not been applied for, however, in all countries. In a recent study for some countries in Africa, for example, only 21 percent of possible patent applications for AIDS drugs have been filed (see box). When patents do exist, alternative access to these drugs is available through two mechanisms: compulsory licensing and parallel importing. Recently,

**Patent Protection in Africa**

*A recent study of 53 African countries found that only 21 percent of potential patents actually exist, thus allowing for the importation of generic drugs. Although this is true for most African countries, it is not true in South Africa, where 11 of the 15 most common drugs do have patent protection. In addition, one of the most commonly used AIDS drugs, Combivir, does have patent protection in most African countries. [4]*

much attention has been paid to the conditions under which these mechanisms are valid.

### **Compulsory licensing**

Compulsory licensing, or use of a patent by a third party without the consent of the patent owner, is allowed under the TRIPS Agreement under a number of conditions that protect the patent owner's rights. Two of the main conditions include the following:

Once compulsory licensing occurs, it cannot be given to a single party for its exclusive use, and it usually applies only to production for the domestic market. One issue for further discussion by the TRIPS Council in subsequent sessions is whether compulsory licensing may be used for import rather than local production. Because many smaller developing countries may not have the domestic capacity to produce sophisticated pharmaceuticals, they would like to purchase drugs on the international market that have been produced under compulsory licensing, after the countries become subject to the TRIPS Agreement in 2005 [5].

### **Parallel importing**

Parallel, or gray-market, imports are those goods that are produced legitimately by the patent holder in one country, purchased by another company, and sold in another country by the second company. This practice is addressed in the TRIPS Agreement via the legal principle of "exhaustion"—a patent right in the specific purchases product is "exhausted" once the patent holder has sold the product. Any issue regarding the exhaustion of intellectual property rights cannot be raised as a dispute in the World Trade Organization, although issues of national treatment and most favored nation treatment can be raised. Note that parallel imports are not the same as "generic" products; if the product is under patent in a particular country, then a generic product is an illegal copy of the patented drug. At the recent TRIPS Council meeting, developed countries warned that parallel imports could affect the negotiations currently taking



place for selling HIV/AIDS drugs for lower prices in developing countries [5].

Recently, resolution of some of these issues relative to AIDS drugs has occurred. After the recent World Trade Organization Ministerial meeting in Doha, Qatar, in November 2001, a declaration was issued which included the following language:

*“Each member has the right to grant compulsory licenses and the freedom to determine the grounds upon which such licenses are granted. Each member has the right to determine what constitutes a national emergency or other circumstances of extreme urgency, it being understood that public health crises, including those relating to HIV/AIDS,...can represent a national emergency...” [6].*

Although this Declaration does support compulsory licensing for domestic production, it explicitly states that no solution to the problem of smaller countries inability to make use of this solution, but urges the TRIPS Council to report such a solution to the General Council before the end of 2002.

### Kenya, South Africa, and Brazil

*The Parliament of Kenya recently joined the South African government in passing a bill to allow domestic production and importation of various medicines, including antiretroviral drugs. The bill requires that Kenya give the relevant pharmaceutical firms six months’ notice prior to granting the compulsory licensing [7]. Brazil recently announced that it would begin domestic production of a generic version of Nelfinavir, after declaring AIDS a “national emergency.” Some royalty payments will be made to patent holders. Earlier domestic production of AIDS drugs was undertaken based on a different Brazilian law that allowed domestic production of a generic drug if a foreign company did not begin production in Brazil within three years of being granted a patent [8].*

Some countries, however, have made decisions to begin domestic production of various drugs, including some antiretroviral drugs (see box).

## Restrictive Trade Practices

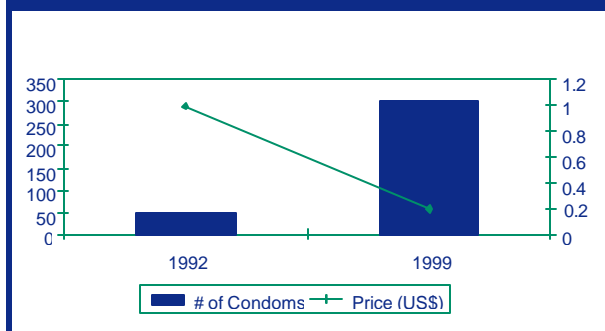
Restrictions on trade patterns take various forms, including tariffs, quotas, delays at border crossings, and other nontariff barriers. Some trade restrictions are based on official government policies, such as tariffs and quotas, and as such are under the direct control of the relevant ministry. Other practices, such as delays at border crossings, are the result of many factors that are not explicitly under the control of government. Identifying some of these trade restrictions, as well as how they affect the HIV/AIDS epidemic, may help countries mitigate some of the impact of the epidemic.

One trade restriction that is under the control of national governments is tariffs imposed on imports. When a tariff is imposed, the domestic price of a good rises above the international, competitive price. The higher relative price of the good can cause a decrease in the demand for it, relative to other goods. For example, one study cites the absence of taxes and tariffs on imported condoms as a major factor in contributing to low condom prices in Haiti, Rwanda, Botswana, Tanzania, and Bangladesh [9]. When the purchase of this good would result in a positive impact on the HIV/AIDS epidemic, lifting tariff duties may result in increased purchases, and thus slow the epidemic.

An example of the impact of reducing tariffs on condoms comes from Brazil. In the early 1990s, Brazil had some of the highest condom prices in the world; the average cost of a condom in 1992 was US\$1. This high price was due to a combination of very high import tariffs and other retail taxes. As a result, the per capita use of condoms was very low—only about 50 million condoms were sold per year. Once the price distortion was recognized, various organizations conducted advocacy campaigns to lower the taxes on condoms. By 1999, the average price per condom decreased to US\$0.20, and total

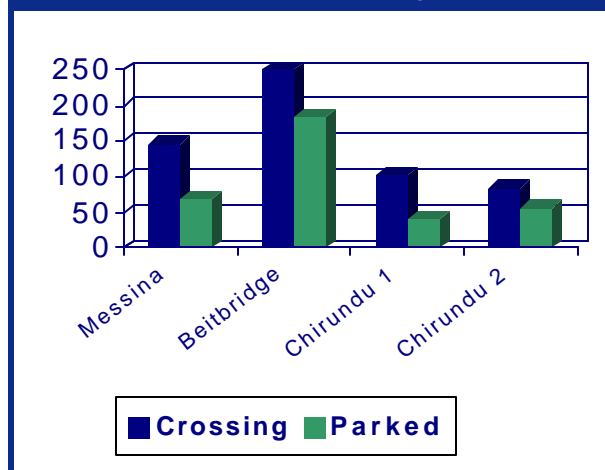
sales increased to 300 million units per year (see Figure 1). Thus, this represents an example in which the removal of a trade distortion had a clear impact on purchases; the resulting increase in condom use could only have a positive impact on the HIV/AIDS epidemic [10].

Figure 1. Impact of Tariff Reduction on Condoms Sold in Brazil



Sometimes, however, potential changes in policy to mitigate the epidemic are not so obvious. For example, delays at border crossings in sub-Saharan Africa increase high-risk behavior, such as the use of commercial sex workers. A 1993 survey of 168 drivers in Cameroon found that the average trip length was 14 days. During the trips, about 62 percent had sex at least once, while 25 percent had sex every night (11). A recent survey of four border crossings in southern Africa found that several thousand truckers cross each border monthly, with about 1,000 sleeping at least one night at each border. The delays are extensive; as Figure 2 shows, for every two trucks that cross the border at each of these four stops, there is at least one that remains parked at the border because of delays. These numbers do not include trucks parked in the towns; in Messina, South Africa, where between 120 and 180 trucks cross daily and between 60 and 80 trucks are parked at the border, it was estimated that about 200 trucks were parked daily throughout the town. Delays are the result of many factors, including lack of infrastructure and staggered border opening hours. One study reports that delays at the South Africa border are related to the country's concern about migration flows [12].

Figure 2. Average Number of Trucks Crossing Border and Parked at Border Daily, South Africa



What can be done to reduce time at border points? The Common Market for Eastern and Southern Africa (COMESA) has devised various policies, some of which are designed to facilitate border crossings. Among them:

- Standardization of *customs rules and regulations* results in faster movement of goods and services by reducing time spent at border points.
- Introduction of a *COMESA carrier license and insurance* that would be valid throughout the region will facilitate movement between countries.
- Introduction of a *customs bond guarantee* reduces delays at borders.

## Tourism

Tourism plays an important and growing role, particularly in certain economies, by providing jobs, income, tax revenues, and foreign currency. The interaction between HIV/AIDS and tourism is complex; due to riskier behaviors adopted by tourists while on vacation, the HIV/AIDS epidemic is exacerbated. At the same time, tourists may be discouraged from visiting countries with high HIV-prevalence rates because of a fear

of infection [13]. Several studies have found that, in general, tourists increase risky behavior in a number of ways. Sexual activity increases, both with other tourists and with local people; however, the use of condoms is not consistent during these sexual encounters. Young people, in particular, increase sexual contact during tourist visits, with a large percentage of these contacts being unsafe. Finally, the increase in alcohol consumption that occurs during holidays increases risky behavior even further [14].

Although there is little quantitative evidence regarding the negative impact of HIV/AIDS on tourism, anecdotal evidence suggests that the HIV/AIDS epidemic may have an impact on overall tourism receipts. Early in the epidemic in the late 1980s, the British military banned soldiers from visiting tourist sites, including Mombasa and Molindi, because of HIV/AIDS. After this story reached the British public, one travel agency reported cancellations of US\$3 million from British tourists. Another study in Thailand, however, found that tourists were not changing plans based on fears regarding the expanding HIV/AIDS epidemic [13]. Experts in the Caribbean region predict that the impact of HIV/AIDS there will grow as tourism increases commercial sex and other high-risk practices [15].

What can ministries of tourism do to encourage tourism amid the HIV/AIDS epidemic? Studies in the Dominican Republic and Indonesia found that tourists were receptive to the idea of having information about HIV/AIDS located in their hotel rooms, particularly those tourists who perceived themselves to be at high risk [16, 17]. Another study in Thailand ascertained that 91 percent of Japanese women and 68 percent of Western women were receptive to reading HIV/AIDS materials as tourists there [18]. In addition, instituting a 100 percent condom-use policy between sex workers and their tourist clients would have an impact on the transmission of the virus. This policy has been shown to be effective in increasing condom use in both the Dominican Republic and Thailand [13]. Finally, treating STIs and providing materials

about HIV/AIDS to workers in the tourist industry, as well as supplying condoms, could have a mitigating effect on the epidemic.

## International World of Work

*“We want to maintain an open policy with our employees who are carrying the disease by accepting their condition with no fear of victimization.”*

—NamWater CEO [19]

The ILO recently adopted a Code of Practice on HIV/AIDS and the World of Work. The code defines HIV/AIDS as a workplace issue and provides guidelines regarding the various issues associated with HIV/AIDS, including the appropriate use of testing in the workplace, the provision of workplace prevention programs, and responsibilities for care and support for affected people. Within these issues, particular attention is paid to how crosscutting topics, such as stigma, discrimination, and gender inequality, affects programs that might be enacted by government, employers and their organizations, and workers and their organizations. The code applies to all employers and workers in the public and private sectors, including formal and informal sectors [20].

### Testing

The code recognizes both appropriate and inappropriate testing procedures. For example, testing is deemed inappropriate when used to hire or fire workers or used in any discriminatory way. It is appropriate, however, when offered on a voluntary basis, or when workers have occupational an exposure. In all cases, confidentiality should be strictly enforced.

Although most African businesses do not currently mandate the testing of their workers, the code will help prevent these practices from occurring. For example, executives in numerous companies in Zimbabwe indicated that what they really thought was needed was a mandatory screening program [21]. Some companies avoid the issue of mandatory testing by allowing their employees to be tested for insurance

purposes [21]. Other companies test their workers in violation of the existing law, thus risking a potential legal response from either the government or their employees.

### **Prevention**

*“Workplace information and education programs are essential to combat the spread of the epidemic and to foster greater tolerance for workers with HIV/AIDS” [20].*

The ILO code discusses in great detail the types of prevention programs that should be adopted, including their objectives, such as attitudinal and behavioral change, and their content. The types of programs the code advocates include:

- Information and awareness-raising campaigns;
- Educational programs;
- Gender-specific programs;
- Linkage to health promotion programs;
- Community outreach programs; and
- Other practical measures to support behavioral change.

As with any intervention, workplace programs for HIV/AIDS will only be widely adopted if leaders are convinced that the programs actually work. For managers, there is a need to know that expending resources on HIV/AIDS prevention will result in preventing new infections. While there are limited data on the impact of workplace prevention programs, a few studies have shown tremendous efficacy of prevention programs (see box). Other studies have found that the treatment of STIs resulted in a significant reduction in the incidence of HIV, although these studies are not specific to workplace treatment programs.

### **Workplace Programs**

*In 1993 in Zimbabwe, 40 factories implemented HIV/AIDS prevention programs. In 1994, 20 of these companies added peer education to their prevention programs, while the remaining companies continued with their existing programs. Factories offering peer education had a much lower incidence of HIV than factories that did not [22].*

Despite the efficacy of prevention programs, such as peer education, condom distribution, and STI treatment, most managers have not pursued such a comprehensive prevention program. Managers argue that employees are already aware of HIV or that the employees do not engage in “immoral” activities. When prevention programs are initiated, they almost always exclude participation by management. AIDS is usually viewed as a problem of the uneducated workers, even though the data indicate that the financial impact of losing a senior member of staff is much greater than losing an unskilled worker.

While providing prevention programs in the workplace is critical, these issues also need to be addressed within the entire community where the workers live. Even fewer companies are, in fact, willing to make contributions to their communities; they often view HIV/AIDS prevention as the responsibility of the government or nongovernmental organizations, not their responsibility. It is often common to hear managers say that they already pay their taxes and therefore should not have to take on the responsibility of the government. However, other companies have recognized that, although the primary responsibility for health care may be with the government, the private sector needs to ensure that minimum health care standards are being met.

### **Care and support**

The ILO Code of Practice recommends that the workplace be involved with various aspects of care and support, either onsite or through the community. Care and support should include

- Counseling;
- Occupational and other health services;
- Linkages with self-help and community-based groups;
- Continuation of benefits;
- Social security coverage;
- Assurance of privacy and confidentiality;
- Parity treatment with other serious illnesses; and
- Employee and family assistance programs.

Whether workers infected with HIV should be treated in the workplace increasingly has become an issue for businesses in Africa. For most companies, the first step in establishing an appropriate treatment strategy could involve a focus on TB. Isoniazid prophylaxis, for example, was found to increase life expectancy in Spain for HIV-infected workers by three years [23]. Cotrimoxazole has also been shown to be extremely effective as a prophylaxis against TB and other opportunistic infections [24].

An increasingly important issue regarding HIV/AIDS concerns the introduction of highly active antiretroviral therapy (HAART). HAART has been shown to be extremely effective in reducing the morbidity and mortality of individuals in developed and developing countries [25]. Even in developing countries, such as Brazil, antiretrovirals were found to decrease mortality by 32 percent [26]. Nevertheless, HAART is extremely expensive for most developing countries. The price is coming down, however, with generic manufacturers offering a combination of drugs for under US\$300 a year. Distribution issues remain important when discussing widespread use of antiretroviral therapy.

The provision of HAART can produce significant savings, particularly for companies that invest heavily in employee training and benefits. The benefits accrue through delaying the impact of AIDS (health care, recruitment, etc.) for a number of years. On a purely economic basis, companies are likely to find that the benefits of HAART exceed the costs for senior staff but not for unskilled workers. There are ethical issues, however, associated with providing HAART only to senior staff. In the end, the decision to provide HAART to employees may extend beyond an economic rationale.

## Effect on Competitiveness

There are several mechanisms by which HIV/AIDS affects the international competitiveness of an economy:

- AIDS deaths lead directly to a reduction in the number of workers available. These deaths occur to workers in their most productive years. As younger, less experienced workers replace these experienced workers, productivity is reduced, thus resulting in a decline in international competitiveness.
- A shortage of workers also leads to higher wages, which leads to higher domestic production costs. These higher production costs again lead to a loss of international competitiveness, which can cause foreign exchange shortages.
- Lower government revenues and reduced private savings (because of greater health care expenditures and a loss of worker income) can cause a significant drop in savings and capital accumulation. This will have an impact on international competitiveness, since a reduction in investment funds may result in reduced investment in new technology and new production techniques.

The impact of HIV/AIDS on competitiveness is difficult to assess quantitatively. Most studies have found that estimates of the macroeconomic impacts are sensitive to assumptions about

- How the epidemic affects savings and investment rates;
- Levels of employees' education, skill, and training; and
- Mechanisms for financing costs—deficit financing vs. other mechanisms.

Few studies have been able to incorporate the impacts found to date at the household and firm levels in macroeconomic projections. Some studies have found that the impacts may be small, especially if there is a plentiful supply of excess labor and if worker benefits are small. Other studies have found significant impacts. The magnitude of the impacts depends partly on the structure of the economy. Economies based on extractive industries or export agriculture are likely to be most severely affected.

Certain sectors are particularly at risk for significant impact from HIV/AIDS, depending on the level of skill required. For example, the mining sector is a key source of foreign exchange for many countries. Most mining is conducted at sites far from population centers, forcing workers to live apart from their families for extended periods of time. They often resort to commercial sex, with resultant HIV infection and the spread of the infection to their spouses and communities when they return home. Highly trained mining engineers can be difficult to replace. As a result, a severe epidemic can seriously threaten mining production, increase unit labor costs, and affect exports and subsequent foreign exchange balances.

Another sector that could be severely affected is the water sector, which in turn affects export agriculture. Developing water resources in arid areas and controlling excess water during rainy periods requires highly skilled water engineers

and constant maintenance of wells, dams, embankments, and so forth. The loss of even a small number of highly trained water engineers can place entire water systems, and significant investment in them, at risk. In addition, these engineers may be especially susceptible to HIV because of the need to spend many nights away from their families. Other heavily affected sectors include agriculture, transport, health, and education.

## Conclusion

The impact of HIV/AIDS could be devastating for certain sectors and certain countries. Yet there are policies that can be adopted that could help mitigate this impact. Given the discussion above about issues regarding HIV/AIDS in the trade and commerce sectors, what can policymakers do to address this potential impact?

- Ministries should be aware of the opportunities available through the TRIPS Agreement and negotiations with the pharmaceutical companies to increase access to essential HIV/AIDS drugs.
- Certain tariff and nontariff-related barriers exist that have an impact on the transmission of HIV/AIDS, such as high tariffs on condoms and delays at border crossings. Policies can be implemented to address these barriers, including lowering relevant tariffs and standardizing various customs rules and regulations to facilitate border crossings.
- Foreign exchange earnings may be at risk due to fluctuations in tourism receipts due to HIV/AIDS. Information and condom campaigns for both tourists and workers in the tourism industry may be effective in fighting the epidemic.
- Ministries may explore the relevance of the newly adopted Code of Practice on HIV/AIDS and the World of Work for domestic workplace guidelines.

- Certain sectors are particularly vulnerable to the HIV/AIDS epidemic, such as mining, transport, water, and export agriculture. Awareness of this vulnerability may increase the incentive to institute workplace programs and to develop plans to address the possible consequences of HIV/AIDS.

## Biography of Author

Lori Bollinger, PhD, is a senior health economist at The Futures Group International. She has collaborated in developing various models to assist in making cost-effectiveness decisions regarding HIV/AIDS resources, including Goals, PMTCT, and HAART. She has also collaborated with local consultants to perform and write analyses of the socioeconomic impact of HIV/AIDS in various countries, including making epidemiological and socioeconomic projections. Dr. Bollinger moderated the online discussion, "Economic Impact of HIV/AIDS" on the International AIDS Economic Network. Dr. Bollinger received her PhD in Economics from the University of Pennsylvania.

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# Chapter 7: AIDS and Macroeconomic Impact

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## Abstract

Policymakers need to understand the mechanisms by which HIV/AIDS will impact on the different levels of the economy, and also to have an estimate of how large these impacts are likely to be. Such information makes it possible to design macroeconomic and fiscal policy to mitigate the anticipated impacts on government budgets, companies, and households.

Numerous studies over the last 10 years have found estimates of the probable size of economic impact, mainly in African countries, where the epidemic is the most serious. Results have indicated that HIV/AIDS will probably reduce the growth rate of Gross Domestic Product (GDP) by between 0.5 percent and 2.6 percent. The size of this reduction is within the range of variation that could be caused by poor economic management or fiscal policy. This implies that the macroeconomic impacts of HIV/AIDS, in themselves, can be substantially reduced by appropriate policy interventions.

It is clear, however, that the most serious impacts of HIV/AIDS are felt at the level of households, that are more likely to fall into poverty; of firms, that face higher employment costs; and of governments, that are likely to face falling revenue and rising expenditure demands. The extent of these effects will form important research areas in the coming years and are probably more important than further studies of impact on aggregate GDP.

Many countries are beginning to introduce, or think about introducing, state-funded programs of treatment. If such programs grow in the future, they are likely to alter the future course of the epidemics. It will be important to understand how these changes are going to impact

upon government budgets and whether or not they are sustainable.

## Introduction

One possible reason that it is important to understand how the HIV/AIDS epidemic will impact on the macro-economy, would be in order to motivate policymakers to commit resources to prevention and mitigation of the disease. However, this kind of cost-benefit thinking is not usual in the area of public health generally—governments do not spend on prevention or treatment of measles or heart disease in order to receive an equivalent return in future productivity. Furthermore, the impact of HIV/AIDS on economies will never in fact be known—it is one of many influences on economic development, and it will never be possible to clearly separate these retrospectively.

Nevertheless, policymakers do need to have some idea of how the epidemic might undermine their economies or their budgets and to understand the mechanisms through which its impact will be felt. It is only in this way that they can take the appropriate counter measures and ensure that there will be adequate public resources in the future in order to prevent or mitigate the human catastrophe that the epidemic threatens to unleash.

## Why Is HIV/AIDS Relevant To This Part of the Economy?

An economy might be thought of as a consequence of the collective activity of large numbers of people and will therefore be affected by any epidemic or failure of public health that undermines the ability of people to work. The HIV/AIDS epidemic does this in a number of

different ways: at aggregate, corporate, household, and government levels.

First, HIV/AIDS causes mortality to rise, particularly among the working age population. This will have the following effects:

- There will be a lower population and labor force growth rate.
- The age structure of the population and labor force will change—the proportion of young people working will increase, which reduces the average experience and productivity of the labor force.
- Labor force participation rates will change—for example, young people may have to stay at home to care for sick parents.
- In situations where important skills are in short supply, the loss of skilled workers will have a strongly negative impact on productivity.

Second, HIV infection causes affected people to become sick more often and also fuels parallel epidemics, such as tuberculosis. The consequent rise in morbidity may have the following impacts:

- Reduced productivity due to workers' time off for sick leave or to look after sick family members, lower productivity while at work due to illness or worry;
- Increased expenditure on
  - Health care (by individuals, firms, and government)
  - Training (by firms and government, to replace sick workers)
  - Sick pay (by firms and government);
- Reduced savings, as at least part of the additional expenditure will be taken from income that would otherwise be saved; and

- Reduced investment (both public and private), due to:
  - Lower expected profits, or increased economic uncertainty, and
  - Diminished ability to finance investment due to lower savings.

### **Aggregate level impacts**

These mechanisms are often referred to as “channels,” whereby HIV/AIDS can be expected to reduce the growth rate of GDP below what it would otherwise have been. It is, however, important to note that population growth will also be reduced by HIV/AIDS. There is no *a-priori* reason to assume that the impact on GDP will be greater than that on population. For this reason, the impact on per capita GDP, or average incomes, may not necessarily be negative. Lower economic growth will also affect consumption demand, which suggests that the market for firms depending on local consumers will grow more slowly due to AIDS. Furthermore the widespread impacts on the labor market (via labor supplies, productivity, and labor demand) are likely to affect wages and employment, both of which could either rise or fall depending on how the other variables interact.

Although macroeconomic impact is often conceived in terms of GDP, it is important to note that GDP (or even per capita GDP) is not a measure of welfare. Socially unproductive activities such as increased household and government expenditure on health care related to HIV (often termed “defensive” expenditure) will be counted as a part of GDP, even though they are not part of what would normally be thought of as productive activity. Impact should perhaps be measured in terms of a more satisfactory indicator of socially productive economic activity.

### **Household level impacts**

The above discussion refers to broad macroeconomic impacts at a high level of aggregation. However, not all households will be affected by

AIDS in the same way, most obviously depending on whether or not a household has a member who is HIV positive. The main effects are as follows:

- Loss of income, if a breadwinner stops work due to sickness or death (this is a permanent impact);
- Loss of income, if a breadwinner has to stop work to look after a sick family member (this is a temporary or transient impact);
- Additional expenditure, on health care and, eventually, funeral costs (a transient impact).

The net effect of these impacts will be to reduce the disposable income of affected households, some of which will fall below the income required to meet their basic needs (the so-called poverty datum line, or PDL). We therefore expect that HIV/AIDS will bring about an increase in the proportion of households that are poor. In addition, the short-term impact on poverty is likely to be worse than the long-term impact (because of the transient factors noted above).

### ***Fiscal (government level) impacts***

HIV/AIDS will have direct effects on some key areas of government spending, most obviously the health budget. There will also be a range of indirect effects arising from the aggregate economic impacts, and the increase in poverty. These can be expected to reduce the ability of government to raise tax revenues (since these depend on the size of the economy), while increasing the demands on government expenditure, including poverty alleviation measures.

Although there may be some savings arising from reduced population growth, we would expect HIV/AIDS to exacerbate the pressure for deficit spending by government. It will also distort development spending on other areas, since it will be necessary to use valuable resources in a “defensive” or socially unproductive way. In addition, we might expect the dis-

tortions that HIV/AIDS causes in the labor market to put more pressure on government in its regulatory role (for example, the issuing of licenses and work permits).

### ***Anecdotal evidence of impact***

Economic impact at the aggregate level is extremely difficult to measure, since we cannot know at any given time what GDP would have been in the absence of HIV/AIDS. There is, however, strong evidence of impact at the firm level. Firms face productivity losses as well as higher costs (a so-called “AIDS Tax”) as a result of increased benefits and training requirements. Numerous studies have calculated the extent of impact in individual firms. For example, see Barks-Ruggles and others (2001). Impact at the household level is also well documented through the direct experience of intervention programs such as home-based care.

