Resource Requirements to Fight HIV/AIDS in Latin America and the Caribbean

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Resource for HIV/AIDS

Abstract

Economists and epidemiologists from ten countries in Latin America and the Caribbean (LAC) reviewed the methods used to develop estimates for resource requirements to address HIV/AIDS prevention and care in low- and middle-income countries. They applied their country-specific knowledge to re-estimate costs, coverage, and capacity of their health and education systems to expand HIV/AIDS interventions by 2005. The reasonably small discrepancy between the model estimates and those of country specialists totaling US$ 173 million provides some confidence in the overall consistency and reliability of the estimating procedures. The most important difference between the model estimates and those of the country specialists was in the estimated future price of HAART. In essence, the estimates of the model reflect the efficiency gains that could result from purchasing arrangements that lead LAC countries to lower prices for ARVs. This preliminary exercise with ten LAC countries confirmed the validity of the use of these estimates as tools at the international level – both to guide the allocation of resources across diseases and countries, and for advocacy and resource mobilization. With the country revisions, these estimates have also been shown to be key tools for country-level strategic planning.

Key words

HIV, AIDS, financing, economics

Introduction

Policy makers need information on the scale of resources required to prevent the further spread of HIV and to provide adequate care for people living with HIV/AIDS. At the international level, estimates on resource needs for HIV/AIDS prevention and care can provide guidance on how to allocate resources across diseases and countries. At the national level, knowledge of the funding levels required to achieve coverage targets for different interventions is key to national HIV/AIDS strategic planning. Finally, both nationally and internationally, such studies are key tools for advocacy and resource mobilization.

Two major studies estimating resource requirements for HIV/AIDS were published during 2001. The first, carried out in preparation for the UN General Assembly Special Session (UNGASS), modeled the cost of HIV/AIDS prevention and care needs in 135 low- and middle-income countries in 2005 [1]. The second, undertaken for the Commission on Macroeconomics and Health (CMH), modeled 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 by 2007 and 2015 [2].

The UNGASS study called for the annual expenditure of US$ 9.2 billion on HIV/AIDS prevention and care in low- and middle-income countries by the year 2005. This compares to an estimated level of expenditure of US$ 1.8 billion in the year 2000. The CMH study concluded that between US$ 13.6 billion and US$ 15.4 billion should be

spent annually on HIV/AIDS prevention and care in selected low- and middle-income countries by the year 2007 in addition to what is already being spent and this should increase to between US$ 20.6 billion and US$ 24.9 billion by 2015.

Since their publication, these studies have been important advocacy and resource mobilization tools at the international level. In his testimony before the Committee on Foreign Relations of the United States Senate, for example, the Executive Director of UNAIDS referred to the results of the UNGASS study [3]. Similarly, these study results have been used to inform key global resource allocation decisions such as those taken by the Global Fund to Fight AIDS, Tuberculosis and Malaria [4].

However, as they stand, it would be inappropriate to use these studies to guide resource allocation decisions at the national level. This is because although costs for selected HIV/AIDS prevention and care interventions were modeled on a country-specific basis in both studies, data limitations on intervention costs, current coverage of interventions and capacity of countries to scale up HIV/AIDS interventions meant that many assumptions were made regionally or sub-regionally in order to build the models. Both study teams recognized that additional country-level work would be necessary to improve the estimates and use them as tools in country-level strategic planning.

This process has begun with individual country explorations of the UNGASS estimates for Latin America and the Caribbean (LAC) sponsored by the Inter-American Development Bank (IDB). Country experts from ten countries in the region were invited

to a workshop during which they reviewed the methods used to develop the UNGASS

estimates and applied their country-specific knowledge to re-estimate costs, coverage,

and capacity of their health and education systems to expand HIV/AIDS interventions by

2005. Economists and epidemiologists from Brazil, Chile, Dominican Republic,

Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, and Trinidad and Tobago

participated in the workshop held in Cuernavaca, Mexico from January 25-26, 2002.

This paper presents the results of this first workshop. They are presented as a composite

for the ten countries and made available as a work in progress, as country team members

continue to review and refine their estimates. Moreover, two additional groups of

countries will come together to conduct similar exercises in the coming months.