## **What Does the Literature Tell Us?**

The studies that attempt to evaluate the economic impact of AIDS can be classified into four categories:

1. **Econometric modeling**, where the impact of AIDS is factored into a growth model with estimated parameters;
2. **Equilibrium modeling**, which attempts to identify and quantify the different channels of HIV/AIDS impact through simulation;
3. **Qualitative studies**, sometimes based on case studies of particular communities or areas; and
4. **The human capital approach**, where the cost of AIDS is calculated through the foregone earnings or production of AIDS victims.

The following is a brief discussion of some of the literature to date in the first two of these categories.

One of the earliest attempts to model the impact of AIDS was carried out by Mead Over in

1992. This study developed a model for African growth, based on labor force, capital accumulation, and exogenous factors, estimated econometrically on a cross-section of African countries. The results indicated a reduction in per capita GDP growth of 1-3 percent in the most heavily affected countries.

Kambou, Devarajan, and Over (1992) used an 11-sector CGE with three categories of labor to simulate the impact of AIDS. They found that AIDS reduced output, exports, investment, and savings, and reduced GDP growth by almost 3 percent, mainly through the savings and investment channel, and also the shortage of skilled urban labor. The paper concluded that it is the distribution of AIDS cases (across labor categories) rather than the absolute numbers of AIDS infections that is crucial in determining the impact of AIDS.

Cuddington (1993a) modeled the effects of AIDS on the growth of GDP and GDP per capita through a single sector, full employment Solow-type growth model, incorporating capital, labor, and technical change. The model was calibrated to base year (1985) data for Tanzania. The simulation results showed that AIDS reduced the average real GDP growth rate by 0.6-0.9 percent.

Cuddington (1993b) extended the Tanzanian model, introducing a dual labor market, including a formal sector with wage rigidities, so that the labor market does not clear. The paper concluded that the benefits of improved labor market adjustment policies are of the same order of magnitude as the losses caused by AIDS, hence the policy environment can help to mitigate the impact of AIDS.

Bloom and Mahal (1995) used an econometric model, estimated on a sample of 51 countries for the period 1980-92. The impact of AIDS was less significant than that of other standard growth model elements, and the paper concluded that predictions that AIDS will have a major economic effect are not borne out by empirical evidence.

Greener, Jefferis, and Siphambe (2000a and 2000b) used an approach similar to Cuddington to estimate the impact of HIV/AIDS in Botswana. The model contained two productive sectors, and two categories of labor. The paper found that the overall reduction of GDP growth ranged from 0.8-1.4 percent, depending on the scenario assumptions, and concluded that government will need to adopt measures to stabilize the labor market and increase investment.

Arndt and Lewis (2000) used a CGE to estimate impact on the South African economy, using exogenous demographic projections. They found that GDP growth rates might be reduced by as much as 2.6 percent over a 12-year simulation period, implying a reduction in per-capita GDP as well. They also used the model to decompose the relative impacts of the different channels, finding that the most important impacts arose from the redirection of government spending, and the fall in total factor productivity.

The Bureau for Economic Research (BER) in Stellenbosch, South Africa (2001) constructed a comprehensive econometric model that estimated the impact of HIV/AIDS on the South African economy. The model forecast an impact of about 0.5 percent on GDP growth, but also found a 0.6 percent decrease in formal sector employment, and a rise of 2.3 percent in the inflation rate.

There have been many other notable studies of sectoral, household, or development impacts. For example, Barnett and others (1995), and Tibaijuka (1997) found evidence, from case studies, that AIDS leads to labor shortages in agricultural economies, and as a result, has a negative impact on rural household food security and income, and worsens rural poverty.

The book *Confronting AIDS: Evidence from the Developing World*, compiled by Ainsworth, Fransen, and Over (1998) contained 17 studies, commissioned by the European Commission and World Bank in 1996. These included studies on the link between HIV/AIDS and devel-

opment, and the impact on households in Uganda, Côte d'Ivoire, and Thailand. A paper published by the African Development Forum (2000) discusses the economic impact of HIV/AIDS, and analyses the impact on households and other areas of the economy, including a discussion of the economics of prevention and treatment.

## Lessons Learned

Overall, both the econometric and equilibrium modeling approaches conclude that while the macroeconomic impact of AIDS is likely to be negative, it is also quite small. Furthermore, the reductions in GDP and GDP per capita growth caused by AIDS are probably less than the variations in growth rates that result from changes in the broader economic policy environment. It is tempting to conclude that the negative macroeconomic impacts of AIDS can be offset by other economic reforms—in fact, the prospect of AIDS-related growth problems should act as an incentive to proceed with reform programs that are needed for other reasons.

This does not, however, take account of the modeling evidence that HIV/AIDS is likely to both increase and deepen the level of poverty in many countries. Policy measures also need to focus upon this problem, where there is at present very little empirical or quantitative evidence of the actual impact at the current stage of the epidemic.

## How Will Impact Change in the Future?

Most of the studies to date have attempted to estimate impact under the assumption that the HIV/AIDS epidemics will continue in the absence of effective cures or preventive treatments. In recent years, some countries (such as Brazil and Botswana, among others) have begun to introduce antiretroviral treatment with the intention of making these available to as many affected people as possible.

The widespread introduction of the currently available forms of treatment may have a variety of effects on the impact of the epidemic. First, the complex nature of the treatment regime is likely to cause compliance problems that may cause the emergence of resistant strains of the virus. The extent of this problem is likely to compromise, to at least some extent, the success of treatment programs in reducing the impact of the disease.

Second, it is possible that widespread treatment may undermine the current attempts to encourage behavioral change aimed at preventing further spread of the virus, since it may cause people to feel safer, and more able to engage in risky behavior. If this occurs, it will also mitigate against the beneficial effects of treatment. It will be important to anticipate and understand the nature of these effects, and the way in which treatment programs will change the course of the epidemic and the range of impacts.

The development of effective vaccines against the virus will also have a major effect on the impacts, depending on when they can be introduced, how much they will cost to administer, and how effective they will be in preventing transmission. It is likely that the impact of vaccines will be slow. There is also a threat that public perception of widespread vaccination may reverse some of the progress made in behavioral change and undermine the effectiveness of the programs.

## Conclusion

This paper has already concluded that most studies of macroeconomic impact indicate that the range of probable impacts are well within the range of variation that could be expected from changes in economic management. It is, therefore, not likely that further studies of macroeconomic impact alone will yield useful information.

There are three areas where better information is urgently needed. The first of these is to improve our understanding of the impact of HIV/

AIDS on household poverty, and the possible policy interventions that are required. This will require more work of a quantitative nature than researchers have attempted in the past, and will need to move beyond simulation exercises to well-founded empirical studies.

The second area would be to improve our understanding of the relative importance of the different impact channels, in order to inform the policies required to counter them. This is likely to involve exercises based upon the construction of CGE models, rather than the partial equilibrium or econometric approaches that have formed the majority of studies to date. The impact of possible demographic and behavioral changes resulting from treatment or vaccination programs will also need to be taken into account.

A third and related area will be to improve our understanding of the budgetary impacts to government, and how these interact with the economy as a whole. This is particularly important in an environment where expensive treatment programs are becoming common, and where targeting issues for drug treatments or possible future vaccines are becoming increasingly important.

## Recommended Reading

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Barnett T & Whiteside A. *Guidelines for studies of the social and economic impact of HIV/AIDS*. Geneva: UNAIDS, Best Practice Collection, 2000

Greener R, Jefferis K & Siphambe H. *The macroeconomic impact of HIV/AIDS in Botswana*. Gaborone: Ministry of Finance and Development Planning, 2000

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Robert Greener is a Senior Research Fellow at the Botswana Institute for Development Policy Analysis (BIDPA) in Gaborone. He has conducted a study of the macroeconomic, poverty, and fiscal impacts of HIV/AIDS in Botswana, as well as a study of the HIV/AIDS-related data. He has also led a number of other major policy studies in Botswana, including a review of the Rural Development Policy, and the rebuilding of the Macro-Economic Planning Model for Botswana (MEMBOT).

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## Section Three: Using Economics to Respond to the Pandemic

*“Agencies operating at the international level have a need for economic analysis to help develop global health policies and determine resource requirements to support their advocacy efforts.”*

Broomberg, J. et al. 1996, “Economic Analysis at the Global Level: A Resource Requirement Model for HIV Prevention in Developing Countries.” *Health Policy* 38: 45-65.

*“In the view of Jonathan Mann, MD, of the Francois-Xavier Bagnoud Center for Health and Human Rights, Boston, Mass, adjusting the mechanisms of supply, demand, and cost is not enough. For the former director of the WHO Global Programme on AIDS, resolution of the problem lies in an affirmation of the universal right to health care.”*

Marwick, C. 1998 “HIV/AIDS Care Calls for Reallocation of Resources.” *JAMA* 279(7): 491-493.

*“The UN Special Session on AIDS represents a unique opportunity for the international community to acknowledge the magnitude of the HIV/AIDS epidemic and the very real opportunities to apply proven-effective treatment and prevention interventions. Growing international recognition of the moral and practical imperative to expand resources for HIV/AIDS in developing countries offers hope that millions more infections can be prevented, and millions of people living with HIV disease can enjoy longer and higher quality lives.”*

Alagiri, P. et al. 2001. “Global Spending on HIV/AIDS: Tracking Public and Private Investments in AIDS Prevention, Care, and Research.” Kaiser Family Foundation.

# Chapter 8: Resource Allocation Within HIV/AIDS Programs

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## Introduction

The Declaration of Commitment of the United Nations General Assembly Special Session on HIV/AIDS (UNGASS) calls for spending on HIV/AIDS programs to increase to US\$7-10 billion annually by 2005.<sup>1</sup> The Declaration specifies a number of goals at the global and national level and calls for specific actions to reach those goals, but it does not specify how the funding should be allocated. The Report of the Commission on Macroeconomics and Health estimates that spending on HIV/AIDS in low- and middle-income countries should increase by US\$14 billion by 2007 and suggests that US\$6 billion is needed for prevention, US\$3 billion for care, and US\$5 billion for antiretroviral (ARV) treatment.<sup>2</sup>

A detailed estimate of spending requirements prepared for UNGASS calls for minimum spending of US\$9.2 billion annually by 2005 in low- and middle-income countries to provide coverage of essential prevention, care, and mitigation services in an effort to reach the UNGASS goals.<sup>3</sup> Details of spending needs by category of intervention are shown in Figure 1.

A recent analysis shows that these coverage levels are sufficient to achieve the UNGASS goals.<sup>4</sup> However no analysis has been done to show whether this is the most cost-effective approach

to achieving these goals or whether the same goals could be reached with less funding and a more strategic allocation of resources.

## Resource Allocation at the National Level

Resource allocation at the global level is of interest to international donors, but issues become even more important at the country level where resources are actually used.

- How should individual countries allocate the resources available to them now?
- For the future, how much funding is needed for each program area?
- How can the resource allocation process be improved?

Very little information is available about actual expenditures at the country level. Information from National AIDS Accounts in Latin America collected by SIDALAC indicates that over 80 percent of current expenditures are for treatment, and that condom purchases, blood screening, and IEC programs account for most of the prevention expenditures.<sup>5</sup> Similar information is not available for other regions.

<sup>1</sup> S-26/2. Declaration of Commitment on HIV/AIDS. United Nations General Assembly. 27 June 2001. Paragraph 80.

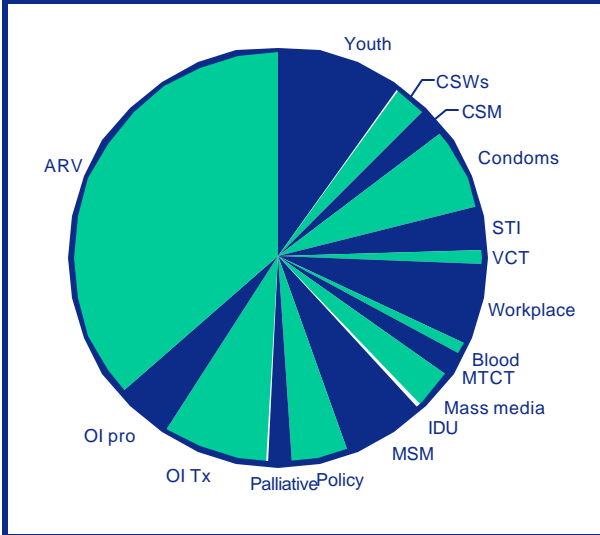
<sup>2</sup> Commission on Macroeconomics and Health. *Macroeconomics and Health: Investing in Health for Economic Development* 20 December 2001.

<sup>3</sup> B. Schwartlander, J. Stover, N. Walker, L. Bollinger, J.P. Gutierrez, W. McGreevey, M. Opuni, S. Forsythe, L. Kumaranayake, C. Watts and S. Bertozzi. "Resource Needs for HIV/AIDS" *Science*, Vol 292, 20 June 2001. pps. 2434-2436.

<sup>4</sup> J. Stover, N. Walker, G.P. Garnett, J.A. Salomon, K.A. Stanecki, P. Ghys, N.C. Grassly, R.M. Anderson and B. Schwartländer. "Can We Reverse the HIV/AIDS Pandemic with an Expanded Response?" *Science* forthcoming.

<sup>5</sup> SIDALAC. *Flujos de financiamiento y gasto en VIH/SIDA en países seleccionados de América Latina, 2000*. Mexico City: SIDALAC. 2001.

Figure 1. Allocation of the US \$9.2 Billion Required in 2005



Source: B. Schwartlander, J. Stover, N. Walker, L. Bollinger, J.P. Gutierrez, W. McGreevey, M. Opuni, S. Forsythe, L. Kumaranayake, C. Watts and S. Bertozzi. "Resource Needs for HIV/AIDS" *Science* 292, 20 (June 2001): 2434-2436.

Although we know very little about the allocation of actual expenditures, information is available on the planned allocation of expenditures from the budgets of strategic plans.

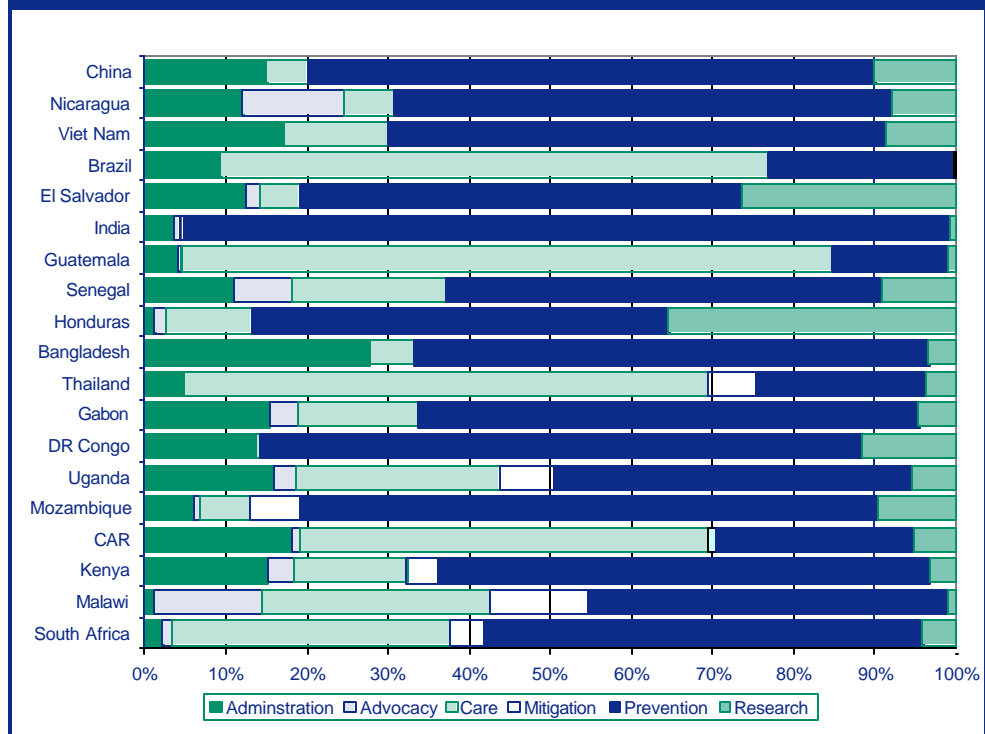
Figure 2 shows the allocation of resources by broad program categories as reported in the budgets of national strategic plans. In this figure, countries are ordered according to adult HIV prevalence in 1999, with China at 0.07 percent at the top and South Af-

rica at 19.9 percent at the bottom. We might expect that countries with low prevalence would allocate most of their resources to prevention while those with high prevalence would allocate a greater proportion to care and mitigation. But no such pattern is evident in this figure.

## Factors Influencing Resource Allocation Decisions

How were these allocation decisions made? Why do some countries allocate so much more funding for care or research than others? Since the funding today is much less than the requirement in most low- and middle-income countries, the allocation of those resources is critical.

Figure 2. Allocation of Resources in Budgets of National Strategic Plans



Source: Lori Bollinger and John Stover. *How do AIDS Control Managers Make Resource Allocation Decisions?* Glastonbury, CT: The Futures Group International. September 2000.

To answer these questions it is useful to begin with a description of how resource allocation

decisions are currently made. We interviewed AIDS program managers and studied AIDS budgets in about 20 countries to better understand how these decisions are made.<sup>6</sup> Several key points emerged from these interviews.

### 1. The level of autonomy in planning is directly related to the amount of local funding.

The amount of autonomy that National AIDS Programs have in allocating resources is largely determined by whether the majority of their funding is from national budgets or international donors. In countries that are not dependent on donor financing (such as Mexico, Thailand, Brazil, and South Africa), funding decisions were made by national government organizations. In contrast, in countries that are largely dependent on international donor funding (such as Malawi, Zambia, and Mozambique), the donors played a significant role in resource allocation decisions. Often this influence resulted from the fact that donors choose the parts of the program that they wished to fund. Those parts that were not funded by donors often did not get funded at all. As a result, the final allocation of expenditures may be very different from the planned budget.

### 2. The key priority-setting exercise is now the National Strategic Planning exercise.

Although resource allocation decisions may be made at many levels, most priority setting now takes place within the strategic planning process. Almost all countries have developed national strategic plans. In the best cases, strategic planning is a well-defined process that includes participation from all sectors, including various sectors of the national government, international donors, national and international NGOs, the private sector, community organizations, and people affected by HIV/AIDS. Most countries utilize the strategic planning guidelines from

UNAIDS<sup>7</sup> in carrying out the process. This process brings together all the stakeholders and provides a framework to discuss needs and priorities.

Now that the Global Fund for AIDS, Tuberculosis, and Malaria is operating, the process of developing applications to the fund, within the context of the Country Coordinating Mechanism (CCM), is becoming an important part of resource allocation decisions.

### 3. Costing of strategic plans is generally done after the plan is completed.

In most strategic planning exercises, the detailed plan is completed first, then the budget is developed. As a result there is little “strategic” budgeting. That is, the goals and objectives of the plan are already set before the budget is developed. There is no analysis of how different levels of spending or different allocation patterns might affect the achievement of the goals.

### 4. Strategic plan budgets are generally based on “bottom-up” budgeting.

In most cases, the budget for the strategic plan is developed by costing the detailed activities indicated in the plan. For example, if the plan calls for counseling services to be expanded, the budget might be estimated by multiplying the number of health centers in the country by the cost to train one counselor. This approach clearly indicates the operational budget required to train the counselors. However, it does not relate the training of the counselors to infections averted or behavior change. Thus, it is impossible to say whether counselor training is more cost-effective than, for example, condom procurement.

### 5. Cost-effectiveness information plays a limited role in resource allocation.

<sup>6</sup> L. Bollinger and J. Stover. *How do AIDS Control Program Managers Make Resource Allocation Decisions?* Glastonbury, CT: The Futures Group International. September 2000.

<sup>7</sup> UNAIDS. *Guide to Strategic Planning Process for a national response to HIV/AIDS*. Available at [www.unaids.org](http://www.unaids.org). 1998.

Cost-effectiveness analysis does not play a major role in resource allocation in most countries, although it has been used extensively in a few countries, such as Brazil and Thailand. Cost-effectiveness information from international research does play a role in helping countries decide what interventions to include, but not in deciding how to set priorities for programs. For example, the results of the Mwanza trial of syndromic management of STIs showed that it was cost-effective<sup>8</sup>. Most program managers are aware of these results and were influenced to include syndromic management of STIs in their strategic plans. However, the amount of funding allocated to syndromic management has not been based on whether it is more or less cost-effective than other programs, such as mass media or school education, but rather on estimates of need, capacity to use additional funding, and the willingness of donors to fund these activities.

#### 6. Inertia is strong; past allocation patterns are an important determinant of current expenditures.

When asked to describe the resource allocation process, most program managers discussed both the existence of fixed costs, as well as prior commitments in previous years. In general, the spending pattern in the previous year is a major determinant of spending patterns in the current year. Recurring costs account for the majority of overall expenditures; salaries and other overhead expenditures such as office expenses predominate over other expenses. Furthermore, services for the current year are generally fixed at or above the previous year's level. For example, if a certain number of condoms were distributed the prior year, the same or a greater amount of condoms need to be distributed in the current year. Thus, current expenditures are determined by past allocation patterns because of recurrent costs that carry through each year as well as previous levels of programs.

#### 7. Other considerations (political, legal, ethical) play an important role in determining overall resource allocation patterns.

Many factors in addition to cost-effectiveness play a role in resource allocation decisions. These include political considerations, as various interest groups become more vocal in protesting the status quo; legal considerations, as in the constitutional right to universal health care that exists in certain countries; and ethical considerations, as in the moral right to health care for a person living with HIV/AIDS.

### Tools for Resource Allocation

In the past two years new tools have become available to assist with resource allocation within HIV/AIDS programs. These tools assist planners to understand the relationship between funding of program elements and coverage or impact. The methodology used to develop the UNGASS estimates is now available in an Excel spreadsheet for use at the national level.<sup>9</sup> This model can be used to determine the amount of funding required to cover the population in need of various services, such as condoms, voluntary counseling and testing, and HAART. The spreadsheet uses local information on the demographic, economic, social, and epidemiological context to estimate the need for services. These estimates are combined with the unit costs of providing the service to determine the funding required, by activity, to meet the existing needs.

A computer model called *Goals* uses a similar approach to calculate the coverage that can be achieved by different levels of expenditures, but extends these calculations to determine the effects on behavior change and HIV prevalence, the number of infections averted, and years of

<sup>8</sup> K. Attawell and H. Grosskurth. *From knowledge to practice: STD control and HIV prevention*. Luxembourg: European Communities, 1999.

<sup>9</sup> The UNGASS spreadsheet has been developed by The Futures Group International and the Instituto Nacional de Salud Publica. Requests for copies can be sent to the authors at [j.stover@tfgi.com](mailto:j.stover@tfgi.com).

life saved.<sup>10</sup> This model allows programs to determine the most cost-effective approaches to achieving prevention and care goals.

## Conclusion

Resource allocation within HIV/AIDS programs is complex because programs strive to achieve multiple goals: preventing new HIV infections, providing care and treatment for those infected with HIV, mitigating the social and economic consequences of the epidemic, protecting human rights, stimulating a supportive environment, and so forth. These multiple goals cannot easily be reduced to a single concept, such as disability-adjusted life years (DALYs), that would allow cost-effectiveness analysis to determine “optimal” allocations, because the impact of certain activities such as protecting human rights cannot be measured in cost-effectiveness terms. Instead, resource allo-

cation will remain a complex process involving multiple stakeholders and multiple goals. However, the current process can be improved. New computer tools for estimating the funding required to meet existing needs and prevent new infections can help provide better evidence for the budgeting process. New mechanisms for involving all stakeholders in priority-setting decisions, such as the Country Coordinating Mechanism required for application to the Global Fund, can improve the process by expanding participation in these debates. As more resources become available through the Global Fund, low-income nations will be less reliant on donor choices about program priorities. They will face increased opportunity and increased responsibility to allocate available resources wisely.

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<sup>10</sup> J. Stover, L. Bollinger, K. Cooper-Arnold. *The Goals Model for Estimating the Effects of Resource Allocation Decisions on the Achievement of the Goals of the HIV/AIDS Strategic Plan*. Glastonbury, CT: The Futures Group International. December 2001.

## Biography of Authors

John Stover is Vice President of The Futures Group International. His work focuses on advocacy, policy formulation, projections, strategic planning, costing, and evaluation in the areas of HIV/AIDS, family planning, and reproductive health.

Lori Bollinger, PhD, is a senior health economist at The Futures Group International. She has collaborated in developing various models to assist in making cost-effectiveness decisions regarding HIV/AIDS resources, including Goals, PMTCT, and HAART. She has also collaborated with local consultants to perform and write analyses of the socioeconomic impact of HIV/AIDS in various countries, including making epidemiological and socioeconomic projections. Dr. Bollinger moderated the online discussion, “Economic Impact of HIV/AIDS” on the International AIDS Economic Network. Dr. Bollinger received her PhD in Economics from the University of Pennsylvania.



# Chapter 9: Cost-effectiveness and Economic Evaluation of HIV/AIDS-Related Interventions: The State of the Art

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## Introduction

“The culture of international public health discourse and infectious disease can be characterized in part by the reigning logic of cost-effectiveness” (*Henry and Farmer, 1999*).

Within the context of scarce resources, it is critical that resources for HIV/AIDS have the maximum possible impact in responding to the epidemic. A key question is what type of intervention or interventions to undertake where and when. Economic evaluation is a tool derived from the principles of welfare economics to help decision makers make the best of limited resources. It plays a part in determining how economic resources should be combined and allocated, when for some reason the market cannot or is not allowed to operate. For more than 30 years, cost-effectiveness analysis (CEA) has been used to evaluate interventions within the health sector. CEA attempts to consider both the epidemiological impact of interventions as well as the resources required to implement these interventions.

Economic evaluations use economic theory to develop a systematic framework by which to assess the relative costs and consequences of different interventions. In practice, this framework can be applied to a whole range of questions such as: whether a new drug be used for a particular treatment, whether free standing or mobile clinics the best way to deliver a particular service or whether priority should be placed on some types of prevention activities relative to others. The advantage of such a framework is that it allows clear identification of the relevant alternatives and makes the viewpoint (e.g., whose perspective—the provider? the con-

sumer? society as a whole?) more explicit. The basic task of any economic evaluation is to identify, measure, value, and compare the costs and consequences of alternatives being considered (Drummond et al., 1997). The result of an economic evaluation is a ratio of numbers representing the cost per outcome of a particular alternative. More importantly it gives an idea of the relative magnitude of cost per outcome of the alternatives (e.g., is the difference really hundreds of dollars or a few cents?). Economic evaluation makes the comparison between alternatives explicit and transparent, and as such, facilitates priority-setting and hence, resource allocation.

CEA was spearheaded onto the international public health agenda by the publication of the World Bank's 1993 World Development Report (WDR), and its background studies (World Bank, 1993; Jamison et al., 1993). This was the first work that attempted comparisons both internationally (involving two or more countries) and globally (broader worldwide comparisons, by low and middle-income country categorization). The work is now being refined by the World Health Organization (WHO). The influence of CEA in health policy debates has arisen for a number of reasons. While priority-setting and planning have been emphasized in the health sectors since the 1960s, the greater prominence of CEA reflects the broader trend of evidence-based planning and priority-setting in the context of health sector reform. In addition, the emergence of the World Bank, an institution dominated by economists, as the largest external donor to the health sector has led to a greater emphasis on economic approaches to priority-setting for low- and middle-income countries.

Many of the recent publications dealing with CEA in low-and middle-income countries now attempt to present results in terms of disability adjusted life years (DALYs) (Gilson et al., 1997; Sweat et al., 2000; Creese et al., 2002). In addition to the World Bank, other donor organizations are trying to integrate the use of these CEA concepts in their planning processes. For example, CEA is becoming part of the project approval process, with economic and financial project appraisals providing information on the cost per DALY gained by the project.

While there is clearly a growing demand for CEA, it is in the face of limited availability of data for low-and middle-income countries. Accordingly, there have been attempts to generalize the results of specific studies to other settings (Kumaranayake and Walker 2002). Following the re-organization of the WHO in 1998, a new program “Choosing Interventions: Costs, Effectiveness, Quality and Ethics” (EQC) was established as part of the Global Program on Evidence for Health Policy. EQC aims to collaborate with international organizations to provide international guidelines for CEA intended to provide a more standardized evidence-base, and address some of the concerns surrounding the WDR methodology (Murray et al., 2000). There is ongoing work by WHO to collect CEA data for over 100 interventions, including those related to HIV/AIDS.

## Summary of the Literature

What is the evidence-base related to the cost-effectiveness of HIV/AIDS interventions? Two recent reviews consider existing studies related to CEA of HIV/AIDS interventions. Creese and others (2002) reviewed more than 60 studies of prevention, care, and treatment in Sub-Saharan Africa. Of these studies only 24 studies qualified for inclusion in the comparative analysis. Inclusion criteria included:

- containing data for Africa,
- measuring both cost and effectiveness,

- appearing to use standard practice methods for estimating costs and outcomes,
- appearing to include all major cost items, and
- allowing a generic measure of outcome (either HIV infections prevented or DALYs gained) to be calculated.

Results showed that the cost per HIV infection prevented varied widely. Costs for condom distribution ranged from \$11 to more than \$2,000, while blood safety measures ranged from under \$20 to about \$1,000. The cost per HIV case prevented of diagnosing and treating other sexually transmitted diseases (STDs) averaged a little more than \$270, and the cost of voluntary counseling and testing (VCT) averaged between \$400 and \$500. The costs of interventions to prevent vertical HIV transmission varied the most, with prices for a single dose of nevirapine ranging from \$20 to \$341 and breastfeeding and formula interventions ranging in cost from \$4,000 to more than \$20,000 per HIV infection prevented.

Cost per DALY gained by interventions also varied, although not as widely. The cost for combined STD treatment and condom distribution was about \$1 compared to “well over \$1,000” for highly active antiretroviral therapy (HAART) for adults (drugs only). Single-dose nevirapine and blood safety measures cost about \$10 per DALY gained, while the cost of tuberculosis treatment ranged from \$10 per DALY gained to \$68 per DALY gained if in-patient care was involved. Home-based care also ranged from about \$100 to \$1,000 per DALY gained.

A key limitation of the review by Creese and others was the lack of studies for comparison. For five interventions, only one study was found, while no intervention was analyzed in more than four studies. In addition, in no one country were all interventions studied. Table 1 reviews the type of intervention, countries, and CEA results from their analysis. Results were drawn from 11 countries only.

Walker and Kumaranayake (2002) reviewed the published literature for cost and cost-effectiveness of prevention activities for all developing countries. They found 38 studies of which 23 were from Sub-Saharan African countries, five from Asian countries, three from Eastern European countries and seven studies presenting results for developing countries as a whole. No studies were found for Latin America. The review also considered a broader range of interventions relative to Creese and Parker, including mass media, interventions related to schools and youth, interventions working with injecting drug users, vaccines and potential microbicides. Similar to Creese et al. (2002), the majority of studies were focused on the costs and cost-effectiveness of preventing mother-to-child transmission (10 studies), eight studies focused on VCT, eight studies focused on

strengthening blood safety systems, and five studies examined the cost-effectiveness of treating symptomatic STDs. There was limited or no evidence for a number of prevention strategies such as mass media, working with schools and youth, working with injecting drug users, and interventions working with men who have sex with men.

Both reviews pointed out problems related to the transparency and quality of the costing and cost-effectiveness methods used in the literature. Despite the limited evidence-base, Creese et al. (2002) conclude that there is a strong economic case for giving priority to preventive interventions, as well as tuberculosis treatment.

Table 1. HIV/AIDS Intervention Groups, Individual Interventions and Standardized Cost-Effectiveness Results, 2000, US\$

Intervention groups (numbered) And individual interventions	Place and year of publication (Reference)	Cost per HIV infection prevented	Cost per DALY gained*
<b>PREVENTION</b>			
<b>1. Condom distribution</b> Condom distribution plus STD treatment for commercial sex workers <sup>1</sup> Female condoms: targeted to commercial sex workers targeted to high-risk women targeted to medium-risk women	Sub-Saharan Africa (Moses et al., 1991)  Kenya (Homan et al., 1999)	11-17  275 1,066 2,188	1  12 48 99
<b>2. Blood safety</b> Hospital-based screening  Strengthening blood transfusion services through: Defer high risk donors Test and defer high-risk donors <sup>2</sup> Rapid test  Improved transfusion safety with outreach <sup>3</sup>  Improved blood collection & transfusion	Tanzania (Jacobs and Mercer, 1999) Zambia (Buve and Foster, 1995)  Zimbabwe (McFarland et al., 1995) Zimbabwe, 1995 (24) Zimbabwe, 1995 (24)  Zambia (Watts et al., 2000)  Tanzania (Jacobs and Mercer, 1999)	18 107  18-107 48-74 62  208-256  950	1 5  1-5 2-3 3  10-12  43
<b>3. Peer education for commercial sex workers</b> <sup>4</sup>	Cameroon (Kumaranayake et al., 1998)	79-160	4-7
<b>4. Prevention of mother to child transmission</b> Single dose nevirapine – targeted  Single-dose nevirapine <sup>5</sup> – universal  ZDV Petra regimen  ZDV CDC regimen <sup>6</sup>  Formula recommendation Breast feeding 3 months Formula provision Breast feeding 6 months	Sub-Saharan Africa (Stringer et al., 2000) Uganda (Marseille et al., 1999)  Uganda (Marseille et al., 1999) Sub-Saharan Africa (Stringer et al., 2000)  S. Africa (Soderlund et al., 1999)  S. Africa (Wilkinson et al., 2000) S. Africa (Soderlund et al., 1999)  S. Africa (Soderlund et al., 1999)	20-341 308  143 268  268  949-2,198 2,356  3,834 5,006 6,355 21,355	1-12 10  5 9  9  33-75 81  131 171 218 731
<b>5. Diagnosis and treatment of STDs</b>	Tanzania (Gilson et al 1997)	271	12
<b>6. Voluntary counseling and testing</b> <sup>7</sup>	Kenya and Tanzania (Sweat et al., 2000)	393-482	18-22

<b>TREATMENT AND CARE</b>			
7. Short-course tuberculosis treatment for new sputum-smear positive pulmonary patients <sup>8</sup> Ambulatory care  IUATLD model (involves 2 months Hospitalization at treatment outset followed by monthly visits to a health clinic to collect drugs)  Community-based DOT	Malawi, Mozambique, Tanzania, (Murray et al., 1991)	N.A.	2-3
	Uganda (Saunderson, 1995)	N.A.	2-4
	South Africa, (Floyd et al, 1997)	N.A.	8-16
	Uganda (Saunderson, 1995)	N.A.	3-4
	Malawi, Mozambique, Tanzania, (Murray et al., 1991)	N.A.	4-8
Community-based DOT	South Africa (Floyd et al, 1997)	N.A.	34-68
	South Africa (Floyd et al, 1997)	N.A.	14-21
8. Cotrimoxazole prophylaxis for HIV+ tuberculosis patients <sup>9</sup>	Hypothetical low income country, sub-Saharan Africa (Guinness, undated)	N.A.	6
9. Home-based care Community-based program  Health facility based program <sup>10</sup>	Tanzania (Msobi and Musumi, 2000)	N.A.	77
	Zambia (Chela et al., 1994)	N.A.	99
	Zambia (Chela et al., 1994)	N.A.	681
	Tanzania (Msobi and Musumi, 2000)	N.A.	786
10. Preventive therapy for tuberculosis Isoniazid for 6 months Rifampicin plus pyrazinamide, 2 months Isoniazid plus rifampicin, 3 months	Zimbabwe (Hanson et al., 1998 )	N.A.	469-1230
	Uganda (Bell et al., 1999)	N.A.	169
		N.A.	282
11. Antiretroviral therapy for adults Laboratory and drug costs  Drug costs	Uganda (Bell et al., 1999)	N.A.	288
	Senegal and Côte D'Ivoire, (Creese et al 2002)	N.A.	1,100
	South Africa (Wood et al 2000)	N.A.	1.800 <sup>11</sup>

Source: adapted from Creese et al. (2002).

Notes: Ranges reflect:

<sup>1</sup> Sensitivity analysis for variation in condom use, HIV transmission and efficacy.

<sup>2</sup> Sensitivity analysis undertaken within the study to explore the changes in HIV prevalence, STD incidence and prevalence of STD history.

<sup>3</sup> Sensitivity analysis carried out to explore the changes of adding outreach services to identify donors and varying HIV prevalence in the donor and recipient populations.

<sup>4</sup> Sensitivity analysis undertaken within the study to explore the changes in coverage, HIV prevalence, condom use and transmission probabilities.

<sup>5</sup> Ranges show results of analysis undertaken to explore all plausible scenarios of costs and effects including targeted versus universal coverage.

<sup>6</sup> Analysis was undertaken for each province and cost-effectiveness varied among provinces, principally due to variation in HIV prevalence (which affects the costs per pregnant women identified to be eligible for the intervention). The difference in the cost-effectiveness ratios for universal and targeted coverage were also explored.

<sup>7</sup> Study undertaken in 2 countries.

<sup>8</sup> Range in possible HIV prevalence among tuberculosis patients, range in plausible cure rates, and that some studies were done in more than one setting.

<sup>9</sup> Plausible variation in mortality, morbidity, drug resistance, wastage and cost.

<sup>10</sup> Variation in cost-effectiveness between rural and urban areas.

<sup>11</sup> Cost per life year gained, not DALY, used. Reported value of \$15,000 (based on annual drugs cost of \$2,900) recalculated using drugs costs in Bell et al., 1999.

## Challenges of Economic Evaluation as Applied to HIV/AIDS

The limited-evidence base related to HIV/AIDS interventions reflects a number of challenges. First, with respect to prevention activities, the primary impact measure is the number of HIV infections prevented. However, this is difficult to measure, as an infection averted by an intervention will also result in a chain of further or secondary infections averted among their sexual partners. Thus, if one only considers the interventions to prevent HIV infection. (Grosskurth et al., 1995; Gilson et al., 1997; The Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000; and Sweat et al., 2000).

The direct measure or 'gold-standard' for quantifying impact is a randomized controlled trial (RCT). Here impact is measured by dividing communities into two groups: a control group and an intervention group. The project is implemented in the intervention group, and both communities are followed up in order to estimate the impact of the intervention. However, RCTs are time-consuming, expensive, and difficult to implement and so far have only been conducted in a limited number of settings to assess interventions to prevent HIV infection. (Grosskurth et al., 1995; Gilson et al., 1997; The Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000; and Sweat et al., 2000).

Thus, estimates of the potential impact of different interventions are difficult to make. Because of the dynamic nature of infectious disease transmission, calculating the full impact of the intervention requires that both the infections averted among people having direct contact with the intervention, as well as the secondary infections averted because the chain of transmission has been broken, must be considered. Mathematical epidemiological models that simulate patterns of HIV transmission over time are increasingly being used to estimate the impact of different forms of intervention, and the potential impact of new forms of HIV prevention technology (for example, van Vliet et al.,

1998; McLean and Blower, 1993; Perrucci, 1992; Garnett and Anderson, 1994; Korenromp et al., 2000; Vickerman and Watts, 2002).

A second challenge relates to the comparison of prevention and care/treatment interventions. The nature of the outcomes may be quite different (e.g., HIV infections averted versus cost per patient treated). In theory, the use of a common measure such as a DALY would allow a comparison. For care and treatment-related studies, this requires knowledge about what the effect of the care and treatment activities will be in terms of reducing the onset and duration of illness. Again, this requires knowledge of the natural history of the illness and what would happen in the absence of care and treatment. Again, the RCT approach would be the gold-standard approach, but has rarely been implemented in the context of evaluating HIV/AIDS care and treatment-related interventions.

A third challenge for HIV/AIDS interventions and their evaluation, is the importance of the context and prevalence in which the intervention is implemented. Questions now arise about whether the effectiveness and cost-effectiveness of interventions may change as the prevalence rises. An intervention's impact will also vary across settings, by the stage of the epidemic, intensity of implementation, and synergy with other ongoing prevention activities. Consequently, the cost-effectiveness of an intervention will itself vary by the stage of an epidemic. The question of how effectiveness may change became more prominent in light of the failure of the Rakai mass STD treatment trial in Uganda (Wawer et al., 1999). The results suggest that at later stages of the epidemic STD management may have less impact as one tries to expand in higher prevalence settings (Kumaranayake and Watts, 2001). This has been one of the explanations for the contrast between the success of the Mwanza trial, where overall HIV prevalence was four percent in contrast to Rakai where the HIV prevalence was 16 percent (Grosskurth et al., 2000). Computer models suggest that the contribution of STDs to HIV transmission decreases as the epidemic matures since HIV is

now found outside the core or high-risk groups where HIV and STD transmission tend to coincide (Robinson et al., 1997).

Some interventions (particularly focusing on the most vulnerable groups) may be particularly important to implement rapidly in settings where HIV infection is emerging. However, other forms of intervention (such as youth-focused interventions) may become increasingly important in settings where the epidemic is generalized. The mix of interventions will need to change over the course of the epidemic, with priorities for intervention shifting between population sub-groups, and from more targeted to broader population-focused interventions, as the patterns of HIV incidence change over time (Kumaranayake and Watts, 2000).

## Areas for Future Work

Clearly, given the limited evidence base, two key priorities are to expand our knowledge of HIV/AIDS cost-effectiveness and the factors that influence them and to use the existing evidence base to guide decision making. Care must be used when extrapolating from the existing evidence base, where data is largely drawn from high prevalence sub-Saharan settings, often from pilot or small-scale interventions. A key question is the ability to generalize or transfer current results of CEA between settings. There are a range of technical issues regarding the way that the cost-effectiveness ratios are converted for comparability (e.g., exchange/purchasing power, time units, average rather than marginal approaches), in addition to broader issues of interpretation and use of CEA across different settings. First, factors such as the unit costs or prices of resources, prevalence, incidence and natural history of many diseases, and practices used in one setting may not be directly relevant from more regional scenarios to local national settings (Bryan and Brown, 1998). Second, CEA studies that have been generated in the context of trial or pilot settings, which are highly monitored and supervised, may have a limited degree of generalizability. The experience of moving from trial to actual program settings has

been that “many cost-effective interventions achieve less than their predicted effectiveness because of the limitations imposed by failures of systems or the behavior of people” (Janovsky and Cassels, 1996).

For example, what is clear from the recent mother-to-child transmission (MTCT) implementation is that while an intervention can be very successful in trial conditions and highly cost-effective, the cost-effectiveness can be substantially worse in real-life implementation. A key issue has been the acceptability of VCT and people’s willingness to be tested and then return for their results. In Côte d’Ivoire, only 17.5 percent of the HIV positive women who were initially identified took part in a MTCT intervention trial—some did not agree to test, others did not return for results, and more than 40 percent refuse to enroll in the MTCT program, despite being HIV positive and pregnant (Wiktor et al., 1999). A second issue is that in most trial contexts, investments have been made in shoring up basic infrastructure and this has been critical in achieving results. The success of the Mwanza STD trial was also attributable to a degree of strengthening the health system and case management for STDs, whereas in Rakai, the study found high levels of infection and re-infection between rounds of treatment, and they were limited to existing health services for treatment of new infection and re-infections (Grosskurth et al., 2000).

In terms of generating new knowledge, particularly important is the consideration of both geographical areas and interventions that to date have limited information. Thus, evaluating the cost-effectiveness of prevention activities in Latin America, Asia and Eastern Europe is a priority. There are a number of prevention interventions that need further assessment. In particular, HIV prevention interventions working with schools and youth are a priority, as well as integrated initiatives and understanding the role of mass media. There is still limited data on the cost-effectiveness of interventions working with injecting drug users, and no studies

related to interventions working with men who have sex with men.

Another priority area relates to the entire area of care of opportunistic illnesses and antiretroviral (ARV) treatment, such as HAART. While home-based care and tuberculosis treatment was included in the review, the entire area of cost-effectiveness of a package of HIV/AIDS care (both inpatient and outpatient) needs to be systematically reviewed. Given the political debate and growing imperative to provide ARV drugs, there is urgency in really understanding the costs and effectiveness of implementing such programs within low-resource settings. The ARV studies presented in the review by Creese and others only focused on drugs and laboratory costs, but there is a broader question regarding the infrastructure that is also required. To date, there is only one CEA study (Freedberg et al., 2001) that compares the cost-effectiveness of HAART to a no-HAART scenario, and this

was undertaken in an American setting. An assessment of the Brazilian ARV program, found that the occurrence of HIV-related opportunistic illness declined 60-80 percent with a four-fold reduction in hospitalization rates. It is estimated that the ARV program results in an overall cost savings of more than US \$670 million over a 3-year period to the Brazilian government (Teixeria et al., 2001). These factors were not taken into account in the results presented in the review by Creese and others. Whether these results are generalizable to low-income, high-prevalence settings remains to be seen.

The methods of economic evaluation and CEA for HIV/AIDS have been rapidly evolving over the past 15 years—the key priority is now to apply these methods in a range of countries and a range of interventions in order to increase the body of knowledge available to policymakers.



## Recommended Reading

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## Biography of Author

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# Chapter 10: Randomized Trials of HIV Prevention Interventions in Developing Countries

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## Introduction

Substantial amounts of funding are invested annually in HIV prevention efforts. Annual HIV prevention expenditures in the United States are estimated at a little less than one billion dollars [1]. In developing countries, several countries spend well over US\$ 25 million on HIV prevention annually [2, 3]. However, the rates of people living with HIV/AIDS worldwide continue to rise each day in the face of these large investments [4].

The annual increases in the number of people living with HIV/AIDS might suggest that investments in HIV prevention worldwide should be substantially increased. Several recent studies have made this argument [5, 6]. Yet this argument only holds if there is convincing evidence that current HIV prevention interventions are effective.

Over the past 15 years, there has been only limited evidence of effectiveness of HIV prevention interventions, particularly in developing countries, where over 95 percent of people currently living with HIV/AIDS live [4]. Although some gains in terms of changing individual behavior have been made, there has been only limited evidence of a substantial impact of these interventions on the epidemic.

It is also true that important questions remain unanswered in HIV prevention research. In general, little is known about HIV prevention among people living with HIV/AIDS and even less in developing country settings [7, 8]. Simi-

larly, no studies have been conducted on what some HIV prevention experts have termed the “combination approach to HIV prevention,” which incorporates a range of interventions acting on all levels of society within a geographic area [8]. And though some research has been done on these groups in high-income countries, there has been very little evaluative research on HIV prevention interventions targeting men who have sex with men (MSM), injecting drug users (IDU), and youth in developing countries [9].

We are currently at a critical point in the response to HIV/AIDS, with renewed attention directed toward preventing the spread of the epidemic. Several foundations, such as the Bill and Melinda Gates Foundation, have recently dedicated large amounts of their resources to HIV/AIDS prevention. The Global Fund to Fight AIDS, Tuberculosis, and Malaria has also recently made a substantial pot of money available for HIV/AIDS prevention and care programs.

Along with this renewed investment in HIV/AIDS prevention programs, however, there is a clear emphasis on *impact*. Given that there is not sufficient funding to try all possible prevention techniques, funders want to know what works best in tackling the AIDS epidemic, and they often want to know what the societal return is on their monetary investment. Similarly, policymakers need more information on national HIV prevention strategies and the packages or bundles of prevention interventions to be implemented. They need information about

the costs and the benefits of implementing these interventions. These can and should be developed based on currently available HIV prevention research findings.

Through carefully controlled studies, there exists a unique opportunity to assess effectiveness, and subsequently to prevent the spread of the epidemic into areas where it is still nascent. Unfortunately, there has been some strong resistance to carefully controlled evaluation for several reasons. Some researchers have the perception that pre- and post- evaluation measurements are sufficient to measure impact, although this method is nowhere near as powerful as a randomized design. There is also resistance due to the ethical concerns of “treating” one randomly selected group while comparing them against a “control” group. In addition to these levels of resistance, there is also concern about excessive costs, and often a lack of sufficiently trained researchers to design and implement this type of randomized study. All of the randomized trials of HIV prevention interventions to date have been controlled trials as opposed to intervention evaluations with experimental designs.

Large-scale interventions offer an incredible opportunity to conduct carefully controlled, randomized intervention studies because the costs of the evaluation are incremental compared with the costs of the intervention itself. The evaluation of the Frontiers Prevention Program (FPP), funded by the Bill and Melinda Gates Foundation and implemented by the International HIV/AIDS Alliance, provides an opportunity to look at some of the current gaps in HIV prevention research. The FPP aims to reduce HIV infections in four relatively low-prevalence countries (Cambodia, Ecuador, India, and Madagascar) through comprehensive community-based HIV prevention interventions focused on key populations critical to the dynamics of the epidemic. The evaluation of the FPP will consist of a randomized trial of these interventions.

This chapter reviews the community-level randomized trials of HIV prevention interventions

in developing countries that have been conducted to date. It discusses the gaps in current HIV prevention research in these countries. And finally, it provides an overview of the evaluation of the Frontiers Prevention Project and highlights the key gaps in HIV prevention research that this evaluation can help to fill.

## **HIV/AIDS Prevention Efforts**

There is evidence that selected HIV prevention interventions can and have been effective [8, 9]. Targeted condom promotion interventions have increased condom use among diverse populations [10, 11]. Access to sterile needles and syringes has resulted in decreased risk behavior among IDUs [12, 13]. Voluntary counseling and testing (VCT) interventions have resulted in decreased risk behaviors among HIV-positive participants and their partners [14, 15]. HIV prevention interventions including community involvement have led to decreased risk behavior as well as decreased incidence of sexually transmitted infections (STI) and HIV [16-20]. Transmission of HIV from mother to child can be prevented with the administration of antiretrovirals to mothers and their children [21-23]. Though studies to date have produced contradictory results, STI treatment can also be highly effective in reducing HIV transmission [24-26].

In addition, HIV seroprevalence rates were controlled or lowered in Senegal, Thailand, and Uganda, where they would otherwise have been expected to increase. It seems evident that these outcomes are the result of the HIV prevention efforts [27]. However, though all three countries have implemented nationally coordinated multisectoral strategies to prevent the spread of the HIV epidemic, a clear link between decreasing or stabilized national HIV seroprevalence rates and individual or combinations of HIV prevention interventions has not been demonstrated.

## Randomized Trials of HIV Prevention Interventions in Developing Countries: An Overview

Though there is lack of consensus on whether randomized trials are the only design that can produce real measures of efficacy of HIV prevention interventions [8], these trials provide the strongest measure of efficacy of interventions. Thus, this section focuses on the community-based randomized trials of HIV prevention interventions conducted in low- and middle-income countries. Several more comprehensive reviews of HIV prevention research have been undertaken [8, 9, 28, 29] with a number of overviews focusing specifically on the evaluation of HIV prevention interventions in developing countries [9, 29].

In a review of journal articles available before May 15, 2002, nine evaluations using the randomized trial design were identified (See Table 1 in Annex). These included evaluations of a condom promotion program in Thailand [30, 31]; evaluations of school-based HIV education programs in Brazil, the Philippines, Tanzania, and Namibia [31-34]; an evaluation of HIV counseling and testing interventions in Kenya, Tanzania, and Trinidad and Tobago [15]; evaluations of STI prevention and treatment interventions in Mwanza, Tanzania, Rakai, Uganda and Masaka, Uganda [24-26]. This review did not include randomized trials conducted to assess the transmission of HIV between mother and child, microbicides, or vaccines.

### Condom promotion

The randomized controlled trial in Thailand examined the additional protection against STI provided to sex workers by giving them the option of using the female condom when clients refused to use a male condom [30]. Brothels in four cities in Thailand were randomized into two study groups. In one group, sex workers were instructed to use male condoms consistently, and in the other, sex workers had the

option of using the female condom if clients refused or were not able to use male condoms. The proportion of unprotected sexual acts—defined as sexual acts in which condoms were not used, tore, or slipped in or out—were then measured over a 24-week period. Condom use was high in both groups (97.9 percent in the control group and 97.3 percent in the intervention group). Male condom use was lower in the intervention group (88.2 percent and 97.5 percent, respectively), although this reduction in male condom use was counterbalanced by the use of female condoms in 12 percent of all sexual acts.