Methods

For the UNGASS model, as described previously [1], cost estimates for selected

HIV/AIDS prevention and care interventions were based on country-specific estimates of

the size of the populations in need of each of the interventions included. These estimates

were based on epidemiological and demographic data from UNAIDS, WHO and the UN

Population Division for the general population and orphans; and surveys and special

studies in the literature for key populations such as sex workers and injecting drug users.

Because not everybody has equal access to services, a composite access indicator was

developed for facility-based interventions using the median of percent of the population

with access to tuberculosis treatment (DOTS), essential immunizations (DPT3), attended births and prenatal care services.

Beyond these common features, slightly different methodologies were used for prevention and care. The methodology used to estimate resource requirements for the 12 HIV prevention interventions (Table 1) and for support to orphans in each country is detailed elsewhere [5]. For each country, separate calculations were made for specific population target groups for rural and urban populations. Target coverage rates were calculated using current HIV prevalence [6] and levels of economic development as measured by the World Bank. Finally unit costs were estimated for each intervention drawing on published and unpublished studies of pilot programs and area-specific interventions [7]. The product of numbers of people in need of the service, the target coverage rate, and the unit cost yielded estimates for each intervention. The sum of these products generated the estimates of resources needed for prevention in each country.

A somewhat different methodology was used to estimate the resources needed for care interventions (Table 1). This is because the limited capacity of country health care systems to expand delivery of services is a more important constraint to what could be achieved by 2005.

Data from UNAIDS on expected HIV-related deaths estimated year by year, 2000 – 2006, were used to estimate the number of persons needing care in each country and for each of the services or interventions to be provided to those persons. Current levels of

service delivery were estimated using the composite indicator mentioned above. Yearly country-specific growth rates for each of the interventions were then applied to the estimates of current access to derive estimates of feasible coverage levels for 2005. The assumed growth rates were adjusted based on national income and on previous success in scaling-up coverage for EPI vaccination coverage.

Separate estimations were made for labor costs and the costs of pharmaceuticals. Labor costs in the health sector delivery system were generally taken to be wage costs in the public health service.[1] Because drug and pharmaceutical prices have been so volatile during the past two years, estimating these prices in the future was particularly problematic. International pharmaceutical companies have indicated a willingness to bargain down the prices of selected drugs and several governments have made some favorable arrangements on pricing. Cipla in India and some Brazilian producers have produced generic equivalents at drastically reduced prices [8, 9]. More recently, the Thai government has developed tablets made up of three antiretroviral drugs costing US$ 0.46 per day or US$ 200 per annum [10]. The prices included in the UNGASS model were estimated taking into account differential pricing agreements with the poorest countries paying the least.

Finally, as with the prevention interventions, for each country the multiplied product of estimated people needing services in 2005, country capacity to expand current care

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[1] Private sector wages in the health sector were recognized as much higher, but the modeling was done with the perspective of increasing publicly funded care.

services and unit cost yielded estimates for each intervention and the sum of these products generated the estimates of resources needed for care in each country.

Prior to the workshop, country specialists were sent a description of the model. In addition, they were sent a list of all of the parameters used by the model. During the workshop, the teams from each country reviewed the model for their country using computer-based data adjustment programs that permitted real time data changes and analysis of their implications. The result is a set of revised estimates for HIV/AIDS program costs for the year 2005 for these ten countries.

Results

Prevention

The net effect of the changes by the country specialists to the twelve prevention intervention cost estimates for the ten countries for 2005 was an increase of 15 percent in the total prevention budget from US$ 327 million to US$ 375 million.   Figure 1 presents the comparison between the two sets of estimates for the twelve prevention interventions.

A number of important changes in the expected unit cost of selected interventions were identified. These included the average cost for training a primary school teacher in the skills necessary to inform youth about HIV/AIDS and motivate behavioral change which increased from US$ 69 to US$ 82; the average cost for training a secondary school

teacher which changed from US$ 38 to US$ 60; the cost of treating sexually transmitted infections (STIs) which increased by one third, from US$ 9 to US$ 12 per case; and the average cost for testing a unit of blood which almost doubled, increasing from US$ 15 to US$ 28. The estimated cost per mass media campaign also increased from US$ 489,000 to US$ 565,000. This last average masks large differences, only partly explained by differences in country size, as the lowest country-specific estimated cost was US$ 3,000 per campaign, whereas the largest was about US$ 1.7 million per campaign.