### School-based HIV education programs

The trial in Sao Paulo, Brazil evaluated a series of four HIV prevention workshops for students aged 18-25 years attending night, public, junior, and high schools in the inner city of Sao Paulo [31]. Students were randomized into intervention and control groups. The students attended four three-hour sessions during which they discussed HIV/AIDS, its impact on their lives, risk perception, and condom use negotiation. Only girls reported statistically significant changes in behavior including improved communication with partners about sex and less unprotected sex with non-monogamous partners.

Students in public high schools in a semi-urban district of Metro Manila, the Philippines were randomized. In the intervention group, teachers provided students with HIV/AIDS prevention information as well as information on how to reduce their risk behavior and information dispelling misconceptions about people living with HIV/AIDS. After implementation of the intervention, the intervention group had decreased stigma toward people living with HIV/AIDS. There was no statistically significant overall effect on intended preventive behavior.

In Tanzania, public primary schools were stratified according to location and randomly assigned to intervention and control groups. The sixth-graders in the intervention schools received 20 hours of lessons on how to protect

themselves from HIV infection, along with encouragement to communicate openly about AIDS and to delay sexual activity until they were older [33]. After 12 months, the youths demonstrated a significant increase in their AIDS-related knowledge level and reported significantly more positive attitudes toward people with AIDS than did the pupils from comparison schools. A positive but nonsignificant trend was seen for attitudes toward having sexual intercourse and for initiation of sexual intercourse during the previous year (seven percent vs. 17 percent).

In a trial in Namibia, 515 secondary school students in two districts in Namibia were randomly assigned to intervention and control groups [34]. The youths in the intervention group underwent 14 face-to-face sessions emphasizing abstinence and safer sexual practices. In this trial, there were no significant differences reported in overall rates of abstinence or sex with a condom between the intervention and control groups. However, among the subset that was sexually inexperienced at baseline, students who received the intervention were significantly more likely to remain sexually inexperienced one year later. In addition, in the immediate post-intervention period, among baseline virgins who subsequently initiated sex, intervention youth were significantly more likely than control youth to use a condom.

### **Voluntary counseling and testing**

In the voluntary counseling and testing randomized controlled trial conducted in Nairobi, Kenya, Dar es Salaam, Tanzania and Port of Spain, Trinidad, 3,120 individuals and 586 couples were randomly assigned to two groups receiving either VCT or basic health information, which included a videotaped presentation with culturally appropriate information on HIV prevention [15]. The proportion of individuals reporting unprotected intercourse with nonprimary partners declined significantly for those receiving VCT than those receiving health (men, 35 percent reduction with VCT vs. 13 percent reduction with health information and

women, 39 percent reduction with VCT vs. 17 percent reduction with health information).

### **STI prevention and treatment**

Two randomized controlled trials evaluated different approaches to STI treatment. The first evaluated the impact of improved STI case management at the primary health care level on the incidence of HIV infection in Mwanza, a region of northwestern Tanzania [24]. HIV incidence was compared in six intervention communities and six pair-matched comparison communities. The intervention consisted of the establishment of an STI reference clinic, staff training, regular supply of drugs, regular supervisory visits to health facilities, and health education about STIs. A random cohort of about 1,000 adults from each community were surveyed. HIV incidence in intervention villages declined by 42 percent after two years. No change in reported sexual behavior was observed in either group. It was therefore concluded that improved STI treatment reduced HIV incidence.

In Rakai, Uganda, the efficacy of an intensive STI-control program via home-based mass antibiotic treatment was evaluated [25]. Ten community clusters were randomly assigned to intervention and control groups. All participating residents were visited in their home every 10 months. During these visits, they were interviewed, asked to provide biological samples for assessment of HIV and other STI infection, and they were provided with mass treatment. The prevalence of syphilis and trichomoniasis was significantly lower in the intervention group as compared with the control group. However, the study did not observe any effect of the STI intervention on the incidence of HIV infection. The incidence of HIV infection was 1.5 per 100 person-years in both the intervention and control groups.

Finally, in 1994, a randomized controlled trial of the efficacy of two interventions to control the spread of HIV began in Masaka, a rural area of southwestern Uganda [26]. The target population for the trial was 176,000 adults living in

18 parishes [35]. These were randomly assigned to three groups, and condom promotion and HIV testing and counseling were carried out in all three groups. People living in parishes in group A received information, education, and communication (IEC) activities aimed to increase public awareness with respect to STIs and AIDS. People living in parishes in group B received the same IEC interventions with improved treatment of STIs. Group C consisted of comparison parishes where community development activities, unrelated to HIV was provided. The effectiveness of the interventions was measured by the rates of HIV-1 seroincidence in the study parishes. The study was recently concluded and the results are not yet published.

## **HIV Prevention Research in Developing Countries: Existing Gaps and the FPP Evaluation**

As mentioned above, gaps in HIV/AIDS prevention research in developing countries and globally persist in three major areas.

First, though there have been a significant number of randomized controlled trials on HIV prevention interventions targeting MSM in high-income countries [16, 18, 36-38], there have not been any rigorous evaluations of these interventions in developing countries. There is a similar trend for HIV prevention interventions targeting youth. While only four evaluations were identified in developing countries, Jemmott and colleagues identified 13 randomized controlled trials evaluating adolescent prevention interventions in the United States alone [39]. Finally, in the case of interventions targeting IDUs, there have been no studies in developing countries and only one randomized trial in high-income countries was identified [40].

Second, there are also gaps globally in HIV prevention among people living with HIV/AIDS. Two randomized studies conducted to measure the long-term effectiveness of HIV prevention interventions targeting HIV-positive people in

the U.S. found that risk behavior decreased significantly following these behavioral interventions [41, 42]. However, though HIV prevention among people living with HIV/AIDS is accepted as conventional wisdom among HIV prevention experts, research in this area is limited.

And finally, there has never been a rigorous evaluation of an entire package of HIV prevention activities incorporating a range of biomedical, behavioral, and social interventions targeting a variety of groups in a community [8].

The evaluation of the Frontiers Prevention Project (FPP) provides an opportunity to look at several of these critical issues. The FPP aims to reduce HIV infections in relatively low-prevalence countries through comprehensive community-based HIV prevention interventions focused on key populations critical to the dynamics of the epidemic and will operate in several geographic sites in Cambodia, Ecuador, India (Andhra Pradesh), and Madagascar. The central hypothesis of the FPP intervention design is that focused participatory interventions with key populations in a low prevalence environment will not only reduce HIV transmission in key populations, but will also slow the spread of HIV more widely in the general population within the geographic sites.

Key populations have been defined as sex workers, people living with HIV/AIDS (PLWHA), sex work clients; people seeking treatment for STIs; MSM, and IDUs. Within each of the selected geographic sites, the FPP will focus the large majority of its resources on HIV prevention interventions with and for key populations. This comprehensive package will include key population community mobilization and demand creation, and supply of prevention services and commodities. The FPP intervention design also recognizes that key populations are part of and influenced by the broader community within which they live. As such, additional interventions within each site will endeavor to promote a favorable environment in the surrounding community.



The evaluation of the FPP will consist of a randomized trial to assess the impact of these interventions on (1) knowledge, attitudes, and norms; (2) behavior change; and (3) STI prevalence of key populations and in the general population. Fifteen intervention and control geographic sites will be selected in Andhra Pradesh, Ecuador, and Madagascar. Sample sizes of key populations and the general population will be based on the best available data on the prevalence of biological and behavioral outcomes relevant to the country; the expected change in response due to the intervention by risk group; estimated variation among persons, sites, and households; and expected response rates.

This study will therefore provide information on the effectiveness of HIV prevention interventions targeting three groups on which little information is available especially from developing countries: PLWHA, MSM, and IDUs. In addition, the FPP evaluation will also assess the impact of an entire package of HIV prevention interventions a variety of populations groups in a community.

## Conclusion

Substantial amounts of funding are invested annually in HIV prevention efforts and with renewed investment directed toward preventing the spread of the epidemic; these funds are likely to increase. However, increasingly funders want to know the return on their investment. At the same time, to strengthen responses to the epidemic, policymakers need more information on national HIV prevention strategies and the packages or bundles of prevention interventions to be implemented. They need information about the costs and the benefits of implementing these interventions.

There has been limited evidence of effectiveness of HIV prevention interventions over the past 15 years, particularly in developing countries where most people living with HIV/AIDS live. Given the scope at which the rates of people living with HIV/AIDS increases each day, it is es-

sential that people involved in HIV prevention have additional information on the effectiveness of HIV prevention interventions, particularly in developing countries, to ensure that increasing funds are invested as efficiently as possible and that additional resources are raised.

There is no question that these trials provide the strongest measure of efficacy of interventions. All of the randomized controlled trials of HIV prevention interventions have been controlled trials, as opposed to intervention evaluations with experimental designs. Large-scale interventions such as the FPP implemented by the International HIV/AIDS Alliance offer an incredible opportunity to conduct carefully controlled, randomized intervention studies because the costs of the evaluation are incremental compared with the costs of the intervention itself. At this point in the epidemic, all large-scale projects should include an evaluation component so that policymakers and funders can identify what types of interventions are the most effective.

## Recommended Reading

Auerbach JD, Coates TJ. "HIV prevention research: accomplishments and challenges for the third decade of AIDS." *Am J Public Health* 2000(90):1029-1032.

Merson MH, Dayton JM, O'Reilly K. "Effectiveness of HIV Prevention Interventions in Developing Countries." *Aids* 2000 (14 Suppl 2):S68-84.

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Table 1. Randomized controlled trials of HIV prevention interventions in developing countries

Reference	Country	Type of intervention	Unit of randomization	Sample size	Major results
[30]	Thailand	Female and male condom promotion	Brothel	34 brothels in control group (249 women) and 37 brothels in intervention group (255 women)	Condom use was high in both groups (97.9 percent in the control group and 97.3% in the intervention group). Male condom use was lower in the intervention group (88.2% and 97.5% respectively), although this reduction of male condom use was counterbalanced by the use of female condoms in 12% of all sexual acts. Reduction in weighted geometric mean incidence rate of STIs in study group compared to control group (2.81 and 3.69 per 100 person-weeks respectively).
[31]	Brazil	HIV/AIDS prevention workshop	Student	394 students	Only women reported statistically significant changes in behavior including improved communication with partners about sex and less unprotected sex with non-monogamous partners
[32]	Philippines	HIV/AIDS prevention workshop	Student	845 students	After implementation of the intervention, the intervention group had decreased stigma towards people living with HIV/AIDS. There was no statistically significant overall effect on intended preventive behavior.
[33]	Tanzania	HIV/AIDS prevention workshop	School	1063 students 12 schools in control group and 6 schools in intervention group	After 12 months, the youths demonstrated a significant increase in their AIDS-related knowledge level and reported significantly more positive attitudes toward people with AIDS than did the pupils from comparison schools. A positive but non-significant trend was seen for attitudes toward having sexual intercourse and for initiation of sexual intercourse during the previous year (7% vs. 17%).
[34]	Namibia	HIV/AIDS prevention workshop	Student	515 students	There were no significant differences reported in overall rates of abstinence or sex with a condom between the intervention and control groups. However, among the subset that was sexually inexperienced at baseline, students who received the intervention were significantly more likely to remain sexually inexperienced one year later (17% vs. 9%). In addition, in the immediate post-intervention period, among baseline virgins who subsequently initiated sex, intervention youth were significantly more likely than control youth to use a condom (18% vs. 10%).
[15]	Kenya, Tanzania, Trinidad and Tobago	VCT	Individuals and couples	3120 individuals and 586 couples	The proportion of individuals reporting unprotected intercourse with non-primary partners declined significantly more for those receiving VCT than those receiving health (men, 35% reduction with VCT vs. 13% reduction with health information and women, 39% reduction with VCT vs. 17% reduction with health information).
[24]	Tanzania	STI treatment	Community	12,537 individuals 6 intervention communities and 6 pair-matched control communities	HIV incidence in intervention villages declined by 42% after 2 years. No change in reported sexual behavior was observed in either group. It was therefore concluded that improved STI treatment reduced HIV incidence.
[25]	Uganda	STI treatment	Community	12,726 individuals 5 intervention communities and 5 control communities	The prevalence of syphilis and trichomoniasis were significantly lower in the intervention group as compared with the control group. However, the study did not observe any effect of the STI intervention on the incidence of HIV infection. The incidence of HIV infection was 1.5 per 100 person-years in both the intervention and control groups.
[26]	Uganda	STI treatment and HIV/AIDS prevention	Community		Study results not yet published.

# Chapter 11: Economics of HIV/AIDS Impact Mitigation: Responding to Problems of Systemic Dysfunction and Sectoral Capacity

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## Introduction

The adverse economic impact of HIV/AIDS is becoming increasingly evident. In high prevalence countries the growth rates of gross domestic product are slowing down, the manpower losses in key sectors are mounting, the number of orphans is increasing, and household poverty is deepening. These countries are facing the formidable challenge of mitigating the economic impact of HIV/AIDS. Yet economic mitigation is not high on the agenda of those donor agencies and countries involved in mounting a response to HIV/AIDS impact. They appear trapped in an awareness, prevention and care paradigm, which, while vital, fails to recognize the issue of systemic erosion and impending socioeconomic collapse. In short, they have assumed HIV/AIDS to be a public health issue and failed in many cases to recognize it for the development and systemic management challenge it more properly represents.

There are three important contributory reasons for this. First, the paucity of data precludes recognition of the extent of the impact of the epidemic and its economic cost. Twenty years into the pandemic, reliable data on prevalence, infection, and impact remains hard to come by. Relative to the steady spread of the disease into the new century, available studies and data are remarkably outdated while more routine economic research is comparatively insensitive to HIV/AIDS issues. Second, existing levels of systemic dysfunction are often so endemic in high-prevalence countries that they mask the real impact of the disease until it is too late. Even informed high HIV/AIDS prevalence countries

apparently remain unconvinced of the longer term impact, and have not yet developed strategies to cope with the obvious and incontrovertible impact of HIV/AIDS, such as the increase in the number of orphans and decline in the size of the labor force. And third, much of the responsibility for national HIV/AIDS mobilization and response is vested in the health sector, leading to the assumption that it is a passing health issue.

This paper concludes that:

- The vicious cycle of low growth, unemployment, low social and economic status, depression, and poverty will become increasingly virulent over the coming years as HIV/AIDS mortality and morbidity spirals in high prevalence countries. The dysfunctionality of current systems, the lack of sustainable management capacity, and the inefficiency of resource allocation utilization at every level of the economy—macro, meso and micro—are likely to paralyze public and private systems as they operate at the margin of collapse.
- Economic mitigation activities at every level are interlinked, with the micro level dependent on the robustness of meso level sectors, and the meso dependent on the policies and inter sectoral approaches of the macro-level. Thus, stronger sectoral and inter sectoral policies and programs (multisectoral approaches) are essential to mitigate the impact of HIV/AIDS on the household and on economic growth at the macro level. Depending on their intent and effectiveness, such policies and

programs could constitute the basic determinants of HIV/AIDS mitigation through their influence on issues such as education and poverty. Implemented effectively with due understanding of the issues, these could, in turn, help prevent new infections and convert the vicious cycle to a virtuous one.

- The key point of departure is to accept and understand HIV/AIDS as a systemic management challenge rather than a public health problem. HIV/AIDS will impact every aspect of systemic functioning over the long-term and will exacerbate existing problems of capacity and sustainability. To respond strategically to this challenge, it is necessary to move beyond the continuum of awareness, prevention, and care and frame a management approach that uses hard data and appropriate indicators to inform decisionmaking. The objective should be to mitigate—at all levels and in all sectors—by improving management and focusing on those issues that both drive and impede the economy.
- A simple operational framework for adopting such a multisectoral approach exists together with the methods and tools required to implement it, and it could be applied in key sectors. These key sectors include health, education, and agriculture but depend on the support and monitoring of finance for rigor and implementation. Governance and democracy also has a key role to play in establishing the sociopolitical environment in which the mitigation of economic impact can be empowered to build sectoral capacity. This sectoral strengthening has to take place within the context of economic growth strategies that need to be developed and reviewed with the future impact of HIV/AIDS in mind.
- The time required to replace increasing manpower losses and associated effects—including the loss of experience and institutional memory—reinforces the need to take urgent action to mitigate HIV/AIDS impact and pre-

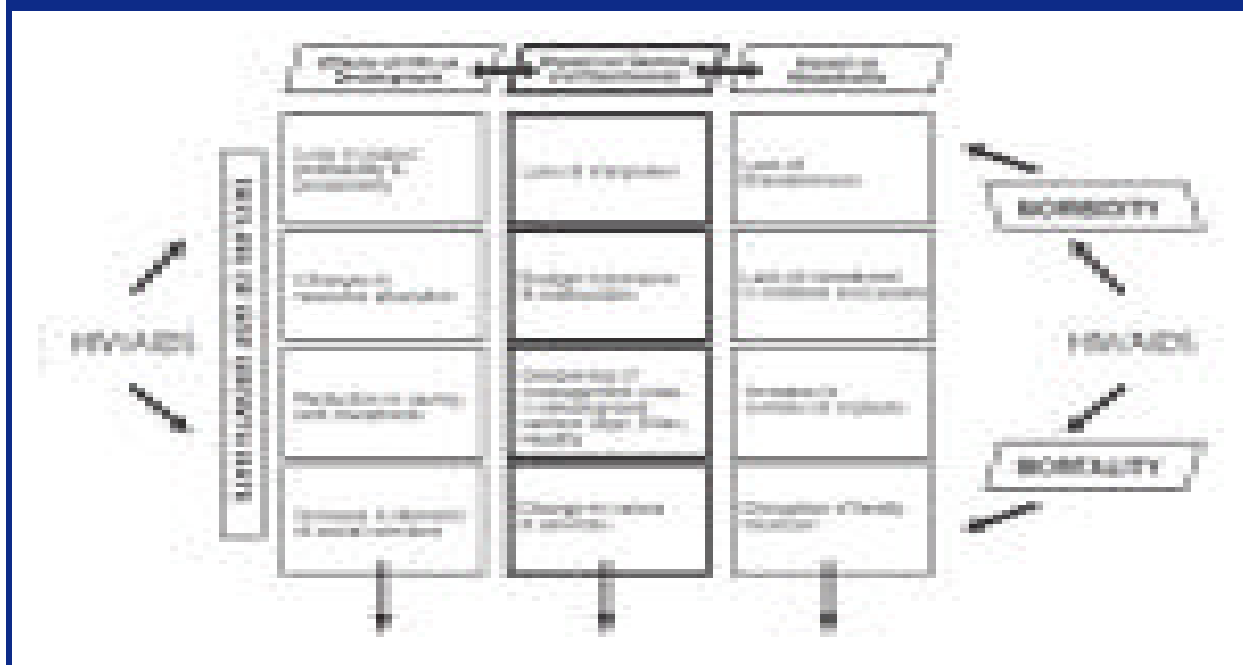
vent countries from accelerating deeper into the vicious economic cycle. Thus rapid response—especially at the public sectoral level—is essential. This suggests that the immediate focus of mitigation efforts should be on the sustainable improvement of management capacity and the consequent reduction of dysfunctionality in the health, education, and agriculture sectors.

## **Economic Impact—A Vicious Cycle**

This section makes three points. First, HIV/AIDS impacts all levels of the economic system—macro, meso, and household—and these interrelated impacts feed on each other to create a vicious cycle. Second, HIV/AIDS impact at all levels is evidenced by three main indicators, as follows:

1. Loss of manpower and skills
2. Changes in the population structure and the erosion of whole production and consumption bands, with consequent distortion of resource allocation due to changes in demand for goods and services
3. Deterioration in management capacity and governance

Third, the most direct impact of HIV/AIDS mortality and morbidity is at the household level, the base of the economy. It reduces the people's ability to work, generate adequate income, save, and invest and increases their dependency on the state. These factors change the extent and nature of demand for the services and output of different sectors such as health, education, and agriculture and will place unprecedented strain on social service delivery. In addition, the leadtime involved in replacing skilled manpower losses due to HIV/AIDS and the associated loss of experience and institutional memory, will reduce sectoral capacity to produce goods and services and meet the household and macroeconomic needs. This will, in turn, reduce or slow economic growth. This vicious cycle constrains the ability of the system to reduce household poverty, as the following figure illustrates.



Source: Adapted from Alan Whiteside's presentation

Note: Sectors here are defined as functional spheres managed by all the stakeholders including governmental and nongovernmental organizations.

The destructive erosion of HIV/AIDS is not occurring on neutral ground: Its advent coincides with a number of complicating socioeconomic and development factors, and its primary impact is to exacerbate these, as well as existing and residual, levels of societal and sectoral dysfunction. It is unfortunately true that many high-prevalence countries also suffer residual problems of limited human resource capacity, suggesting that this lack of sustainable management capacity and associated systems may overlay a second vicious cycle of vulnerability.

The assumption that technology alone may resolve these problems is also misleading: Instead, these problems require a systematic process of training and empowerment, based on need, rather than simple supply-driven interventions. Indeed, the move to technology enhanced economic growth has slowed and, in some sectors, obliterated job creation in the developing world, providing an uncomfortable reminder that de-

velopment has its costs. Globalization and changing trade dynamics, too, have contributed significantly to deepening poverty and unemployment in some developing economies, and economic gaps may in fact be widening along these fracture lines, further stressing the micro- and mesoeconomy.

### **Evidence of the Impact of HIV/AIDS**

A key failure both within the sectors involved and the development agencies that support them has been the lack of attention to data collection and management information systems development. Few systematic studies have been carried out on the impact of HIV/AIDS at the household, sector, or macro levels, and this failing has contributed in large measure to the lack of awareness and understanding—often misinterpreted as denial—in sectoral management.

Because of the limited number of impact assessments, the same evidence is quoted over and over by different authors. This information is summarized in the Annex. While quantitative *estimates* of impact are available for the increase in orphan numbers, the decrease in the labor force size, the increase in mortality rates, and the change in size, age, and structure population, these are often not taken seriously by sectoral management. These estimates can and should provide the basis for developing systematic management and mitigation strategies but many highprevalence countries still require hard data as evidence to make the case for intervention. The introduction of new ways to regularly collect and analyze a time series of key indicators to provide an effective decision support system is long overdue for the interests of both HIV/AIDS mitigation and good sectoral management.

## **Strengthening Sectoral or Meso Capacity—Adopting and Implementing Multisectoral Approaches to Break the Vicious Cycle**

This section discusses the critical role of the sectors or meso level interventions in economic mitigation, provides evidence of their effectiveness, and presents a simple operational framework for adopting and implementing multisectoral approaches, including a mobile task team method for addressing the systemic problems at the sectoral level.

### **The Critical Role of Sectors in Economic Mitigation**

As shown in figure one, sectoral or meso level actions could be most effective in economic mitigation and in breaking the vicious cycle. They are the link between macro policies and programs and the ultimate beneficiary—the household. Stronger sectoral systems could help in bridging top-down and bottom-up approaches and in formulating and implementing policies

and programs. The sectors play a key role in the following:

- Providing stronger support to households to meet their needs (orphan care, health services, and micro and small scale enterprise) more adequately. This will influence their decisions on savings, investments, and productivity. Examples of successes of stronger sectoral policies and their impact at the grassroots—level have been documented recently in Uganda by the World Bank. In Uganda, the education sector, with more inclusive and equitable policies, has reached the orphans better than the health sector had with no such policies. [1] Similarly, with the exceptional medical and social care, support for microenterprise and microfinance activities for affected families and communities are growing. However, various studies have indicated that for sustainability and success, these activities depend on the extent to which they are linked to growth sectors.
- Improving contributions to national output as a result of increased efficiency through better management of sectoral resources.
- Adopting policies that may bring about behavior change. Examples include improvement in girls' education, women's empowerment, and the provision of housing for families posted away from home.

### **Multisectoral Approaches in HIV/AIDS**

Multisectoral approaches can be either sectoral or intersectoral. The sectoral approach can be defined as those actions that each sector could undertake to mitigate the impact of the epidemic on its core business and thus strengthen its capacity to contribute better to economic development and HIV/AIDS mitigation, prevention, and care. Examples include strengthening the education sector to deliver education more efficiently, and adopting policies and programs for care and prevention, such as the education of



orphans or life skills education. In the second case, the ability of each sector to deliver results increases exponentially if related sectors coordinate their activities intersectorally and agree to prioritized objectives for development in general and/or HIV/AIDS mitigation, prevention, and care in particular.

Thus, greater attention needs to be given to the strengthening of sectors or sectoral clusters related to the improvement of household economic and social status, in addition to contributing to economic growth through agriculture, education, and health.

## An Operational Framework for a Multisectoral Approach

Given the points above, an effective approach would involve each of the key sectors in strengthening their capacity to provide services to communities affected by HIV/AIDS in the concerted manner illustrated below:

- Each arrow represents sectoral actions by different implementing agencies to strengthen

household needs. Assessing household needs and matching them with response capacity implementing agencies (governmental and nongovernmental) is a first step in the sectoral strengthening.

- The center represents intersectoral activities focused on issues important to the communities and household, such as orphan-care or youth development.
- Sectoral and intersectoral activities need to strengthen management capacity by addressing systemic issues through the common objective of better governance.

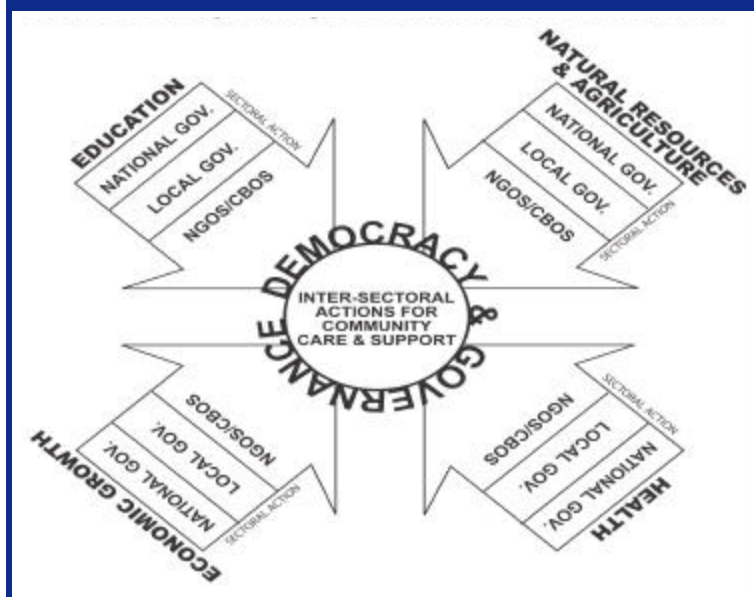
### Example of the functioning of the above operational framework

A number of operations have been underway at the community level, in which various sectors work together to achieve a common objective, as illustrated in the operational framework given above. One example of such an effort is the USAID/Malawi Project COPE II (Community-based Options for Protection and Empowerment II). The specific objectives for COPE II, as mentioned in the USAID Project Profile for Orphan and Vulnerable Children, include:

- Strengthening the capacity of government and community organizations to lead and sustain effective responses to meet the needs of HIV/AIDS affected children and families; and
- Advocating policy change at national, district, and local levels.

It has been a successful effort, reaching 12,583 orphans and other vulnerable children in four districts with care and support via village AIDS committees. District AIDS coordinating commit-

*Multisectoral Framework: Sectoral Strengthening for Intersectoral Collaboration*



the capacity of the sector to respond better to

committees. District AIDS coordinating commit-

tees and community action committees raised \$20,000 through local fundraising efforts.

Similar efforts through decentralized programs are underway in other countries. Successful efforts are characterized by local level programs with strong support in terms of favorable policies, adequate finances, and technical assistance. Thus, building the systems from the national to local level is essential.

## Methods and Processes for Strengthening the Sectors

The Health Economics & HIV/AIDS Research Division (HEARD) at the University of Natal has been funded by a number of agencies—primarily USAID—to prepare toolkits and briefs for all relevant sectors to assess the impact of HIV/AIDS and prepare an appropriate response. These toolkits have been expressly prepared for the use by government ministries and a wide cross-section of private sector activities. The toolkits are available at the HEARD website [www.und.ac.za/und/heard](http://www.und.ac.za/und/heard).

In addition to these toolkits, a methodology and virtual organization has been developed to provide a systemic approach to sectoral HIV/AIDS mitigation and management. This methodology is a model for multisectoral adaptation, although it was initially developed specifically for the education sector. This Mobile Task Team (MTT) on the impact of HIV/AIDS in education has developed a principled approach and terms of reference that address almost all the underlying issues already described.

## The Mobile Task Team (MTT) Method

The MTT approach is based on the understanding that HIV/AIDS is a sectoral management challenge that requires a systematic and sustainable response. Since few sectors, including education, have the knowledge, experience, or capacity to address the strategic issues involved, it is appropriate to mobilize a support mecha-

nism to guide them through the development of an informed response. The MTT was created for this purpose and is available by request to develop a process of ongoing support to meet sectoral needs and to help generate a prioritized implementation plan. Its operations are, however, designed to train and build sectoral skills and transfer ownership of its tools, templates, models, and techniques to nominated counterparts within the sector. The education MTT comprises a team of southern Africa-based professionals active in complementary disciplines relevant to the management and mitigation of HIV/AIDS and is, in effect, an Africa-to-Africa initiative.

The MTT is funded for this purpose by USAID and is effectively available at no cost to the sector concerned. MTT overheads are limited by dint of its virtual organizational character and its costs are therefore almost entirely operational. Most importantly, the MTT is a self-mobilizing learning unit in a constant state of knowledge absorption and development, and as such, has an acknowledged its obligation to feed this knowledge back into the HIV/AIDS and education environments. The MTT is already working in 11 education systems in Africa and is committed to the replication of its operations in other sectors, in addition to a multisectoral approach to social service delivery.

In treating the impact of HIV/AIDS as a systemic management issue, the MTT suggests that each sector to address the following four areas of impact and response.

- 1. Budget allocation and management:** The review—probably including an impact assessment—of system vulnerability, budget allocation and expenditure, management capacity, and HIV/AIDS national and sectoral planning. One key outcome might be the establishment of a full-time HIV/AIDS Management Unit for the sector that acts as a management information and budget support clearinghouse.

2. **Replacement of skilled manpower:** The collection of relevant hard data on payroll, attrition, and other variables to inform projection modeling, develop a clear basis for calculating and budgeting demand for the replacement of skilled manpower, and the location of these skills and models in sectoral hands.
3. **Changing demand/service dynamics:** Analysis of the service demand equation and the development of a comprehensive understanding of the market dynamics. In education, for example, this would involve the research and analysis of enrolment, drop out, permanent loss, and orphaning by age and gender and the consequent impact of these changes on service demand and output by level.
4. **Policy and implementation response:** This might necessitate a policy audit in response to the data available, but would certainly involve a facilitated process of developing a shared vision for the sector—a prioritized sector-wide implementation plan with clear lines of responsibility and timing and the enlistment of multisectoral and nongovernmental organization (NGO) partners. The emphasis would be on the practical and attainable and on the fact that the HIV/AIDS crisis also represents an unprecedented opportunity to redesign sectoral practice and future development that could not, in conventional circumstances, be otherwise easily opened for review.

In order to achieve these goals, the MTT was developed a series of tools, techniques, templates, and models to assist in the workshoping and training process and in generating a variety of outcomes. In principle, these tools are designed to add value to existing work and analyses and can be replicated quite easily in other sectoral environments. The MTT is in a constant state of development and learning, so it will continue to refine and improve these tools and approaches based on their comparative success in operational terms.

The key to this MTT process, however, lies in the empowerment of the sector concerned to

define its needs, take ownership of the process and take on sufficient skills and knowledge to take charge of its own destiny.

## Suggested Actions

- Economic mitigation could be treated as an important third component of HIV/AIDS programs. Addressing the level of systemic dysfunction, as it exists, may appear too formidable a task by the countries and donors concerned and may deter action.
- The multisectoral approach presented above may make the task of economic impact mitigation somewhat more manageable. Thus, those sectors key to economic growth and primarily concerned with HIV/AIDS mitigation, prevention, and care could adopt or adapt the MTT approach to strengthening their sectors.
- In addition, the abovementioned sectors could work collaboratively in high priority areas to impact critical issues such as food security, basic health care, orphan support, and youth employment. The technological vehicle of geographic information systems (GIS) could be used to merge sectorals and provide the practical means to advance a shared agenda.
- The MTT approach can be applied fairly rapidly because it does not require elaborate preparation or initiating studies. It is an outcome-based approach that helps ministries and sectoral agencies take prioritized action as they identify problems within a holistic context.
- The above approach could be supplemented by the development of trained, in-country rapid response teams strategically located to expedite action by trouble shooting within or between sectors.
- Any sectoral actions need to be supported by an economic growth strategy and plan that

takes full account of both the impact of HIV/AIDS on future economic growth prospects at every level and the needs of household and the communities.

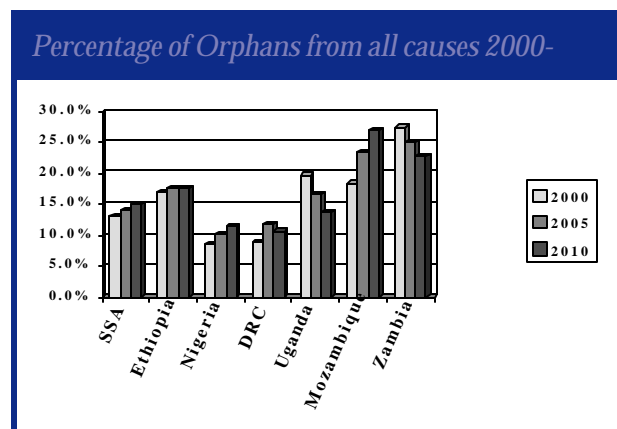
- In addition, the allocation of resources both at the macro and sectoral levels could be brought in line with the objectives defined in the growth strategy. The Goal model, described elsewhere in this report, could be used for such resource allocation decisions.

## Annex

### Available Evidence of HIV/AIDS Impact

#### Household impact

Apart from the loss of breadwinners and the growing realization of reduced life expectancy, the most serious issue for the household, community, and society as a whole is the increase in the number of orphans. As illustrated in the following chart, the percentage of orphaned children in selected high prevalence countries increased from 2 percent in 1980 to 15—17 percent in 2000 and will increase to almost 20 to 30 percent in 2010. In South Africa, for example, data suggest that one in five school aged children will be orphaned by 2010; one in four will be orphaned in some higher prevalence provinces.



Source: Children on the Brink, 2000; U.S. Census Bureau

In these high prevalence countries, almost three-quarters of the households in the community take in and care for orphans, reducing their own consumption per head as well as their ability to save and invest. The burden of this large number of orphans is sending shock-waves through the communities concerned. For example, Africa's traditional extended family system, exemplary at absorbing members under stress, is confronted with impact on every constituent part of its network and may reach a breaking point without some assistance. The ability of these emerging populations to absorb this level of stress is limited, given that they function off a very low, and often non-existent, social security base to begin with. Adding the impact of HIV/AIDS to this strain may have the effect of not only accelerating the reversal of development gains but of fragmenting the very societal structure that has thus far sustained marginal societies.

Thus, HIV/AIDS may generate a new class of poor and push those who are already living at the margin even closer to the edge. In Zambia, for example, AIDS led to a rapid transition from relative wealth to relative poverty in many households. In two-thirds of families, monthly disposable income fell by more than 80 percent when the father died [5].

#### Sectoral Impact

While most of the sectoral assessments available are confined to the impact of such inputs as labor, financial resources, and management capacity, analysis on HIV/AIDS impact on output or outcomes is rare. However, estimates of the decline in labor force size, a few ad hoc studies on the loss of specialized skills and some anecdotal evidence of impact on management capacity are available, and are mentioned below. This is not an exhaustive inventory, but it shows the magnitude of the problems, which are illustrated by the points below.

## Labor Force

According to data from the international labor organization (ILO) and the UN Population Division, as illustrated below, about 10 percent to 30 percent of the labor force in identified high prevalence countries will be lost during the next 15 years (see table below), necessitating a major overhaul of development strategy and process thinking.

	By 2005	By 2020
Botswana	-17.2	-30.8
Lesotho	-4.8	-10.6
Malawi	-10.7	-16.0
Mozambique	-9.0	-24.9
Namibia	-12.8	-35.1
South Africa	-10.8	-24.9
Tanzania	-9.1	-14.6
Zimbabwe	-19.7	-29.4

## Loss of specialized skills

### Education

According to a report by the World Bank, HIV/AIDS is killing teachers faster than nations can train them, undermining an international effort to enroll all children in school by 2015 and confirming the redundancy of many well-intentioned declarations in the AIDS era. The report states that in parts of Uganda and Malawi, nearly one-third of all teachers are HIV-positive. In Zambia, teacher deaths nearly doubled, to 1,300 in the first ten months of 1998 from 680 in 1996. In the Central African Republic, 85 percent of the 340 teachers who died between 1996 and 1998 had AIDS, vanishing from their classrooms an average of ten years before when they would have normally retired.

The HEARD Mobile Task Team on the impact of HIV/AIDS on education has found that HIV/AIDS exacerbates existing high attrition rates. Their research suggests that in the KwaZulu

Natal province of South Africa, the impact of HIV/AIDS on an existing attrition rate of 7 percent in 1999 will require the replacement of almost 70,000 of 75,000 teachers by 2010. The South African Democratic Teachers Union (SADTU) has evidence that the average age of death for teachers in KwaZulu Natal province has declined to age 36, suggesting the need for a complete policy revision with respect to dramatically shortening pre-service training.

### Health

Estimates based on different stages of the epidemic suggest that a country with a stable 15 percent prevalence rate can expect that between 1.6 percent and 3.3 percent of its health care providers will die from AIDS each year [6]. Given that antenatal HIV prevalence rates range between 19 percent and 32 percent across high prevalence southern African countries, the implications are obvious. It is also important to recognize that the HIV/AIDS impact is variable over a given area and that these averages mask the extent of impact on certain hospitals and clinics.

### Agriculture

In Malawi, death rates among employees of the Ministry of Agriculture and Irrigation have doubled, almost exclusively because of HIV/AIDS [1]. In Namibia, studies indicate that agricultural extension workers spend one-tenth of their time attending funerals.

### Mining

Approximately 25 percent of miners in South Africa are living with HIV/AIDS according to the country's Medical Research Council, which expects this figure to increase to 30 percent by 2005.<sup>7</sup> In Botswana, which has the continent's highest prevalence rate, data produced by HEARD indicates a comparative rate of over 30 percent in 2001.

### *Natural Resource Management*

The Forestry Department of Kenya has estimated that since 1988 it has lost an average of 36 employees a year (two to four employees per month) due to HIV/AIDS. Environmental professionals such as wildlife veterinarians, silviculturalists, and plant pathologists are highly educated professionals, and the cost of training replacement personnel is as high as \$40,000 per person [3].

### *Budget and management*

Budget and management constraints are made worse due to HIV/AIDS.

### *Capital and Recurrent Budget Imbalance*

Many sectors have little to spend on capital projects because of recurrent commitments, and this will worsen as HIV/AIDS inflates health care, training and replacement costs in the recurrent budget. The education sector routinely budgets between 90 percent and 95 percent on teacher salaries alone, leaving little to reduce backlogs and address capital needs. The cost of teacher training in South Africa involving a four-year degree track may cost between three and four times the cost of building a modern classroom, for example. In spite of the comparatively high remuneration for qualified teachers in that country, competition for these skills is intensifying as the private sector seeks to replace its own AIDS losses and puts pressure on increasing wage demands.

### *Increasing Expenditure Bottlenecks*

Inadequate absorption capacity at all levels of the sectoral system leads to under-spending and rollovers; this may also be true of external (donor agency) funds placed in sectoral hands. Loss of permanent and temporary skills will lead to capacity failure at all levels while mid- and local level structures may collapse and lose yet more of their capacity to receive and disburse. The perennial rollover of unspent sectoral funds also has the effect of persuading the finance sec-

tor that HIV/AIDS projections are unfounded given the inability of the sectors concerned to spend the money.

### *Management – Human Resource Shortages*

The shortage of skilled and experienced decisionmakers is growing at all levels of the system for reasons of both AIDS-mortality and increased recruitment by the private sector. While many sectors are seen to be personnel-heavy (evidenced by the share of recurrent budget), there remains a limited pool of top managers; HIV/AIDS will reduce the number of candidates for entry into this pool and create pressure for extension of service. There may also be an increasing gulf between the attitudes and value systems of older managers and the influx of much younger entrants to their ranks, because of evident losses in the group 35 to 50.

### *Planning and Projection Problems*

The inability to calculate and project basic demand and supply equations and model a sustained response has long been evident at the sectoral level. There is a limited culture of decisionmaking informed by hard data and information, and planning is all too often based on political agendas and promises. The lack of functional management information systems compounds this problem, as does the uncertainty about the value of HIV/AIDS indicators. Informed planning and adequate data collection holds the key to management response and mitigation

### *Training Under-Provision or Inadequacy*

Failure to provide for appropriately trained replacement stock to meet system demand is the issue. Combined with a lack of informed planning, the failure to adequately project demand for new personnel and factor in competition from other quarters could paralyze a given sector. The additional problem of training for entry into the “emergency” environment of the HIV/AIDS era must be faced and addressed in ways that include the prospect of dramatically

foreshortening pre-service training time and having to provide additional levels of in-service support.

## **Macro or National Level Impact**

African economies could be devastated by the forecast 10 million AIDS deaths in southern Africa over the next 15 years. The apparent high mortality rate among the 15—29 age group and women, in particular, has profound implications for the provision of services and related productivity.

The Southern African Development Community's (SADCs) Regional Human Development Report for 2000, released in Swaziland this week, estimated that the potential loss of 6.3 million lives between 1995 to 2005 would slash the gross domestic product (GDP) in countries across the region. It reported that Zambia's GDP had, for example, already fallen by an estimated 9 percent in 2000 as a direct result of HIV/AIDS.

The UN Development Program (UNDP), in its Botswana Human Development Report, cites government studies showing that HIV/AIDS will result in the GDP being between 24 percent and 38 percent lower by 2021. It also predicted

that in 25 years, the GDP could be 40 percent lower than it would be without the impact of HIV/AIDS.

UNAIDS has estimated that when HIV prevalence rates rise to more than 20 percent, GDP in the countries affected can be lowered by as much as 2 percent a year. In South Africa, the investment bank ING Barings has projected that HIV/AIDS could drag down GDP by 0.3 to 0.4 percent a year. Another study has indicated that by the end of the decade, AIDS could have reduced South Africa's GDP by 17 percent—the equivalent of \$22 billion [1].

HIV/AIDS also exacerbates the systems' inability to allocate and utilize resources in an optimal manner. For example, the direct and indirect impact of the HIV/AIDS on the macroeconomy and sectoral budgets will increase the problem of lack of capital and/or recurrent budget at a national or sectoral level through diversion and increased consumption in competing sectors. Similarly, limited numbers of competent financial managers are already under stress and their numbers may be thinned further, compromising performance by personal and institutional circumstances.

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# Chapter 12: Antiretroviral Treatment for HIV-Infected Adults and Children in Developing Countries: Some Evidence In Favor of Expanded Diffusion

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## Introduction

The year 2001 was notable for a growing awareness by the international community that the inequality between rich and poor nations in the care and treatment of people living with HIV/AIDS not only represents a “moral scandal”<sup>1</sup> but also a major economic, political, and social challenge that threatens world stability. While the distribution of highly active antiretroviral therapies (HAART) in high-income countries has proven to be effective in drastically reducing morbidity and mortality associated with HIV infection,<sup>2,3</sup> the world is now confronted with the necessity of accelerating access to care and treatment in developing nations where 95 per-

cent of the estimated 40 million infected persons live.<sup>4</sup> In June 2001, the Declaration of Commitment unanimously adopted by a Special Session of the United Nations General Assembly (UNGASS) recognized the need for implementing “*national strategies, supported by regional and international strategies, ... to address factors affecting the provision of HIV-related drugs, including antiretroviral drugs*”.<sup>5</sup> In January 2002, WHO Director-General Gro Harlem Brundtland acknowledged that recent advances in research, simplification in treatment regimens, and drastic price reductions now make it possible for the millions of poor people who need antiretroviral therapies to start accessing them and have a chance of living a full life.<sup>6</sup> Recent estimates of

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<sup>2</sup> WHO. Safe and effective use of antiretroviral treatments in adults with particular reference to resource-limited settings. WHO/HSI/2000.04. Geneva: 2000.

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<sup>5</sup> UN Special Session Declaration of Commitment on HIV/AIDS. Global Crisis—Global Action. New York, June 25-27, 2001. Available at: [www.unaids.org/whatsnew/others/un\\_special/Declaration020801\\_en.htm](http://www.unaids.org/whatsnew/others/un_special/Declaration020801_en.htm)

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the funding needs for the global fight against HIV/AIDS have taken into account the goal of increased access to treatment, including antiretroviral therapy, and are consistent in calling for an investment of between US\$8 billion-10 billion per year to be provided jointly by the international community and national resources.<sup>7,8,9,10,11</sup> Although a significant event, the Global Fund to Fight AIDS, Tuberculosis and Malaria, which becomes fully operational in April 2002,<sup>12</sup> is presently funded at US\$1.9 billion,<sup>13</sup> which means that the extent to which it will contribute to the provision of antiretroviral treatment will remain far below current needs and benefit only a few countries in the short

term. Because money targeted to improving public health in developing countries has to be spent, as elsewhere, where it can yield the highest returns, some experts argue that antiretroviral therapy may not be the best investment choice.<sup>14,15,16,17</sup> The experiences of middle-income countries, such as Brazil,<sup>18</sup> Chile,<sup>19</sup> and Thailand,<sup>20</sup> which have introduced antiretroviral drugs in their programs of HIV/AIDS care, as well as pilot studies in low-income sub-Saharan African countries, including Côte d'Ivoire, Senegal,<sup>21</sup> and Uganda, demonstrate that the existing barriers to rational, large-scale access to these therapies can, at least partially, be overcome. Since Spring 2001, scientists and physicians,<sup>22,23,24</sup>

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<sup>13</sup> UN Foundation. Official tally of pledges to the Global Fund to Fight AIDS, Tuberculosis and Malaria. Geneva, March 11, 2002. Available at: [www.globalfundatm.org/files/Financial\\_contributions.html](http://www.globalfundatm.org/files/Financial_contributions.html)

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economists,<sup>25</sup> public health experts,<sup>26</sup> senior statesmen,<sup>27</sup> NGOs,<sup>28</sup> and grassroots organizations everywhere<sup>29,30</sup> have been calling for action and increasingly endorsing the idea of expanded access to antiretroviral treatment. Building on these experiences, and on the recently completed evaluation of the UNAIDS “Drug Access Initiative” that took place between 1998 and 2000 in Côte d’Ivoire<sup>31,32</sup> and Uganda,<sup>33</sup> the authors wish to update the evidence<sup>34,35,36,37,38</sup> supporting the use of antiretroviral drugs in resource-limited settings.

## Access to Antiretroviral Treatment Should Facilitate Rather Than Impede Prevention Efforts

Rather than having to choose between prevention and treatment, it is time to recognize that prevention and treatment mutually reinforce each other and should be considered as part of an integrated approach to care.<sup>22,23,39,40</sup> Developing countries that have pioneered some of the most successful policies either to contain HIV rates of infection to relatively low levels (Senegal<sup>41</sup>) or significantly reduce its incidence, as well as HIV-related risk behaviors over time (Brazil,<sup>42</sup> Thailand,<sup>43</sup> Uganda<sup>44</sup>), have also been the most proactive in favoring access to antiretroviral treatment.

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<sup>36</sup> Farmer P, Léandre F, Mukherjee JS, Claude MS, Nevil P, Smith-Fawzi MC, Koenig SP, Castro A, Becerra MC, Sachs J, Attaran A, Kim JY. Community-based approaches to HIV treatment in resource-poor settings. *Lancet* 2001; 358:404-9.

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Targeted prevention strategies that simultaneously address risk behaviors and factors that generate vulnerability, including poverty, discrimination, inadequate education, and gender inequality, may be effective in many different settings. Unfortunately, such approaches have not been implemented on a scale sufficient to halt the pandemic. While it is estimated that 9 out of 10 HIV-infected people in sub-Saharan Africa do not know their serostatus, there is a wide consensus that voluntary HIV counseling and testing can serve as a critical entry point for HIV prevention programs.<sup>45,46</sup> However, beyond the insufficient availability of testing and counseling facilities, the motivations for adherence to screening programs and seeking HIV diagnosis will remain limited as long as prospects for access to treatment following a positive test result are lacking. In studies performed in Abidjan,<sup>47,48</sup> 20 percent to 26 percent of pregnant women who received adequate counseling refused to be tested for HIV; of those who underwent testing and were found positive, more than one-third in the second of these studies (38.6 percent) did not return for notification.<sup>47</sup> Moreover, fewer than one out of ten adults seen

in primary health care centers in the most populated neighborhoods of Abidjan had been tested for HIV, and this proportion decreased below 5 percent in the case of pregnant women.<sup>32</sup>

An additional consideration is that the combined use of secondary prevention and antiretroviral treatment in HIV-infected individuals is likely to achieve the highest reduction in the incidence of new HIV infections. Whereas HAART decreases the probability of sexual transmission of HIV in the case of unprotected sexual intercourse,<sup>49,50,51,52</sup> just as low maternal viral load correlates with decreased risk of perinatal transmission,<sup>53</sup> the increase in life expectancy of treated patients will predictably translate into an increased probability of sexual encounters between sero-different partners.<sup>54</sup> The overall impact on HIV incidence will further depend on the extent to which risk behaviors are affected by the availability of treatment. In developed countries, there have been disturbing reports of a decreased awareness of HIV risks in the general population<sup>55</sup> and of an increased incidence of STDs<sup>56,57</sup> and high-risk

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behaviors<sup>58,59</sup> as HAART has become widely available. In contrast, evidence from cohort studies indicates that individuals receiving HAART tend to adopt protective behaviors more frequently than those who are not on treatment.<sup>60</sup> In a survey conducted in Côte d'Ivoire during the first quarter of 2000 in over 700 patients, it was observed that those who had access to antiretroviral treatment through the Drug Access Initiative were more likely to maintain sexual activity, in association with the improvement of their health status, but declared more frequent condom use than untreated HIV seropositive individuals.<sup>32</sup>

## Antiretroviral Drugs Can Now Be Made Available at Differential and Affordable Prices in Developing Countries

Full coverage for HAART at current prices on the international drug market represents less than 0.1 percent of gross domestic product (GDP) in high-income OECD countries. It would, however, exhaust public health expenditures and account for a significant share of GDP in the 16 sub-Saharan countries where HIV prevalence is over 10 percent of the adult population.<sup>61</sup> This would be the case even if the eligibility criteria for antiretroviral treat-

ment were more stringent than those currently used under North American and European guidelines. Moreover, a significant proportion of the eligible HIV-infected population would remain out of reach of the health care system (e.g., in rural areas). In Côte d'Ivoire,<sup>32</sup> half (49 percent) of untreated patients seeking HIV care had CD4 cell counts below 200/mm.<sup>3</sup> Even the most conservative estimates thus indicate that over one million HIV-infected individuals are in urgent need of antiretroviral treatment in sub-Saharan Africa.<sup>62</sup> Extrapolation of the data from the Drug Access Initiative in Côte d'Ivoire and Uganda provides an estimate of 4 to 5 million people who could benefit from treatment at this time.<sup>32</sup> In contrast, it is estimated that only 200,000 HIV-infected individuals in the developing world are currently receiving antiretroviral treatment of any kind, one half of them in Brazil,<sup>63</sup> and 22,000 in the 11 countries that participate in the UN Accelerated Drug Access Initiative.<sup>64</sup>

Table 1. Annual Costs (in US\$) of Selected Triple Therapies in Uganda & Côte d'Ivoire

Triple Therapies	Uganda December 2000	Uganda March 2001	Côte d'Ivoire March 2001	Côte d'Ivoire July 2001
2 NRTIs + Indinavir	1490-1510	960-1100	4210-5500	810-1310
2 NRTIs + Efavirenz	1560-1580	870-1000	3480-4620	780-1210
2 NRTIs + Nevirapine	640-800	500-780	na	na
2 NRTIs + Nelfinavir	na	na	4370-5670	3240-4050

Sources: Uganda Ministry of Health & Ministère de la Santé de Côte d'Ivoire

<sup>58</sup> Dodds JP, Nardone A, Mercey DE, Johnson AM. Increase in high risk sexual behaviour among homosexual men, London 1996-8: cross-sectional, questionnaire study. *BMJ* 2000; 320:1511-12.