The discrepancies between UNGASS estimates and revised country estimates across these twelve interventions are not large, with two exceptions. First, the resources needed for social marketing of condoms more than doubled in estimated cost from US$ 14 million to US$ 31 million, because the estimated average price per condom, including distribution costs, doubled from US$ 0.10 per condom to US$ 0.21 per condom.

Second, the resources needed to prevent mother-to-child transmission (MTCT) increased from US$ 9.2 million to US$ 15.9 million. The estimated cost for MTCT interventions was much higher among the group of LAC region countries than was the UNGASS estimate, at US$ 61 per case treated rather than only US$ 5 in the UNGASS estimates. Most of this increase is due to the presumption by one large country that the treatment protocol (ACTG 076) would be substantially more costly than envisioned in the UNGASS estimating procedure.

Care and support

The care cost estimates generated by the country teams varied from the UNGASS estimates by a larger percentage than did the prevention estimates. The ten countries taken together raised their care and support estimate for 2005 from US$ 437 million to US$ 562 million. This change is an increase of about 29 percent; nearly double the percentage change for prevention services.

Much of the observed increase in estimated cost for care and support can be attributed to increases the country specialists made in their expected costs for HAART. Their projected spending for HAART in 2005 was US $440 million, far higher than the US$ 304 million called for in the UNGASS estimates for these ten countries (Figure 2).

Only a part of this increase is due to increased patient load, as the numbers of HAART patients rose in the country specialists' estimation by only 24,000 patients from a total of 196,000. The bulk of the increase is attributable to higher estimates of pharmaceutical costs associated with delivery of HAART in 2005. In contrast to the UNGASS model assumptions, several country teams assumed that they would face the same pharmaceutical costs in 2005 as they do today despite evidence of dramatic price reductions from mid-2001, when the UNGASS estimates were prepared, to early 2002 when the workshop was held. This pessimistic view held by a number of smaller

countries may reflect their relative lack of bargaining power and further argues for cooperative purchasing mechanisms.

The revisions also led to some small but significant changes in costs for opportunistic illnesses and support for orphans. The cost of year 2005 prophylaxis associated with opportunistic illnesses rose from US$ 27 million to US$ 31 million. Expected costs of support for orphans rose in percentage terms by much more, from about US$ 5 million to US$ 15 million. Much of the variation in the cost of orphan support will depend, of course, on the degree to which families and communities find ways to care for orphans without costly institutionalized care.

The country specialists cut the estimated 2005 cost of lifetime palliative care, lifetime opportunistic illness treatment, and annual laboratory testing costs associated with HAART. These amounts changed, respectively, from US$ 12 million to US$ 9 million; from US$ 44 million to US$ 32 million; and from US$ 43 million to US$ 36 million. All of these decreases are attributable to the country specialists' view that the estimated unit cost of the above-mentioned services will be lower than the UNGASS team anticipated.

The country experts were somewhat more optimistic than the UNGASS team in projecting care and support coverage to the year 2005 (see Figure 3). For four out of the five services there described, the country specialists expected to achieve higher rates of coverage. The increased coverage with HAART, which would in these specialists' view be close to 70 percent, rather than to the 60 percent anticipated in the UNGASS

estimates, will represent a substantial challenge for all these countries. That component of coverage will also be the most expensive of the five presented in the graphic.

As noted earlier, the largest change in shares between the UNGASS and the country team estimates occurred in the projected cost of HAART in the year 2005. That share, in the country specialists' view will be 77 percent, rather than the 70 percent derived from the earlier estimates. Support to orphans increased in this new projection from an expected one percent of all care and support for HIV/AIDS to three percent in the country revised estimates. As these shares rise, others declined. Thus the proportions attributable to lifetime costs for palliative care; lifetime costs for opportunistic illness treatment, and annual laboratory testing associated with HAART, each declined by from one to four percentage points.