<sup>59</sup> Van de Ven P, Kippax S, Knox S, Prestage G, Crawford J. HIV treatments optimism and sexual behaviour among gay men in Sydney and Melbourne. *AIDS* 1999; 13:2289-2294.

<sup>60</sup> Bouhnik AD, Moatti JP, Vlahov D, et al. Highly Active Antiretroviral Treatment (HAART) does not increase sexual risk behavior among French HIV-infected drug users. *J Epidemiol & Commun Hlth* (in press).

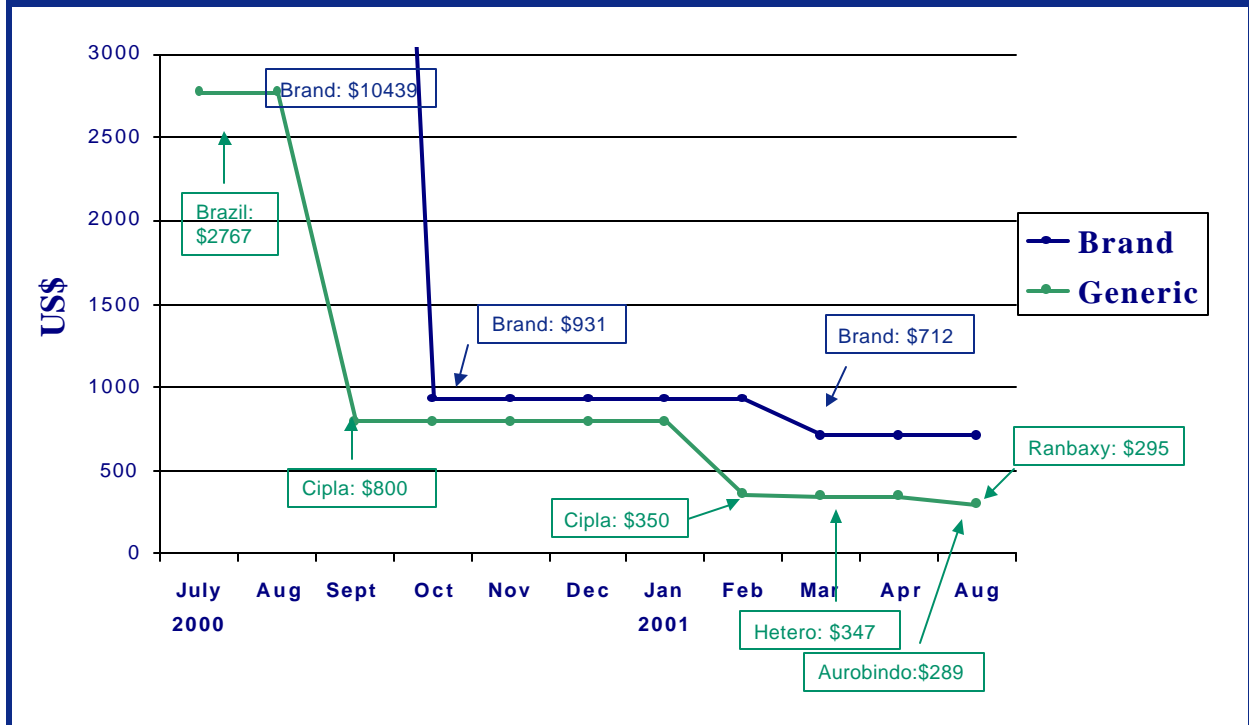
<sup>61</sup> Hogg RS, Weber AE, Craib KJ, Anis AH, O'Shaughnessy MV, Schechter MT, Montaner JS. One world, one hope: the cost of providing antiretroviral therapy to all nations. *AIDS* 1998; 12:2203-2209.

<sup>62</sup> World Bank. *Costs of scaling HIV program activities to a national level in sub-Saharan Africa*. Washington DC, November 2000.

<sup>63</sup> Statement by H. E. Minister of Health of Brazil, Senator José Serra. Special Session of the UN General Assembly on HIV/AIDS, New York, June 27, 2001.

<sup>64</sup> WHO Geneva. Estimate of number of individuals receiving antiretroviral therapy in developing nations under the UN Accelerated Drug Access Initiative as of December 31, 2001. Personal communication, Dr Badara Samb, WHO.

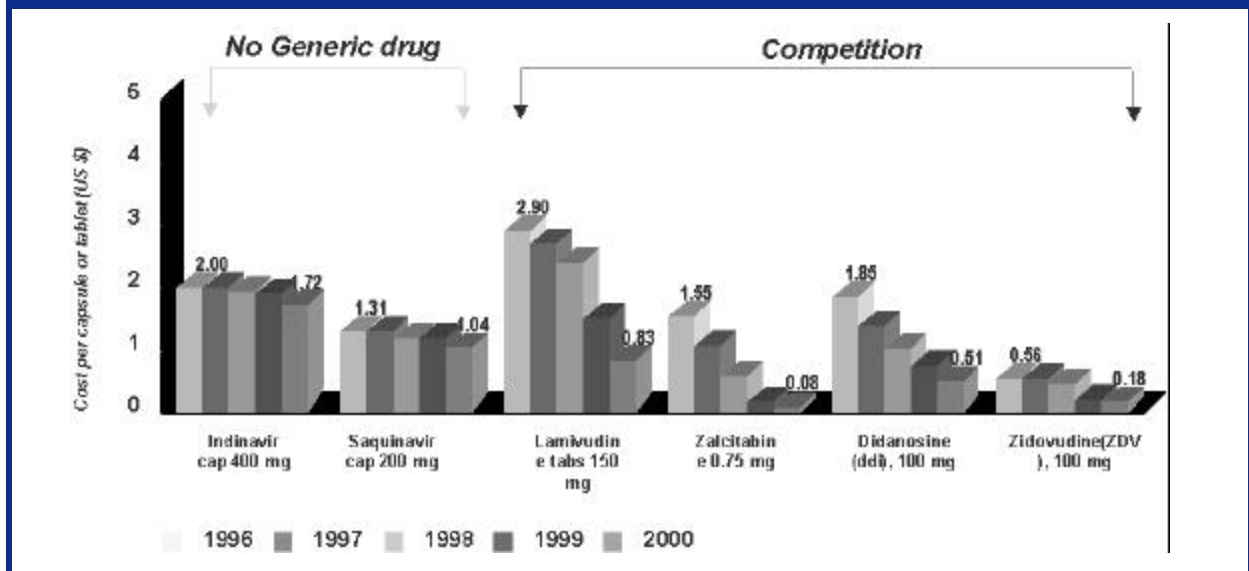
Figure 1. Sample AIDS Triple-combination (stavudine 40 mg + lamivudine 150 mg + nevirapine 200 mg)  
Lowest World Prices per Year per Patient (2000/01)



Source: MSF Campaign for Essential Medicines

Significant reductions in the prices of antiretroviral drugs that were hardly conceivable two years ago have now been brought about in several developing countries (See Figure 1 and Table 1).

Figure 2. Evolution of Prices of Antiretroviral Drugs in Brazil (1996/2000)



Source: National STD/AIDS Programme of Brazil

Prices charged by pharmaceutical companies for patented drugs and diagnostic tests are commonly several orders of magnitude higher than their marginal cost (the cost of producing an additional unit of the drug). Low marginal costs explain why generic drug producers, as soon as they do not have to pay royalties to patent holders, are able to offer substitutes to branded products at comparatively low prices. Using the capacity of its national industry to produce cheaper generic versions of eight antiretroviral drugs, Brazil has been able to deliver free HAART for almost 100,000 HIV-infected patients.<sup>65</sup> Taking into account current production costs of generic suppliers and potential economies of scale, marginal costs of delivery of some triple drug HAART combinations can be expected to be lower than US\$200 per patient/year. In a perfectly competitive market, in which consumers will automatically buy a substitute good if its price is lower, international drug prices would spontaneously tend to be based on such marginal cost.

Of course, in the case of innovative products like antiretrovirals, private firms legitimately need to recover their high overhead costs for research and development and for fulfilling the regulatory prerequisites of market approval in high-income countries.<sup>66</sup> Economic theory has long recognized that guaranteeing the intellectual property rights of the inventors, although it corresponds to the attribution of a “temporary monopoly power” to the patent owner, creates socially useful long-term incentives for private risky investments in research and development of innovations.<sup>67</sup> However, the international market of branded antiretroviral products is characterized by imperfect competition: a limited number of firms (7) supplies a limited number of products (15); inside each of the three

classes of antiretroviral drugs, the number of suppliers is even smaller (£ 4). In such oligopolistic markets, economics points out that private firms are in a position to impose prices and rates of return that may capture an “excessive rent”, and that it is often in the interest of society to associate patent rights with compulsory licensing obligations in order to guarantee an efficient public disclosure of innovative knowledge.<sup>68</sup> Indeed, existing World Trade Organization rules about “Trade-Related Aspects of Intellectual Property Rights” permit compulsory licensing:<sup>69</sup> any country may allow a third party to use a patent without the owner’s consent “in cases of national emergency” or “other circumstances of extreme urgency”. HIV/AIDS certainly qualifies for such status on most developing countries.<sup>70</sup>

Economic theory also emphasizes another important point: the fact that firms in monopoly (or oligopoly) position can rationally practice price discrimination (i.e., to offer different prices for the same product according to the characteristics of each segment of the demand on markets). It would be the firm’s rational behavior to offer the highest prices for customers with the lowest price elasticity of demand (and the highest willingness to pay for the product) and vice versa. Price discrimination between markets in different countries and between various sectors in the same national market is a common practice. It explains why various “intermediary” agents may interfere with the process of retail price determination and share some fraction of the “rent” with the firm exercising monopoly power. Therefore, price differences for HIV/AIDS drugs between developed and developing countries is not per se an economic anomaly. On the contrary, it can even be argued that increased volume of drug sales that would be pro-

<sup>64</sup> WHO Geneva. Estimate of number of individuals receiving antiretroviral therapy in developing nations under the UN Accelerated Drug Access Initiative as of December 31, 2001. Personal communication, Dr Badara Samb, WHO.

<sup>65</sup> Statement by H. E. Minister of Health of Brazil Senator José Serra. Special Session of the General Assembly of the United Nations on HIV/AIDS, New York, 27 June 2001.

<sup>66</sup> GRABOWSKI H, VERNON J. Returns to R&D on new drug introductions in the 1980’s. *J Hlth Eco* 1994 ; 13 :83-104.

<sup>67</sup> GROSSMAN GM, HELPMAN E. *Invention and Growth in the Global Economy*. MIT Press, 1991.

<sup>68</sup> GREENWALD B, STIGLITZ JE. Externalities in economics with imperfect information and incomplete markets. *Quarter J Eco* 1986; 1: 229-264.

<sup>69</sup> CORREA C. *Integrating public health concerns into patent legislation in developing countries*, South Centre, Geneva, 2000.

<sup>70</sup> UNAIDS statement at the WTO Ministerial Conference, Seattle, December 1999.

moted by unit price decreases in developing countries with high HIV prevalence can contribute to profitability of the drug industry at the international level.

Economic theory has also established that in the context of imperfect competition, information asymmetries between suppliers and buyers are likely to be exacerbated:<sup>71</sup> in such markets, like the ones of innovative drugs, private firms have a priori no incentive to disclose information on their real production costs as well as the lowest levels of the prices that they would rationally be ready to accept to sell.

In general, informed consumers (in the sense of consumers who have the most exhaustive information about available prices) produce a “positive externality” in favor of less informed consumers to the extent that they contribute to increased competitive pressure on suppliers, which creates an incentive for firms to decrease prices and to improve quality of products. Logically, this leads to a positive impact of improved dissemination of price information on the collective efficiency of the market mechanism.<sup>72</sup> Theoretical as well as empirical research has already shown that “uninformed” consumers will tend to pay higher prices and that an increase in the proportion of such uninformed consumers favors an increase of the average price level, which negatively affects the other consumers with better information (the latter will ultimately obtain higher prices than those that would have been reached at equilibrium in the absence of uninformed consumers).<sup>73 74</sup>

Economic evidence clearly suggests that appropriate information would never be spontane-

ously revealed by market mechanisms characterized by imperfect competition. It strongly supports the usefulness for buyers to benefit from a mechanism for systematic information about drug prices and transactions on the different national markets. This kind of information should be considered as a global public good whose availability would increase public welfare in the different countries.

However, it should be recognized that the impact of increased price information may not always lead to price decreases. For instance, when consumers a priori discriminate between products belonging to a similar class of goods (for example, by exhibiting an a priori preference for brand rather than generic products), diffusion of information may paradoxically translate into price increase. In such a case, informed consumers may reveal their preferences by giving priority for searching transactions concerning their a priori preferred products and by stopping their market search as soon as they find a price below their maximum willingness to pay; this behavior will render firms’ demands more inelastic (informed consumers will not check out another firm’s product if the preferred firm’s price exceeds the anticipated price by less than the search cost) and will contribute to increase the equilibrium.<sup>75</sup> This point highlights the absolute necessity, in the case of drugs, to combine any improvement in information on prices with quality control mechanisms if one wants to avoid undesirable effects on prices related to a priori consumer preferences that do not adequately reflect effective differences in quality of products.

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<sup>71</sup> ARNOTT R, GREENWALD B, STIGLITZ JE. Information and economic efficiency. *Information Economics & Policy* 1994; **6**: 77-88.

<sup>72</sup> TIROLE, J. *The Theory of Industrial Organization*, MIT Press, 1988.

<sup>73</sup> VARIAN, A model of Sales, *American Economic Review*, 1980, 70, 651-659.

<sup>74</sup> MORGAN, J. AND SEFTON, M. Information Externalities in a model of sales. *Economics Bulletin*, 2001, 4(7), 1-5.

<sup>75</sup> ANDERSON, S ET RENAULT, R. Consumer Information and Firm Pricing : Negative Externalities from Improved Information, *International Economic Review*, 2001,41(3), 721-742.



## Antiretroviral Access

The experience of Brazil, as well as that of the UNAIDS Drug Access Initiative in Côte d'Ivoire and Uganda, strongly supports the idea that decentralized negotiations and increased competition at the country level can be a powerful mechanism for price reductions. In Brazil, in 2000, the two protease inhibitor drugs, for which no generic local production existed, amounted to as much as 36 percent of the whole purchase costs of the country's antiretroviral medicines. Nevertheless, effective or potential competition from the local companies has induced foreign brand products suppliers to bring their costs down on average by 70 percent.<sup>74</sup> Between 1996 and 2000, prices of antiretroviral drugs have been systematically lower in Côte d'Ivoire where the Public Health Pharmacy used a tender mechanism, open to all international suppliers including generic producers, than in Uganda where procurement exclusively went through a private-not-for-profit company (Medical Access Uganda, Ltd) associating representatives of five of the multinational patent-holders companies.<sup>75</sup> In 2001, soon after the initiative of the Joint Clinical Research Centre in Kampala to introduce imported generic drugs in the country,<sup>76</sup> 20 percent to 45 percent decreases in purchasing costs of the most frequently prescribed HAART combinations were observed. The Brazilian and South African governments have managed to establish their legal right to produce and/or import generic drugs.<sup>77 78</sup> Worldwide mobilization of public opinion in support of these two governments has been a major determinant in reducing the price of antiretroviral brand products during the year 2001.<sup>79</sup> In many countries, significant progress has been recently accomplished in terms of affordability of purchasing prices of commonly prescribed HAART combinations. In Côte d'Ivoire and Uganda, annual costs of HAART tend to come closer to the average GDP per capita (660 and 310 US\$, respectively) but, in the absence of any public mechanism for subsidy, they remain out of reach for the great majority of the infected population.

However, comparative data on prices of HIV/AIDS drugs recently gathered by UNAIDS, UNICEF, MSF, or WHO do not show any clear relationship between variability of source prices between countries and "objective" economic determinants like volumes of sales or HIV prevalence. This is the case for ARV drugs, and to a lesser extent, for other drugs used in treatment of HIV-related morbidity and opportunistic infections. In addition, specificities of funding mechanisms (whether they come from private households and companies, public budgets, or international aid and donations) may contribute to the variability of source prices between and inside countries.

Moreover, several factors other than differences in source prices may influence the variability of retail prices paid by consumers, which is the key variable for patients' financial access to drugs: transportation costs, import and domestic taxes, wholesalers margins, and the various characteristics of national drug supply and of public health policies that may differ between countries and sectors will also interfere with retail prices.<sup>80</sup> Difficulties in management of institutions in charge of drug supply and storage, gaps between drug marketing and scientific evidence, insufficient standardization of clinical protocols and practice, economic constraints and incentives that influence income revenues of health care professionals (including direct dispensation of drugs by physicians in many countries) may also contribute to variability of retail prices inside each country. Difficulties in implementation of public regulatory control of the drug market and barriers to appropriate collaboration between the public and private health sectors often accentuate differences of retail prices.

<sup>74</sup> FERRIMAN A. Doctors demand immediate access to antiretroviral drugs in Africa. *Br Med J* 2001; 322: 1012.

<sup>75</sup> ASHRAF H. USA and Brazil end dispute over essential drugs. *Lancet*. 2001 ; 357: 2112.

<sup>76</sup> Anonymous. South Africa's moral victory. *Lancet* 2001; 357: 1303.

<sup>79</sup> PEREZ-CASAS C, MACE C, BERMAN D, DOUBLE J. *Accessing ARVs: untangling the web of price reduction for developing countries. Campaign for Access to essential Medicines.* Médecins Sans Frontières. Geneva, September 2001.

<sup>80</sup> MYHR, K. Comparing prices of essential drugs between four countries in East Africa and with international prices. [www.accessmed-msf.org](http://www.accessmed-msf.org), 2000.

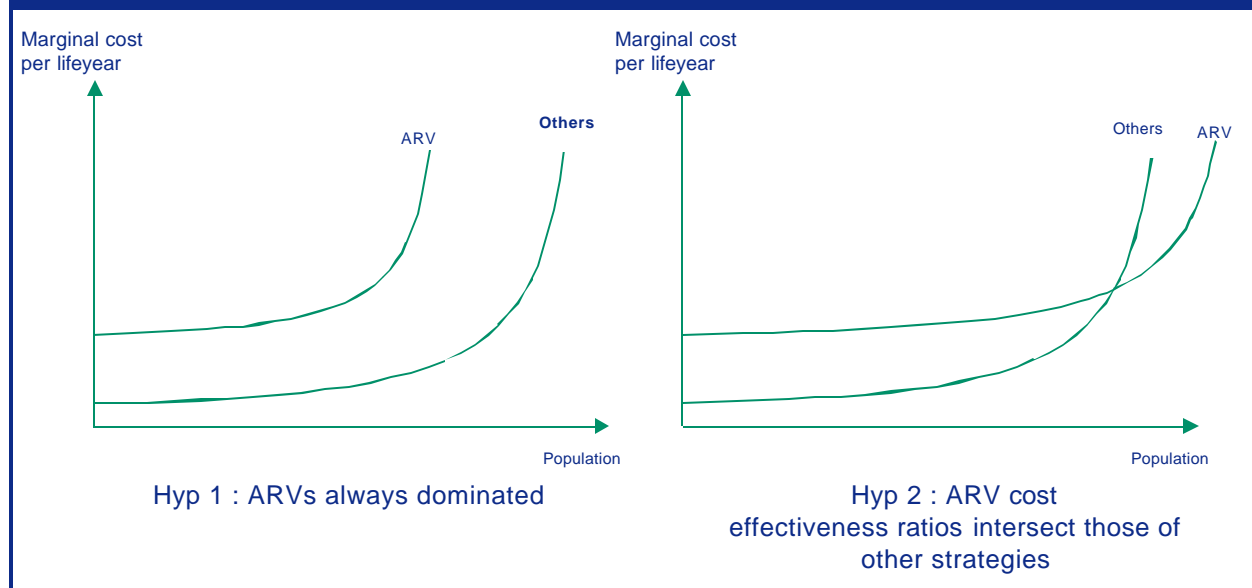
## Antiretroviral Treatment Can Be Cost-effective in Developing Countries

It is often argued that even if drugs were cheaper, antiretroviral treatment would not be “cost-effective” compared with the treatment of opportunistic infections and other alternative uses of resources for HIV care and prevention.<sup>14,15</sup> Such an assertion ignores the fact that, in the absence of an effective AIDS vaccine, all prevention and care interventions will follow the law of diminishing returns (i.e., that successive equal unit-additions of inputs will result, from some point on, in additions of output at a diminishing rate).<sup>81</sup> For example, although the unit cost of condoms is low, increased efforts are needed to promote their use in groups where social and cultural barriers are difficult to overcome, to the extent that the cost-per-averted-infection increases exponentially. Indeed, the no-

tion that antiretroviral treatment will never be cost-effective in developing countries is based on the implied assumption that implementation of other strategies for HIV care and prevention, whatever their decreasing returns, will always dominate even the most cost-effective strategies using antiretroviral drugs (Hypothesis 1 in Figure 3). In fact, it is more likely that, compared to alternative types of care, antiretroviral treatment will prove to be more cost-effective, at least in selected groups of patients (Hypothesis 2 in Figure 3).

The cost-effectiveness argument also ignores the fact that the best prophylaxis for opportunistic infections (OIs) is antiretroviral treatment. Studies on the incidence of OIs in North America and Europe demonstrate that achieving a CD4 count above a certain threshold has been associated with a 75 percent decrease in the incidence of OIs, meaning that discontinuation of prophylaxis can be safely imple-

Figure 3. Two Alternative Hypotheses About Cost-effectiveness of Antiretroviral Treatment Versus Other Strategies for HIV/AIDS Care



<sup>81</sup> Fellner W. Modern economic analysis. McGraw-Hill, New-York, 1960.

mented.<sup>82,83,84,85,86,87,88</sup> Sufficient data already exist to be clear that there is a different spectrum of disease in poor communities. In many regions of the developing world, virulent fungal, bacterial, and mycobacterial infections predominate that will respond to standard antimicrobial treatment, including co-infection with tuberculosis.<sup>89</sup> However, some of these agents are expensive. For example, the reduced cost of antiretrovirals compares favorably to the high cost of fluconazole, widely used to treat fungal infections, which until recent price reductions cost as much as US\$24 per pill in South Africa. It would be far better to treat the underlying cause of the disease, HIV infection, with effective antiretroviral therapy and protect the patient from all OIs.

In rich countries, the total cost of care for adults with HIV infection has declined since HAART was introduced.<sup>90,91,92,93</sup> The extent to which the cost of purchasing antiretroviral drugs is totally, or partially, offset by savings through the reduced number of hospitalizations and opportunistic infections remains unclear. However, once indirect costs (i.e., productivity losses associated with morbidity in HIV-infected individuals) are taken into account, HAART is clearly cost-saving in developed societies.<sup>94,95,96,97,98</sup> This may also be the case among many population groups in developing countries, as suggested by the increasing number of private companies in Côte d'Ivoire, South Africa, Uganda, and Kenya that provide antiretroviral treatment or subsidize their costs

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<sup>82</sup> Carcelain G, Debre P, Autran B. Reconstitution of CD4+ T lymphocytes in HIV-infected individuals following antiretroviral therapy. *Curr Opin Immunol* 2001; 13:483-8.

<sup>83</sup> Jouan M, Saves M, Tubiana R, Carcelain G, Cassoux N, Aubron-Olivier C, Fillet AM, Nciri M, Senechal B, Chene G, Tural C, Lasry S, Autran B, Katlama C. Discontinuation of maintenance therapy for cytomegalovirus retinitis in HIV-infected patients receiving highly active antiretroviral therapy. RESTIMOP study team. *AIDS* 2001; 15:23-31.

<sup>84</sup> Li TS, Tubiana R, Katlama C, Calvez V, Ait Mohand H, Autran B. Long-lasting recovery in CD4 T-cell function and viral-load reduction after highly active antiretroviral therapy in advanced HIV-1 disease. *Lancet* 1998; 351:1682-6.

<sup>85</sup> Koletar SL, Heald AE, Finkelstein D, Hafner R, Currier JS, McCutchan JA, Vallee M, Torriani FJ, Powderly WG, Fass RJ, Murphy RL. A prospective study of discontinuing primary and secondary pneumocystis carinii pneumonia prophylaxis after CD4 cell count increase to >200 x 106/L. *AIDS* 2001; 15:1509-15.

<sup>86</sup> Powderly WG. Prophylaxis for opportunistic infections in an era of effective antiretroviral therapy. *Clin Infect Dis* 2000; 31:597-601.

<sup>87</sup> Powderly WG. Immune reconstitution and the consequences for opportunistic infection treatment and prevention. *Curr Infect Dis Rep* 1999; 1:99-104.

<sup>88</sup> Grant LA, Silverberg MJ, Palacio H, Minkoff H, Anastos K, Young MA, Nowicki M, Kovacs A, Cohen M, Munoz. Discontinuation of potent antiretroviral therapy. Predictive value of and impact on CD4 cell counts and HIV RNA levels. *AIDS* 2001; 15:2101-2108.

<sup>89</sup> De Pinho AMF, Santoro-Lopes G, Harrison LH, Schechter M. Chemoprophylaxis for tuberculosis and survival of HIV-infected patients in Brazil. *AIDS* 2001; 15:2129-2135.

<sup>90</sup> Bozzette SA, Joyce G, McCaffrey DF, Leibowitz AA, Morton SC, Berry SH, Rastegar A, Timberlake D, Shapiro MF, Goldman DP. Expenditures for the care of HIV-infected patients in the era of highly active antiretroviral therapy. HIV Cost and Services Utilization Study Consortium. *N Engl J Med* 2001; 344:817-23.

<sup>91</sup> Gebo KA, Chaisson RE, Folkemer JG, Bartlett JG, Moore RD. Costs of medical care in the era of highly active antiretroviral therapy. *AIDS* 1999; 13:963-969.

<sup>92</sup> Keiser P, Kvanli MB, Turner D, Reisch J, Smith JW, Nassar N, Gregg C, Skiest D. Protease inhibitor-based therapy is associated with decreased HIV-related health care costs in men treated at a Veterans Administration Hospital. *J AIDS* 1999; 20:28-33.

<sup>93</sup> Le Pen C, Rozenbaum W, Downs A, Maurel F, Lilliu H, Brun C. Effect of HAART on health status and hospital costs of severe HIV-infected patients: a modeling approach. *HIV Clin Trials* 2001; 2:136-145.

<sup>94</sup> Sendi PP, Bucher HC, Harr T, Craig BA, Schwietert M, Pfluger D, Gafni A, Battegay M. Cost effectiveness of highly active antiretroviral therapy in HIV-infected patients. Swiss Cohort Study. *AIDS* 1999; 13:1115-22.

<sup>95</sup> Beck EJ, Miners AH, Tolley K. The cost of HIV treatment and care. A global review. *Pharmacoeconomics* 2001; 19:13-39.

<sup>96</sup> Sendi P, Palmer AJ, Gafni A, Battegay M. Highly active antiretroviral therapy: pharmacoeconomic issues in the management of HIV infection. *Pharmacoeconomics* 2001; 19:709-13.

<sup>97</sup> Keiser P, Nassar N, Kvanli MB, Turner D, Smith JW, Skiest D. Long-term impact of highly active antiretroviral therapy on HIV-related health care costs. *JAIDS* 2001; 17:14-9

<sup>98</sup> Gebo KA, Chaisson RE, Folkemer JG, Bartlett JG, Moore RD. Costs of HIV medical care in the era of highly active antiretroviral therapy. *AIDS* 1999; 13:963-9

for their workforces.<sup>99,100,101,102</sup> Without interventions to provide treatment, the negative impact of the AIDS pandemic on life expectancy,<sup>103,104,105,106</sup> as well as on macroeconomic, demographic, and social development,<sup>107,108,109,110</sup> will become increasingly more devastating for developing countries in the coming years. In this regard, the savings in indirect costs obtained through antiretroviral treatment are likely to be proportionally higher in developing countries than in the developed world.

Many health interventions that are considered cost-effective in the North do not save money *per se*. They involve net additional costs that are considered worth incurring to the extent that they “buy” additional health benefits. In high-income OECD countries, for example, it is usually considered that medical innovations should be adopted whose marginal costs per additional life-year saved are below US\$50,000 (circa twice the GDP per capita), whereas those with costs

above US\$150,000 (six times the GDP per capita) are judged too expensive for general use.<sup>111</sup> Using this criterion, antiretroviral treatment is clearly justified on cost-effectiveness grounds in countries such as the United States. The incremental health care cost per quality-adjusted life-year (QALY) of three-drug regimens compared to no antiretroviral treatment has been estimated to amount to US\$13,000-26,000.<sup>112</sup> This compares favorably with prophylaxis for opportunistic infections<sup>113</sup> and a number of HIV-prevention interventions.<sup>114,115</sup>

By applying a similar criterion to developing countries with lower GDPs, the use of antiretrovirals for the prevention of mother-to-child transmission of HIV is clearly cost-effective, and should be implemented on a large scale everywhere, including in the 49 least-developed countries of the world with a GDP per capita circa US\$300.<sup>116,117,118,119</sup> Continuing antiretroviral treatment for the mother and child after deliv-

<sup>99</sup> Aventin L, Huard P. The cost of AIDS in three manufacturing firms in Côte d'Ivoire. *Journal of African Economies* 2000; 9:161-168.

<sup>100</sup> Marseille E, Kahn JG, Saba J. The costs and benefits of employer-sponsored antiretroviral drug provision. Abstract LbOr22, XIII International AIDS Conference, Durban, July 9-14, 2000.

<sup>101</sup> Thea D, Rosen S, Vincent JR, Singh G, Simon J. Economic impact of HIV/AIDS in Company A's workforce. Session D14, XIII International Conference on AIDS, Durban, South Africa, July 9-14, 2000.

<sup>102</sup> Macharia D, Lule G, Silverstein D, Tesfaledet G, Patel S, Owili DM, Chang LW, Nganga L, De Cock KM, Weidle J. Review of antiretroviral therapy in the private sector in Nairobi, Kenya. Abstract 457-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>103</sup> US Bureau of the Census. World population profile 2000. Washington, DC: 2000

<sup>104</sup> Monitoring the AIDS Pandemic Network. The Status and Trends of the HIV/AIDS Epidemics in the World, 2000. U.S. Census Bureau, 2000.

<sup>105</sup> Dorrington R, Bourne D, Bradshaw D, Laubscher R, Timaeus IM. The impact of HIV/AIDS on adult mortality in South Africa. Technical report. Tygerberg: Burden of Disease Research Unit of the Medical Research Council of South Africa, 2001:6.

<sup>106</sup> Whiteside A. Demography and economics of AIDS. In: The changing face of HIV and AIDS. Editors: Weiss RA, Adler MW, Rowland-Jones SL. *Br Med Bull* 2001; 58:73-88.

<sup>107</sup> Loewenson R, Whiteside A. HIV/AIDS implications for poverty reduction. United Nations Development Programme background paper for the UN General Assembly Special Session on HIV/AIDS, New York, June 25-27, 2001.

<sup>108</sup> Piot P, Bartos M, Ghys PD, Walker N, Schwartländer B. The global impact of HIV/AIDS. *Nature* 2001; 410:968-73.

<sup>109</sup> Schwartländer B, Garnett G, Walker N, Anderson R. AIDS in a new millennium. *Science* 2000; 289:64-6.

<sup>110</sup> World Bank. Confronting AIDS: public priorities in a global epidemic. New York: Oxford University Press, 1997.

<sup>111</sup> Garber AM. Advances in CE analysis. In: Culyer AJ & Newhouse JP (Eds.). Handbook of health economics. Vol. 1. Elsevier Science, Amsterdam, 2000.

<sup>112</sup> Freedberg KA, Losina E, Weinstein MC, Paltiel AD, Cohen CJ, Seage GR, Craven DE, Zhang H, Kimmel AD, Goldie SJ. The cost effectiveness of combination antiretroviral therapy for HIV disease. *N Engl J Med* 2001; 344:824-831.

<sup>113</sup> Freedberg KA, Scharfstein JA, Seage GR, Losina E, Weinstein MC, Craven DE, Paltiel AD. The cost-effectiveness of preventing AIDS-related opportunistic infections. *JAMA* 1998; 279:130-6.

<sup>114</sup> Pinkerton SD, Johnson-Masottia AP, Holtgrave DR, Farnham PG. Using cost-effectiveness league tables to compare interventions to prevent sexual transmission of HIV. *AIDS* 2001; 15:917-928.

<sup>115</sup> Moore RD. Cost effectiveness of combination HIV therapy: 3 years later. *Pharmacoeconomics* 2000; 17:325-30.

<sup>116</sup> Marseille E, Kahn JG, Mmiro F, Guay L, Musoke P, Fowler MG, Jackson JB. The cost effectiveness of a single-dose nevirapine regimen to mother and infant to reduce vertical HIV-1 transmission in sub-Saharan Africa. *Ann NY Acad Sci* 2000; 918:53-6.

<sup>117</sup> Marseille E, Kahn JG, Mmiro F, Guay L, Musoke P, Fowler MG, Jackson JB. Cost effectiveness of single-dose nevirapine regimen for mother and babies to decrease vertical HIV-1 transmission in sub-Saharan Africa. *Lancet* 1999; 354:803-9.

<sup>118</sup> Marseille E, Kahn JG, Saba J. Cost-effectiveness of antiviral drug therapy to reduce mother to child transmission in sub-Saharan Africa. *AIDS* 1998; 12:939-948.

<sup>119</sup> Ades AE, Ratcliffe J, Gibb DM. Economic issues in the prevention of vertical transmission of HIV. *Pharmacoeconomics* 2000; 18:9-22.

ery, if indicated, is likely to meet this criterion in situations where breastfeeding remains the norm.<sup>120,121</sup> Estimates of the additional cost per life-year saved with HAART in developing countries<sup>122</sup> suggest that, according to this criterion, and taking into account the current reduced prices of drugs, HAART can already be considered to be cost-effective in middle-income countries, such as Brazil and South Africa, which have GDPs per capita above US\$3,000.

Studies in rich countries have shown that because the probability of survival is the lowest in patients with clinical AIDS, initiating HAART when the CD4 count is below 50 cubic millimeters produces a 50 percent increase in the cost per additional life-year saved as compared with initiating treatment at a CD4 cell count of 200 per cubic millimeter. In Côte d'Ivoire<sup>21</sup> and Uganda,<sup>33</sup> the median CD4 counts of antiretroviral-naïve patients at the initiation of therapy were 89 and 84 cells/mm<sup>3</sup>, respectively. Implementing the current recommendations to initiate treatment at a level no lower than 200 CD4 cells per cubic millimeter should improve the cost-effectiveness ratio. Other ways of decreasing the costs of treatment are being explored, including the identification of the cheapest effective combination regimens for first-line treatment,<sup>123</sup> the simplification of monitoring for efficacy and toxicity of antiretroviral treatment, and the promotion of cheaper and simpler methods for CD4 cell counts and viral load measurements.<sup>124,125</sup> At present, only 13 of 56 countries in the developing world can measure viral load.<sup>126</sup> In Uganda, a viral load test costs US\$100, exceeding the cost of a month's supply of antiretroviral drugs.<sup>71</sup> In Côte d'Ivoire, a viral

load costs US\$65.<sup>118</sup> One immediate priority for the Global Fund should be to analyze the existing data on the experience with antiretroviral drugs in developing countries to determine the most cost-effective conditions for their use.

## Increasing Access to Antiretroviral Drugs Will Create Opportunities for Strengthening Health Care Infrastructures

The Drug Access Initiative in Côte d'Ivoire and Uganda has demonstrated the feasibility of delivering and monitoring antiretroviral treatment in the context of existing health care infrastructures.<sup>31,32,33</sup> The referral centers of the Initiative, which include public, not-for-profit and private health care structures, have been able to provide adequate clinical expertise, laboratory facilities, drug storage and stock management for the use of antiretroviral drugs. The clinical, immunological and virological outcomes have been similar to those reported in Brazil, Thailand, and high-income countries. The number of patients treated under the Drug Access Initiative represents less than 1 percent of the estimated number of eligible HIV-infected individuals in both countries, and the only referral centers are located in Abidjan and Kampala. However, the potential for scaling up these programs using existing infrastructures is large, especially if wider access to antiretroviral drugs is integrated with other vertical disease control programs.<sup>127</sup> A study conducted in Uganda in early 2000 estimated that, based on an annual cost below US\$1,000, access to antiretroviral treatment could be rapidly extended to 50,000

<sup>120</sup> Nduati R, Richardson BA, John G, Mbori-Ngacha D, Mwatha A, Ndinya-Achola J, Bwayo J, Onyango FE, Kreiss J. Effect of breastfeeding on mortality among HIV-1 infected women: a randomised trial. *Lancet* 2001; 357:1651-4.

<sup>121</sup> Nduati R, John G, Mbori-Ngacha D, Richardson B, Overbaugh J, Mwatha A, Ndinya-Achola J, Bwayo J, Onyango FE, Hughes J, Kreiss J. Effect of breastfeeding and formula feeding on transmission of HIV-1: a randomized clinical trial. *JAMA* 2000; 283:1167-1174.

<sup>122</sup> Wood E, Braitstein P, Montaner JS, Schechter MT, Tyndall MW, O'Shaughnessy MV, Hogg RS. Extent to which low-level use of antiretroviral treatment could curb the AIDS epidemic in sub-Saharan Africa. *Lancet* 2000; 355:2095-3100.

<sup>123</sup> Plosker GL, Perry CM, Goa KL. Efavirenz: a pharmacoeconomic review of its use in HIV infection. *Pharmacoeconomics* 2001; 19:421-436.

<sup>124</sup> Didier JM, Kazatchkine MD, Demouchy C, Moat C, Diagbouga S, Sepulveda C, Di Lonardo AM, Weiss L. Comparative assessment of five alternative methods for CD4+ T-lymphocyte enumeration for implementation in developing countries. *JAIDS* 2001; 26:193-5.

<sup>125</sup> Bartholomew C. Prices of CD4 assays and viral load tests must be reduced for developing countries. *BMJ* 2001; 323:809.

<sup>126</sup> Nkengasong JN. Laboratory monitoring of antiretroviral therapy in developing countries. Abstract S27, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>127</sup> Osborne CM, Van Praag E, Jackson H. Models of care for patients with HIV/AIDS. *AIDS* 1997; 11: S135-S141.

individuals with limited infrastructure investments in the nine regional hospitals of the country.<sup>128</sup>

Infrastructure requirements for antiretroviral treatment include basic health care components, access to clean water and refrigeration. In the longer term, there will be limits to the extent to which drug access may be scaled up within the framework of current health infrastructures.<sup>129</sup> It should, however, be emphasized that existing health care systems are already overburdened by the HIV epidemic. In Côte d'Ivoire and Uganda, 50 percent to 80 percent of adult hospital beds are occupied by patients with HIV-related conditions. In Swaziland, the average length of stay in hospitals is six days, but increases to 30.4 days for patients with tuberculosis associated with HIV.<sup>130</sup> The examples of Brazil, Côte d'Ivoire, and Uganda show that providing antiretroviral treatment has positive complementary effects for the upgrading of national health care infrastructures, including laboratory facilities, the training of professionals, and the capacity to conduct research.

## **The Risk of Induction of Viral Resistance Should Not Impede Access to Antiretroviral Treatment in Developing Countries**

The risk of dissemination of resistant viral strains due to suboptimal anti-HIV drug regimens, inadequate prescription, and/or patients' noncompliance with drug regimens has been raised as a threat to public health that may mitigate the overall benefit of antiretroviral treatment.<sup>131</sup> In Europe and North America, cross-sectional studies among HAART-treated patients have indicated that 20 percent to 40 percent do not fully take their regimens as prescribed at any point in time, and longitudinal studies have suggested that no more than one-third remain 95 percent to 100 percent adherent to HAART during follow-up.<sup>132</sup> One of four or five HAART-treated patients exhibit phenotypic and genotypic resistance to at least one protease inhibitor.<sup>133</sup> These observations have not led to recommendations for withholding HAART in developed countries. Despite a first report of multidrug resistant HIV in Southern Africa<sup>134</sup>, there is no evidence currently that viral resistance<sup>135</sup> and nonadherence are a greater problem in cohorts of patients treated in developing countries. In Brazil,<sup>136,137</sup> Senegal,<sup>138</sup> and Uganda,<sup>33</sup> adherence to prescribed antiretroviral therapy was assessed to be greater than 70 percent to 80 percent in cross-sectional surveys. In fact, the greater risk of broad dissemination of resistant viruses may come from the unregulated availability of antiretroviral drugs that will inevitably occur in developing countries in the absence of organized efforts by public health authorities to improve access to treatment. There

<sup>128</sup> McKinsey & Co. Increasing access to ARV treatment: recommended approach for Uganda. Ministry of Health, Kampala, September 2000.

<sup>129</sup> Binswanger HP. Scaling up HIV/AIDS programs to national coverage. Rural Development and Environment for Africa, World Bank, Washington DC. *Science*, 2000; 288:2173-6.

<sup>130</sup> Kingdom of Swaziland. Ministry of Health and Social Welfare. Accelerating access to HIV/AIDS care in Swaziland. A partnership between the Kingdom of Swaziland, the United Nations System, and the Private sector. Project Document, September 2000.

<sup>131</sup> Wainberg M, Friedland G. Public health implications of antiretroviral therapy and HIV drug resistance. *JAMA* 1998; 279:1977-1983.

<sup>132</sup> Carrieri P, Cailleton V, Le Moing V, Spire B, Dellamonica P, Bouvet E, Raffi F, Journot V, Moatti JP. The dynamic of adherence to highly active antiretroviral therapy: results from the French National APROCO cohort. *J AIDS* 2001; 28(3):232-9.

<sup>133</sup> Hertogs K, Bloor S, Kemp SD, Van den Eynde C, Alcorn TM, Pauwels R, Van Houtte M, Staszewski S, Miller V, Larder BA. Phenotypic and genotypic analysis of clinical HIV-1 isolates reveals extensive protease inhibitor cross-resistance: a survey of over 6000 samples. *AIDS* 2000; 14:1203-1210.

<sup>134</sup> Miller S, Peters D, Keena L. First report of multi-drug resistant HIV-1 in Southern Africa. Abstract 375-M, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>135</sup> Weidle PJ, Kityo CM, Mugenyi P, Downing R, Kebba A, Pieniazek D, Respass R, Hertogs K, De Vroey V, Dehertogh P, Bloor S, Larder B, Lackritz E. Resistance to antiretroviral therapy among patients in Uganda. *J AIDS* 2001; 26:495-500.

<sup>136</sup> Laurence J. Adhering to antiretroviral therapies. *AIDS Patient Care & Stds* 2001; 15:107-108.

<sup>137</sup> Palva V, Teixeira P, Shimma E. What is being done to improve ARV therapy adherence in Sao Paulo, Brazil. Abstract THPeB5005, XIII International AIDS Conference, Durban, July 9-14, 2000.

<sup>138</sup> Lanièce I, Ciss M, Djeme B, Ndoye I. Observance of antiretroviral therapy in the Senegalese governmental initiative. Abstract LbOr20, XIII International AIDS Conference, Durban, July 9-14, 2000.

have already been reports of “anarchic” distribution of antiretroviral drugs in sub-Saharan Africa.<sup>139,140</sup> In Uganda, representatives of private business have expressed concerns about excessive mark-ups on antiretroviral drugs when made available through private channels outside the Drug Access Initiative, and have strongly advocated in favor of public price controls of antiretroviral drugs.<sup>33</sup>

## **Regulated Government and Private Efforts to Improve Access to Antiretroviral Treatment Should Reduce Inequality With Regard to Access to Care in Developing Countries**

Equality with regard to access to care is far from being granted in lower-income countries. In Uganda, geographical access to health care facilities is limited to 49 percent of households, and only 43 percent of districts have any form of health facility, with an even lower proportion in rural areas.<sup>141</sup> Users of health care services in urban areas of developing countries often have incomes far above the national average, while such services often do not reach the poorest among urban dwellers.<sup>142,143</sup> Therefore, the concern that the use of public funds to subsidize antiretroviral treatment may be inequitable, or will shift health resources from the poor to those who are less poor, are legitimate. Such concerns, however, fail to realize that even in the best cases, the market will simply not provide adequate services to the most poor, and that it is market failures of this kind that prompt government action in the first place. The Ugandan government considered that it did not have the financial capability to provide any subsidy for covering direct costs of antiretroviral drugs, which are consequently charged to private

households whether or not they benefit from private health insurance coverage. Not surprisingly,<sup>33</sup> patients accessing antiretroviral treatment via the Drug Access Initiative in Uganda have a significantly higher socioeconomic status than the general population of the country. In Côte d’Ivoire, the provision of antiretroviral drugs at a 50 percent to 95 percent subsidized price for persons who meet predefined socioeconomic conditions has allowed access to treatment for a number of patients in spite of their low socioeconomic status: 40 percent of antiretroviral treated patients in this country had no income, and 45 percent had an annual income below US\$400.<sup>21</sup>

Obviously, constraints on government expenditures will prevent the public and private sector from establishing strict egalitarian access to antiretroviral treatment in many developing countries. However, a national consensus should be reached, in each country, for defining the population groups that can benefit from public support for expanded access to treatment. There is no doubt that leaving access to antiretroviral drugs to pure market forces will restrict their availability to the most privileged, and maximize the risk of their diversion to “black market” sales.

## **Antiretroviral Treatment in Developing Countries Is Effective and Well Tolerated by Patients**

Senegalese pilot studies into expanding access to antiretroviral treatment, started in August 1998, have demonstrated the feasibility of establishing programs for antiretroviral drug therapy in Africa.<sup>34,35</sup> Results after 24 months of follow-up showed the clinical, immunological, and virological effectiveness of adult therapy, and excellent compliance with drug regimens during

<sup>139</sup> Harries AD, Nyangulu DS, Hargreaves NJ, Kaluwa O, Salaniponi FM. Preventing antiretroviral anarchy in sub-Saharan Africa. *Lancet* 2001; 358:410-14.

<sup>140</sup> Horton R. African AIDS beyond Mbeki: tripping into anarchy. *Lancet* 2000; 356:1541-1542.

<sup>141</sup> Ministry of Health of the Republic of Uganda. Health sector strategic plan 2000/01-2004/05. Kampala, 2000.

<sup>142</sup> Leighton C. Overview: health financing reforms in Africa. *Health Policy & Planning* 1995; 10:213-222.

<sup>143</sup> Sauerborn R, Noutgara A, Latimer E. The elasticity of demand for health care in Burkina Faso: differences across age and income groups. *Health Policy & Planning* 1994; 9:185-192.

the study period. Among more recent studies, the Senegalese Government HAART Initiative, a prospective observational cohort study of feasibility, effectiveness, adherence, toxicity, and viral resistance, as well as a once-a-day HAART study, have shown that the clinical and biological results are comparable to those seen in Western cohorts, despite differences in the HIV-1 subtype distribution and a more advanced disease stage when treatment was initiated.<sup>144,145,146</sup> Taken together, the data show that HAART is feasible, effective, and well tolerated in African patients. Moreover, viral resistance rarely emerged.

In Brazil,<sup>147</sup> Thailand,<sup>148</sup> India,<sup>149,150</sup> and a growing number of other countries, the evidence is accumulating that expanded access to antiretroviral treatment is feasible in developing nations and that the response to antiretroviral therapy is uniform regardless of the setting and local challenges. Despite continuing concerns about the cost of antiretroviral treatment, the sustainability of drug supply at affordable prices, and concerns about potential drug resistance,<sup>151</sup> which will be closely monitored, the Thai government has recently an-

nounced a major expansion of antiretroviral treatment coverage.<sup>152</sup>

Most studies on antiretroviral treatment in the developing world have been conducted among adult populations. However, this is changing, as witnessed by the growing number of feasibility studies being conducted among children and adolescents in developing nations by pediatricians and foundations that pioneered the use of antiretroviral drugs for the prevention of mother-to-child transmission.<sup>153</sup>

In rich industrialized nations, the success of mother-to-child prevention programs has dramatically reduced the number of infants who are born HIV-infected. Pediatric treatment guidelines are regularly included in the national treatment guidelines,<sup>154</sup> although the market for their use is small. Studies in North America and Europe have shown that treatment with HAART is safe and effective, is associated with a sustained effect on growth, helps to reconstitute immune systems to a degree indistinguishable from healthy HIV-infected children, and markedly reduces mortality among children and

<sup>144</sup> Laurent C, Diakhate N, Fatou Ngom N, Sow P, Faye M, Gueye M, Lanière I, Toure Kane C, Liegeois F, Mboup S, Badiane S, Ndoye I, Delaporte E. The Senegalese government HAART initiative: an 18-month follow-up study of feasibility, effectiveness, adherence, toxicity and viral resistance. Abstract 460-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>145</sup> Landman R, Thiam S, Canestri A, Delaporte E, Mboup S, Vray M, Dalban C, Badiane S, Sow S, Niang AF, Gueye PM, Lanière I, Coulaud JP, Girard PM, Ndoye I. Long-term evaluation (15 months) of ddI, 3TC and efavirenz once-daily regimen in naïve patients in Senegal: ANRS 12-04/IMEA 011 Study. Abstract 458-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>146</sup> Landman R, Thiam S, Canestri A, Delaporte E, Mboup S, Vray M, Dalban C, Badiane S, Sow S, Niang AF, Gueye PM, Lanière I, Coulaud JP, Girard PM, Ndoye I. First evaluation (15 months) of ddI, 3TC and efavirenz once-daily regimen in naïve patients in Senegal: ANRS 12-06/IMEA 012 Study. Abstract 459-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>147</sup> Antiretroviral Therapy: Brazil's experience. Ministry of Health, National STD/AIDS Programme, Brasilia: 2000.

<sup>148</sup> Kunanusont C, Phoolcharoen W, Bodaramik Y. Evolution of medical services for HIV/AIDS in Thailand. Department of Communicable Disease Control, Ministry of Public Health, Nonthaburi, Thailand. *J Med Assoc Thai* 1999; 82:425-34.

<sup>149</sup> Kumarasamy N, Mayer K, Flanigan T, Hemalatha R, Carpenter C, Thyagarajan SP, Solomon S. Survival of persons with HIV disease following antiretroviral therapy in Southern India. Abstract 462-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>150</sup> Pujari S, Naik E, Patel A, Bhagat S. Safety, tolerability, and efficacy of nevirapine-based HAART amongst antiretroviral naïve HIV-1 infected patients in India. Abstract 463-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>151</sup> Phanuphak P. Potential antiretroviral drug resistance in developing countries: the Thailand experience. Abstract S28, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>152</sup> Statement by H. E. Minister of Public Health of Thailand, Sudarat Kaeyuraphan. Bangkok: December 1, 2001.

<sup>153</sup> Wilfert CM. Prevention of mother-to-child transmission: implementation, programs, and treatment of mothers and children. Abstract S26, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>154</sup> Guidelines for the use of antiretroviral agents in pediatric HIV infection, January 7, 2000. Working group on antiretroviral therapy and medical management of HIV-infected children. *HIV Clin Trials* 2000; 1:58-99.



adolescents.<sup>155,156,157</sup> However, in the developing world, an estimated 2.7 million children and adolescents under 15 years of age are living with HIV or AIDS, the vast majority of them in sub-Saharan Africa;<sup>4</sup> reflecting the harsh realities of AIDS. Many of these children are orphans, and access to treatment is virtually nil. Preliminary studies of the feasibility of expanding antiretroviral therapy to children in South Africa suggest increased benefits.<sup>158</sup> A study in Côte d'Ivoire has calculated the cost of pediatric treatment and suggested that it is sustainable in limited-resource settings.<sup>159</sup> It is encouraging to note that other developing nations are exploring the feasibility of expanding access to treatment for children, most notably India<sup>160</sup> and Nigeria.<sup>161</sup>

## **The Development of International Treatment Guidelines for Resource-Limited Settings Will Facilitate Making Rational Decisions About Antiretroviral Treatment**

Far more resources have been devoted to studying viral pathogenesis and treatment than would have been the case had HIV been an exclusively tropical problem.<sup>162</sup> Much of the new science and antiretroviral drugs discovered are primarily geared to resource-rich nations. This is particularly true with high-technology approaches to diagnosing, treating, monitoring and managing HIV/AIDS. In rich industrialized nations, the standard of care is constantly evolving and is subject to frequent revisions based on the latest information, as reflected in the sometimes conflicting national guidelines for antiretroviral treatment.<sup>163,164,165,166</sup>

By contrast, in non-industrialized countries the first problem remains an almost dearth of knowledge about how to diagnose and treat HIV/AIDS and HIV-related conditions in a resource-poor setting, and little has been done to elaborate rational and appropriate approaches to care in communities where at best most sick people only have access to the bare minimum of clinical services.<sup>167,168</sup>

<sup>155</sup> Verweel G, van Rossum AM, Hartwig NG, Wolfs TF, Scherpbier HJ, de Groot R. Treatment with highly active antiretroviral therapy in human immunodeficiency virus type-1-infected children is associated with a sustained effect on growth. *Pediatrics* 2002; 109:E25.