Prevention, care and support: A summary

In the UNGASS model, the estimated resource requirements for HIV/AIDS in the ten LAC countries was US$ 764 million for prevention and care. Following the preliminary parameter adjustments by the country experts, estimated resource requirements totaled US$ 929 million.

Figure 4 shows how this expected expenditure for 2005 is divided between prevention and care, and then between the specific service interventions that each encompasses as estimated in the UNGASS model and in country revisions. Resource needs for the

different interventions are rather equally distributed in both estimates, with HAART consuming over half of all resources for care and support – increasing from 45% in the UNGASS estimates to 51% in the country-revised estimates.

Figure 5 shows how expected 2005 coverage levels changed with revisions by the country experts. The most notable differences are the dramatic increase in the number of people tested, the increase in people receiving OI prophylaxis, the marked decrease in MSM reached, and the decrease in the number of people reached with harm reduction programs.

Discussion

The reasonably small discrepancy between the UNGASS estimates and those of the country specialists totaling US$ 173 million provides some confidence in the overall consistency and reliability of the estimating procedures.

The most important difference between the UNGASS estimates and those of the country specialists was in the estimated future price of HAART. In essence, the estimates of the UNGASS model reflect the efficiency gains that could result from purchasing arrangements that lead LAC countries to lower prices for ARVs. The difference is perhaps even a conservative estimate because price reductions have already been achieved in some countries beyond the best-case scenario assumed for the UNGASS estimates.

This preliminary exercise with ten LAC countries confirmed the validity of the use of these estimates as tools at the international level – both to guide the allocation of resources across disease and countries, and for advocacy and resource mobilization. Even if the global estimates produced by the UNGASS and CMH studies do not provide the exact quantity of resources needed to address the epidemic in low- and middle-income countries, they provide good information on the scale of the resources required.

With the country revisions, similar estimates have also been shown to be key tools at national level. The revised country estimates produced by these 10 LAC countries have already been reported as useful in preparing country proposals for the Global Fund to Fight AIDS, Tuberculosis and Malaria.

To strengthen the quality of HIV/AIDS resource needs estimates, necessary next steps include the compilation of estimates of country-level resource needs for all low- and middle-income countries. Workshops are planned for the rest of the LAC region. Similar initiatives should be undertaken in sub-Saharan Africa, Asia and Eastern Europe. Although there are shortcomings associated with virtually all of the parameters used in the models, the weakest parameters are the unit costs of prevention and care services. Not only are there few studies that have been crudely extrapolated to other countries and regions, virtually no information is available on how those unit costs change as interventions are scaled up. Such information could and should be collected as efforts to scale up begin.

Acknowledgements

References

1. Schwärtlander B, Stover J, Walker N, *et al.* AIDS. Resource needs for HIV/AIDS. *Science* 2001,292:2434-2436.

2. Kumaranayake L, Kurowski C, Conteh L. Costs of scaling up Priority Health Interventions in Low-income and selected Middle-income Countries: Methodology and Estimates. *CMH Working Paper Series*; 2001.

3. Piot P. Testimony to the hearing of the Committee on Foreign Relations of the United States Senate on 'Halting the Global Spread of HIV/AIDS: the Future of U.S. Bilateral and Multilateral Responses'. *Committee on Foreign Relations*. Washington, DC; 2002.

4. Brundtland GH, Piot P. Joint WHO/UNAIDS speech to the Global Fund to Fight AIDS, Tuberculosis and Malaria. Geneva; 2002.

5. Stover J, Bollinger L. Equations for prevention and orphan care calculations. *Science Online*; 2001.http://www.sciencemag.org/cgi/content/full/1062876/DC1/2

6. UNAIDS. Report on the global HIV/AIDS epidemic, June 2000. Geneva: UNAIDS; 2000.

7. Bollinger L, Cooper-Arnold K. Units costs for HIV prevention activities. *Science Online*; 2001. http://www.sciencemag.org/cgi/content/full/1062876/DC1/6

8. India offers cheap AIDS drugs. *CNN.com/world* February 7, 2001.

9. Brazil pushes AIDS fight beyond borders. *CNN.com/world* April 26, 2001.

10. Thailand has cheapest AIDS drug cocktail. *CNN.com/world* March 23, 2002.