<sup>156</sup> Gortmaker SL, Hughes M, Cervia J, Brady M, Johnson GM, Seage GR, Song LY, Dankner WM, Oleske JM. Effect of combination therapy including protease inhibitors on mortality among children and adolescents infected with HIV-1. Pediatric AIDS Clinical Trials Group Protocol 219 Team. *N Engl J Med* 2001; 345:1522-8.

<sup>157</sup> Johnston AM, Valentine ME, Ottinger J, Baydo R, Gryszowka V, Vavro C, Weinhold K, St Clair M, McKinney RE. Immune reconstitution in human immunodeficiency virus-infected children receiving highly active antiretroviral therapy: a cohort study. *Pediatr Infect Dis* 2001; 20:941-6.

<sup>158</sup> Cotton MF. Antiretroviral therapy in children: increased benefit from increased complexity. *S Afr Med J* 2000; 90:985-8.

<sup>159</sup> Giraudon I, Leroy V, Msellati P, Elenga N, Ramon R, Wellfens Ekra C, Dabis F. The costs of treating HIV-infected children in Abidjan, Ivory Coast, 1996-1997. Article in French. *Santé* 1999; 9:277-81.

<sup>160</sup> Kaul D, Patel JA. Clinical manifestations and management of pediatric HIV infection. *Indian J Pediatr* 2001; 68:623-31.

<sup>161</sup> Ekong E, Grant-Isibor I, Igbu T, Uwah A. Evaluation of ritonavir (RTV) in combination with stavudine (d4T) and lamivudine (3TC) in HIV-infected children in 4 Nigerian centres. Abstract 808-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>162</sup> Gilks CF. HIV care in non-industrialised countries. In: The changing face of HIV and AIDS. Editors Weiss RA, Adler MW, Rowland-Jones SL. *Br Med Bull* 2001; 58:171-186.

<sup>163</sup> Carpenter CCI, Cooper DA, Fischl MA, Gatell JM, Gazzard BG, Hammer SM, Hirsch MS, Jacobsen DM, Katzenstein DA, Montaner JSG, Richman DD, Saag MS, Schechter M, Schooley RT, Thompson MA, Vella S, Yeni PG, Volberding PA. Antiretroviral therapy in adults: Updated recommendations of the International AIDS Society-USA panel. *JAMA* 2000; 283:381-390.

<sup>164</sup> Department of Health and Human Services (DHHS) and the Henry J. Kaiser Family Foundation. Guidelines for the use of antiretroviral agents in HIV-infected adults and adolescents. DHHS, 2001. Available at: [www.hivartis.org](http://www.hivartis.org)

<sup>165</sup> Delfraissy JF, et al. New French guidelines for antiretroviral treatment. A consensus panel composed of French researchers, clinicians and community advocates. *HIV Med* 2000; 1:133-6.

<sup>166</sup> British HIV Association Writing Committee. British HIV association guidelines for the treatment of HIV-infected adults with antiretroviral therapy. London: 2000. Available at: [www.aidsmap.com](http://www.aidsmap.com)

<sup>167</sup> Kaninda AV, for Médecins Sans Frontières. The Access Challenge: AIDS treatment in resource-limited settings. Abstract S26, 8th Conference on Retroviruses and Opportunistic Infections, Chicago, IL, 2001

<sup>168</sup> Gilks CF, Katabira E, De Cock KM. The challenge of providing effective care for HIV/AIDS in Africa. *AIDS* 1997; 11(Suppl B): S99-106.

Since 1997, there have been several efforts to issue treatment guidelines for developing countries.<sup>169,170</sup> The WHO has recently appointed a panel of experts to update international treatment guidelines adapted for resource-limited settings that will recommend the most effective first-line regimens based on antiretroviral drugs that are available and affordable locally<sup>171</sup>. These guidelines will also update WHO information published five years ago on alternative HIV testing techniques,<sup>172</sup> laboratory requirements,<sup>173</sup> and CD4<sup>174</sup> and viral load<sup>175</sup> measurement technologies that are reliable and less expensive than those customarily used in wealthy countries. The new recommendations will build on recent work in the field, which shows that alternative methods for HIV monitoring and diagnostics are feasible and can be conducted effectively, reliably, and more cheaply.<sup>176,177,178,179,180</sup> Combined with operational research studies urgently needed to test the practical feasibility and appropriateness of regionally adapted guidelines

relevant to resource-limited settings,<sup>22,23</sup> these recommendations will make it easier for policymakers and health care providers to make rational choices about how to expand access to treatment.

## Expanded Access to Antiretroviral Treatment in Developing Countries Is a Practical Option That can be Implemented Now

A new, landmark report commissioned by the WHO shows that there is now compelling evidence that investment in global health spurs economic development,<sup>181</sup> and that successful prevention and treatment of infectious diseases are linked. A follow-up report by UN agencies and the World Bank shows that scaling up the response to disease is a way out of poverty.<sup>182</sup> Although expanded access to antiretroviral

<sup>169</sup> Consensus Report: Place of antiretroviral drugs in the treatment of HIV-infected people in Africa. IAS, Scientific coordination: Coulaud JP, Larouze B, Ahuanto AM. *AIDS*1999; 13:IAS 1-3.

<sup>170</sup> ANRS, IMEA, IRD, Société africaine contre le Sida, UNAIDS, PNLS-Sénégal, PNLS-Côte d'Ivoire, IAS. Use of antiretroviral drugs in the management of HIV-infected persons. Updated recommendations, October 2000.

<sup>171</sup> Hammer SM, et al. WHO treatment guidelines for resource-limited settings (working title). Steering Committee for the Interim WHO Antiretroviral Treatment Working Group. Spring 2002. In development.

<sup>172</sup> Andersson S, da Silva Z, Norrgren H, Dias F, Biberfeld G. Field evaluation of alternative testing strategies for diagnosis and differentiation of HIV-1 and HIV-2 infections in an HIV-1 and HIV-2 prevalent area. *AIDS*1997; 11:1815-22.

<sup>173</sup> Biberfeld G. Laboratory requirements for the safe and effective use of antiretrovirals. Guidance Modules on Antiretroviral Treatments, Module 5. UNAIDS and WHO, 1998; Available at: [www.who.int/HIV\\_AIDS/antiretroviral\\_modules/indexar.htm](http://www.who.int/HIV_AIDS/antiretroviral_modules/indexar.htm)

<sup>174</sup> Lyamuya EF, Kagoma C, Mbena EC, Urassa WK, Pallangyo K, Mhalu FS, Biberfeld G. Evaluation of the FACScout, TRAx CD4 and Dynabeads methods for CD4 lymphocyte determination. *J Immun Methods*1996; 195:103-112.

<sup>175</sup> Boni J, Opravil M, Tomasik Z, Rothen M, Bisset L, Grob PJ, Luthy R, Schupbach J. Simple monitoring of antiretroviral therapy with a signal-amplification-boosted HIV-1 p24 antigen assay with heat-denatured plasma. *AIDS*1997; 11:F47-52.

<sup>176</sup> Nkengasong JN, Borget MY, Maurice C, Boateng E, Kalou M, Djomand G, Ekpini R, Eholie S, Bissagene E, Coulibaly M, Wiktor SZ, Roels TH, Chorba T. Distribution of HIV-1 plasma RNA viral load and CD4+ T-cell counts among HIV-infected Africans evaluated for antiretroviral therapy. *JAIDS*2001; 28:99-101.

<sup>177</sup> Diabougou S, Van De Perre P, Kazatchkine M, Inwoley A, Mboup S, Prince-David M, Tenin A, Soudré R, Aboulker JP, Weiss L. Feasibility of a multicenter implantation of an alternative technique for the measurement of CD4 lymphocytes. Abstract 12DT4-3, XIII International Conference on AIDS and STDs in Africa, Ougadougou, Dec 2001.

<sup>178</sup> Bonard D, Huët C, Rouet F, Toni TA, Enouf M, Gourvellec G, Minga A, Rouzioux C, Dabis F, Salamon R. Evaluation of antigen p24 immune complex dissociated detection for HIV-1 viral load quantification. Abstract 12DT4-2, XIII International Conference on AIDS and STDs in Africa, Ougadougou, Dec 2001.

<sup>179</sup> Flanigan T, Mahajan A, Kumarasamy N, Mayer K, Carpenter C, Solomon S. Total lymphocyte count (TLC) as a surrogate for CD4 count to initiate and monitor HAART in resource-limited countries. Abstract 456-W, 9th Conference on Retroviruses and Opportunistic Infections. Seattle, WA: February 24-28, 2002.

<sup>180</sup> Monitoring and diagnostic tools for the management of antiretroviral therapy in resource-poor settings. Workshop sponsored by Project Inform and GMHC (Cheng B, Gonsalves G, organizers), Bethesda, MD, November 2001. Available at: [www.projinf.org/presentations/bethesda.html](http://www.projinf.org/presentations/bethesda.html)

<sup>181</sup> Sachs JD, Ahluwalia JJ, Amoako KY, Aninat E, Cohen D, Diabre Z, Doryan E, Feachem R, Fogel RW, Jamison D, Kato T, Lustig N, Mills A, Moe T, Panitchpakdi S, Singh M, Tyson L, Varmus H. Macroeconomics and health: investing in health for economic development. Report of the Commission on Macroeconomics and Health (CMH) of the World Health Organization (WHO), December 20, 2001. Available at: [www3.who.int/whosis/cmh/cmh\\_report/e/report.cfm?path=cmh,cmh\\_report&language=english](http://www3.who.int/whosis/cmh/cmh_report/e/report.cfm?path=cmh,cmh_report&language=english)

<sup>182</sup> WHO, UNICEF, UNAIDS, et al. Scaling up the response to infectious diseases: a way out of poverty. Report by WHO, UNICEF, UNAIDS, the World Bank, UNESCO, and UNFPA launched at the World Economic Forum Annual Meeting 2002, New York. Vallanjon M, ed. Geneva: February 2, 2002. Available at: [www.who.int/infectious-disease-report/index.html](http://www.who.int/infectious-disease-report/index.html)

treatment has become more affordable and is now feasible in many resource-poor settings, it is not reasonable to expect the rapid, broad-scale introduction of antiretroviral drugs and treatment to occur overnight. Rather, expanded access has to be a step-by-step process, albeit an accelerated one, based on planned country-by-country roll-outs designed to enhance existing efforts without imposing undue additional strains on local health care systems.

This is not to deny the urgency of the situation nor the need to intervene with antiretroviral treatment on a scale that matches the magnitude of the epidemic. Expanded access to treatment in middle- and low-income countries in Africa, Asia, and Latin America and the Caribbean is practical wherever there is political will. Refusing access when more affordable antiretroviral treatments are now available, especially if this springs from decisions made in the West, is morally indefensible and risks the perception that rich nations only care about their own.

As the evidence shows, denying expanded access to antiretroviral treatment is not only bad public health, but also bad economic policy.<sup>173,174,183</sup> In an interconnected world, AIDS is a crushing development problem that affects all nations, large<sup>184,185</sup> and small.<sup>186,187,188,189</sup> The World Bank and international development

agencies agree that helping to build capacity and fund improvements to health care infrastructures in low-income, high-incidence countries most affected by the epidemic is an urgent priority for government bankers and economic planners of rich industrialized nations.<sup>173,174,175</sup>

African heads of state have recently adopted a similar stance at the continent level.<sup>190</sup> In Botswana, operational studies have shown that public health care infrastructure, the training of doctors and nurses, and the building of clinics and laboratories, can be upgraded on a crash basis. In all developing nations, capacity building is a crucial step in speeding the implementation of integrated prevention, care, and treatment programs for HIV/AIDS as well as other health programs.

The current and projected declines in productivity in sub-Saharan Africa underline the pressing need to intervene with effective treatments.<sup>176,177</sup> Countries in Southern Africa at the epicenter of the epidemic with up to 25 percent of their workforces HIV-infected cannot wait another decade for a safe, effective AIDS vaccine. Although over 70 Phase I and II vaccine trials have been completed, we are probably at least four years away from Phase III studies of more promising vaccine candidates that are currently in development.<sup>191,192,193,194,195</sup>

<sup>183</sup> The World Bank. Can Africa claim the 21st century? Washington DC: World Bank, 2000:85.

<sup>184</sup> Arndt C, Lewis J. The macro implications of HIV/AIDS in South Africa: a preliminary assessment. *S Afr J Econ* 2000; 68(1):856-87.

<sup>185</sup> Quattek K. The economic impact of AIDS in South Africa: a dark cloud on the horizon. In: HIV/AIDS: A threat to the African Renaissance. *Occasional Papers*. Johannesburg: Konrad-Adenauer Stiftung 2000.

<sup>186</sup> Botswana Institute for Development Policy Analysis. Macroeconomic impacts of the HIV/AIDS epidemic in Botswana: Final report. Gaborone Institute for Development Policy Analysis, 2000.

<sup>187</sup> Sanderson WC, Hellmuth ME, Strzepek KM. Botswana's future: modeling population and sustainable development challenges in the era of HIV/AIDS. International Institute for Applied Systems Analysis, Laxenberg, Austria, 2000.

<sup>188</sup> Sanderson WC, Hellmuth ME, Strzepek KM. Namibia's future: modeling population and sustainable development challenges in the era of HIV/AIDS. International Institute for Applied Systems Analysis, Laxenberg, Austria, 2000.

<sup>189</sup> Nicholls S, McLean R, Theodore K, Henry R, Camara B, et al. Modelling the macroeconomic impact of HIV/AIDS in the English-speaking Caribbean: The case of Trinidad and Tobago and Jamaica. Paper presented at the IAEN, Durban 2000.

<sup>190</sup> Nouveau partenariat pour le développement de l'Afrique (NOPADA), October 2000. Available at :

<sup>191</sup> Letvin NL, Barouch DH, Montefiori DC. Prospects for vaccine protection against HIV-1 infection and AIDS. *Annu Rev Immunol* 2002; 20:73-99.

<sup>192</sup> Barouch DH, Kunstman J, Kuroda MJ, Schmitz JE, Santra S, Peyerl FW, Krivulka GR, Beaudry K, Lifton MA, Gorgone DA, Montefiori DC, Lewis MG, Wolinsky SM, Letvin NL. Eventual AIDS vaccine failure in a rhesus monkey by viral escape from cytotoxic T lymphocytes. *Nature* 2002; 415:272-3.

<sup>193</sup> Mascola JR, Nabel GJ. Vaccines for the prevention of HIV-1 disease. *Curr Opin Immunol* 2001; 13:489-95.

<sup>194</sup> Nabel GJ. Challenges and opportunities for development of an AIDS vaccine. *Nature* 2001; 410:1002-7.

<sup>195</sup> Nathanson N, Mathieson BJ. Biological considerations in the development of a human immunodeficiency virus vaccine. *J Infect Dis* 2000; 182:579-89.

## The Long-term Sustainability of Expanded Access to Antiretroviral Treatment in Developing Countries Will Require Closer Cooperation With Industry

Within the process of expanding access to antiretroviral treatment in developing countries, governments and the international community will need to work more closely with discovery-based pharmaceutical companies. Further attempts to achieve price reductions or modify the social contract between governments and industry on drug patents must be undertaken within the framework of the reaffirmation of the WTO Agreement on TRIPS and public health at the WTO Ministerial Conference in Doha,<sup>196</sup> and with the clear goal of establishing more uniform procedures to make drugs discovered in the developed world more rapidly available at affordable prices in the developing world.

Although the investments required in human resources and improvements to health infrastructure also represent a large expense,<sup>173,174</sup> the future cost of securing antiretrovirals and other essential medicines will be critical to the long-term success of programs to expand access to treatment in developing countries.<sup>71</sup> Further drug discounts may not be sustainable without improved dialogue between industry leaders and governments. A role also needs to be identified in this process for generic drug manufacturers, NGOs, and other stakeholders eager to be involved without creating another layer or set of obstacles. The Global Fund's involvement in this process as a facilitator, as well as the role of international development agencies, charities, and groups who lobby "on behalf" of governments, needs to be defined. Another key issue that can speed this process is resolving the prob-

lem of debt relief that severely limits the flexibility of developing nations to deal with the AIDS crisis on their own.

## Conclusion

The advent of the Global Fund to Fight AIDS, Tuberculosis and Malaria reflects the international awareness that funding for HIV/AIDS has been too little, too slow, too fragmented, and comes with high transaction costs.<sup>197</sup> It also comes at a pivotal time in the epidemic when calls for action are mounting,<sup>22-30</sup> and when only concerted action by the international community can make the decisive difference if catastrophe is to be averted.<sup>198</sup> There is also the growing realization that prevention-only interventions have failed or come too late to make a difference in high-incidence countries where up to 25 percent of the adult population is already infected. Even business leaders have acknowledged, as they did in an executive statement at the recent World Economic Forum in New York, that antiretroviral treatment is cost-effective and has to be part of the solution.<sup>199</sup> The standard of care by which HIV-infected patients benefit in high-income countries where public health care insurance mechanisms are in place will, of course, not be easily duplicated in developing countries where the national wealth is ten to a hundred times lower. The authors believe, however, that the arguments against providing access to antiretroviral treatment in the developing world go beyond the simple recognition of this economic gap. Many of these arguments stem from a double standard of thinking: those that are not even considered in the North serve as dogma to limit access to treatment in the South. From the start, the Global Fund should reject such a double standard and integrate the availability and affordability of antiretroviral treatment for all populations infected with HIV

<sup>196</sup> WTO. Declaration on the TRIPS agreement and public health. Doha WTO Ministerial Meeting 2000: TRIPS. Adopted on November 14, 2001.

<sup>197</sup> Brughla R, Walt G. A global health fund: a leap of faith. *BMJ* 2001; 323:152-154.

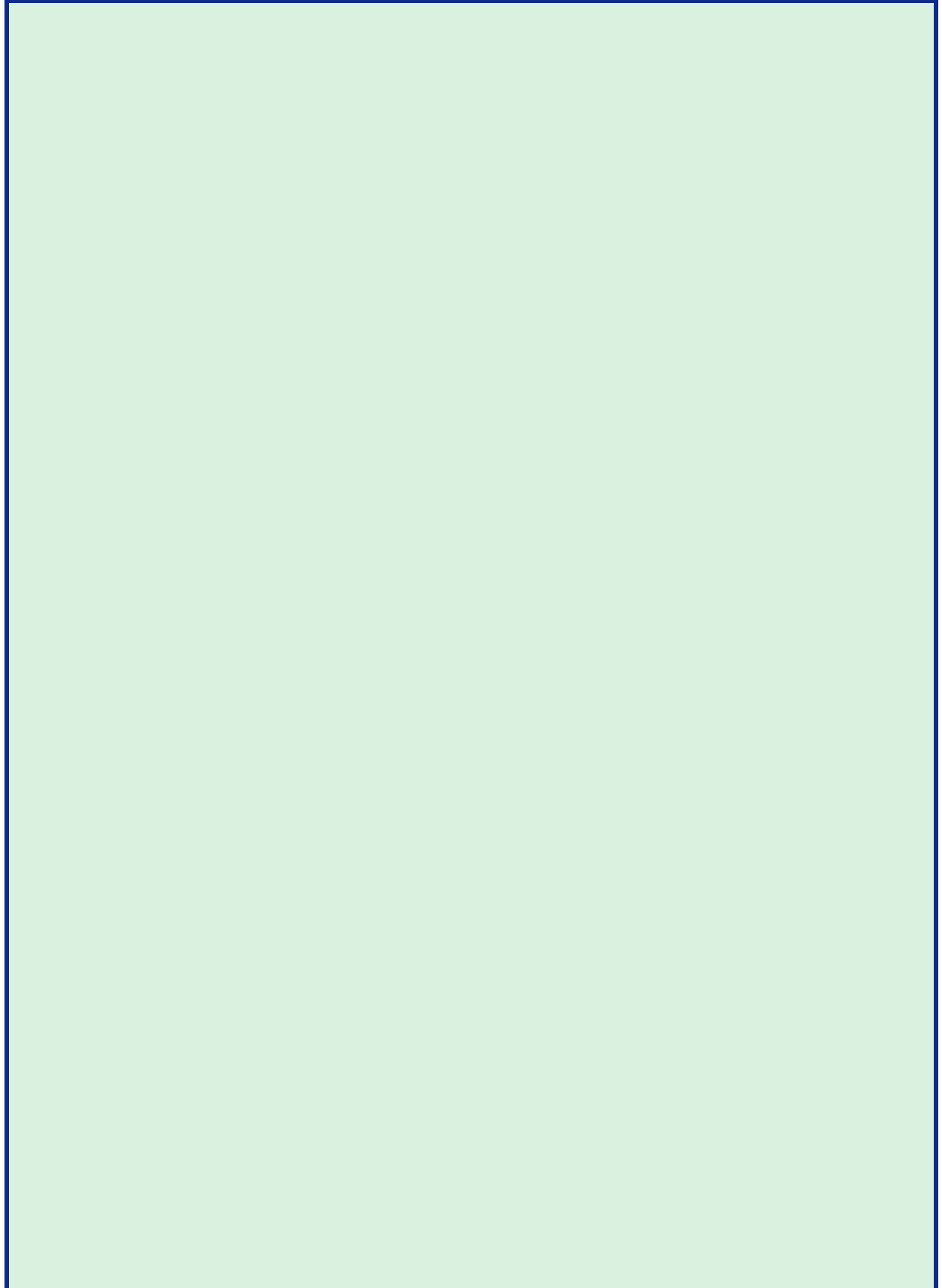
<sup>198</sup> Piot P, Coll Seck AM. International response to the HIV/AIDS epidemic: planning for success. *Bull World Health Organ* 2001; 79:1106.12.

<sup>199</sup> World Economic Forum. The Global Health Initiative Executive Statement. Executive statement by the leading CEOs from the World Economic Forum's Global Health Initiative (GHI). World Economic Forum Annual Meeting 2002, New York: February 2002.

in resource-constrained settings as one of its primary, most fundamental goals. We have reached a turning point in AIDS where access to treatment for HIV-infected adults and children in developing countries can no longer be refused on cost grounds, lack of infrastructure, or other priorities. For the first time, there is evidence that a change in paradigm is now attainable.

## **Biography of Authors**

Jean Paul Moatti, 52, is Professor of Economics at the University of the Mediterranean (Marseilles, Southeastern France) and Director of the INSERM (the French National Institute of Health Research) Research Unit “Social Sciences Applied to Medical Innovations”. He has been involved in AIDS research since 1985 and is currently scientific coordinator of the ANRS (French Agency for AIDS Research) program on “Economic Evaluation of Access to Care in Developing Countries” (ETAPSUD).



# Conclusion

The chapters in this document describe a range of observations, viewpoints, and opinions about the “State of the Art” in the new but quickly maturing field of HIV/AIDS and economics. Most of the authors in this document have 10 to 15 years of experience, observing the significant changes both in the epidemic and the way its impact has been described. The field has clearly changed, from the first studies on the direct and indirect costs of HIV/AIDS, to much more advanced and analytical studies of the economics of HIV/AIDS. The objectives of the field have also changed. The first economic studies were designed primarily to create awareness of the significant impact that HIV/AIDS would cause. More recent analyses have placed greater emphasis on identifying the most cost-effective policies on prevention, treatment, support, and mitigation. The various chapters cover issues ranging from resource allocation, cost-effectiveness, economic impact, and the newest area, economic mitigation.

The chapters on current resource spending and resource requirements indicate that a growing amount of information is now available on the cost of resource required to scale-up the current response. While these global estimates differ (in most cases by billions of dollars), they nonetheless have been useful for setting a target. Unfortunately, there is very little information that defines the baseline level of spending from which policymakers are trying to scale up. Furthermore, as long as information regarding resource flows remains elusive, policymakers



will never know if they are actually getting close to the targeted level of resources. Thus a strong argument is established for monitoring resource flows through the use of National HIV/AIDS Accounts and further monitoring of the global resource envelope.

In the area of cost-effectiveness, a number of authors present cogent arguments in favor of conducting additional cost-effectiveness studies. This is reinforced with the message that analyses of effectiveness could be greatly improved through the use of randomized control trials. Future cost-effectiveness analyses also need to focus not only on measuring behavior change among individuals but should also expand to address structural and societal interventions.

In some areas of this field, it appears that more research is not needed. For example, a strong argument is made that macroeconomic analyses have been of limited value. Instead it is proposed that resources be spent on: (1) identifying the impact of HIV/AIDS on household poverty, (2) identifying the channels through which HIV/AIDS affect national economies, and (3) describing the impact of HIV/AIDS on government revenues and expenditures.

In the field of mitigation, a number of chapters presented unique and innovative perspectives on this relatively new area of work. While impact assessments have served their purpose (namely raising awareness), economists do need to move forward with their analyses and identify the most cost-effective ways to mitigate this impact. This can be completed with a combination of new approaches (e.g., mobile task teams) and new tools (e.g., the Goals Model).

Underlying many of the chapters were economic assumptions about valuing various interventions. However, the cautionary chapter by Professor Barnett was written to challenge economists to question these philosophies and assumptions. Specifically, Professor Barnett challenged economists to place their analyses within the context of the societies in which the work is

performed. These societies often do not easily conform to assumptions made by “western economists”, who often unwittingly attempt to place a value on an individual’s health in isolation of his or her society.

Hopefully this document has served its purpose: identifying what is considered to be “state of the art” in the field of AIDS and economics in the words of some of the leading economists and social scientists. Ideally this document can be reproduced on a regular basis, in much the same way epidemiologists belonging to the Monitoring the AIDS Pandemic (MAP) team meet to update projections on the epidemiology of HIV/AIDS. It is increasingly clear that the impact of HIV/AIDS, and the way that researchers measure this impact, is changing dramatically.