

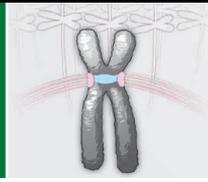
Muliverse without designer

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## LETTERS

edited by Jennifer Sills

### AIDS Funds: Promised

IN THEIR POLICY FORUM “GLOBAL HIV/AIDS POLICY IN TRANSITION” (11 June, p. 1359), J. Bongaarts and M. Over argue that expansion of HIV treatment is unsustainable. In 2005, the G8 promised Africa \$25 billion in order to ensure “universal access” to HIV treatment by 2010 (1). The subsequent expansion of HIV treatment has paved the way for large-scale global health funding mechanisms. However, the G8 commitment to “universal access” is at least 30% short (2). The Global Fund donations from the United States are more than a billion dollars less than their fair share (3), and the funding for the U.S. President’s Emergency Plan for AIDS Relief has increased this year by the smallest increment in the program’s history (4). Rather than scaling down antiretroviral therapy as Bongaarts and Over suggest, we should ensure that the world lives up to its promises.

Bongaarts and Over’s failure to mention the human cost of treating only “a percentage...of those newly needing treatment” is indicative of how cost-effectiveness can be used to avoid fulfilling one’s commitments and promote substandard care, such as the authors’ support for initiating antiretroviral therapy at CD4 levels well below current World Health Organization guidelines. Moreover, the emphasis on pure cost-effectiveness only serves to divert attention from the

real issue of what Girard and colleagues correctly term a need for “an urgent increase in global health funding” (5). As the world strives to make the global funding pie bigger, discussions should center on how to increase the resources available and the most efficacious use of those funds. Instead of working to “transition” away from HIV treatment programs that have been proven to reduce transmission by 92% (6) and have brought hope to countries once thought beyond saving, let us concentrate on how to best advocate for more funding and better policies that allow the world to fulfill its commitments and ensure the right to health for the world’s most vulnerable.

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### AIDS Funds: Undervalued

IN THEIR POLICY FORUM “GLOBAL HIV/AIDS policy in transition” (11 June, p. 1359), J. Bongaarts and M. Over argue that the costs of AIDS funding—especially for anti-retroviral treatment (ART)—are excessive and imply that funding should be redirected to other health priorities. Their arguments are misleading.

Bongaarts and Over argue that HIV/

AIDS spending is “disproportional” to the disease burden. Yet if we look at the share of spending in relation to disability-adjusted life years (DALYs) lost due to AIDS (1), it is clear that in many countries—especially southern Africa, where most HIV-positive people live (2)—the overall share of the total national health resources (3) that is spent on AIDS (2) is lower than the contribution made by AIDS to the burden of disease (1) (see the figure, opposite page).

Bongaarts and Over also argue that ART costs are unsustainable, but they substantially overestimate the funding required. Their costing model assumes that drug prices will remain constant (when they are likely to fall as the market expands) and that ART has no effect on HIV prevention despite evidence that ART reduces infectiousness. They also adopt a very narrow concept of cost-effectiveness, which fails to consider indirect benefits and cost-saving (e.g., they look at the costs of mother-to-child transmission preven-

tion programs in isolation of the cost-savings obtained by reducing HIV rates). They overlook studies that take into account the medical costs of averted AIDS-related opportunistic infections. These studies have shown substantially reduced net costs—with some Brazilian and South African studies showing that ART programs can actually be cost-saving overall (4–6).

Bongaarts and Over criticize AIDS funding for being inefficient and undermining health systems, but their evidence is biased. They cite a negative World Bank evaluation of its African AIDS projects (7) (which were predominantly emergency operations in unstable environments), but they ignore the many more-successful AIDS interventions funded by the Global Fund (8). There are many positive examples of synergies between AIDS programs and health systems development (9–12). A growing body of evidence suggests that services to address HIV can strengthen health systems by train-

#### Letters to the Editor

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ing personnel [p. S30 in (13)], improving drug procurement and distribution systems [p. S34 in (13)], enhancing the role of nurses and community workers in health service delivery [p. S20 in (13)], involving community in research and service delivery beyond HIV [p. S63 and p. S67 in (13)], and developing electronic health records [p. S54 in (13)].

The real obstacle is the political landscape of health policy. Where there are no clear patterns of accountability and incentives, health policy implementation is doomed to failure (7, 14). In the absence of easily measurable outputs and clear, politically feasible and sustainable mechanisms to hold government to account, funds can all too easily be misappropriated (15) or shifted away from priority health interventions—as was the case in Zambia when the TB program collapsed after being “integrated” into the general health care system (16).

AIDS spending, by contrast, can be linked to specific targets and has a constituency (treatment activists) with a strong incentive to hold governments accountable. Moreover, precisely because ART patients need standard health care as well as specialized HIV services, they have an incentive to ensure that both are efficient and effective. Undercutting HIV funding, ostensibly in order to build a

better health care system, could dismantle the most organized and effective health care consumer constituency in existence in developing countries.

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AIDS Funds: Benefits

IN THEIR POLICY FORUM “GLOBAL HIV/AIDS policy in transition” (11 June, p. 1359), J. Bongaarts and M. Over contend that global health initiatives focused on HIV/AIDS treatment, such as the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR), are not the best use of international health aid. We disagree.

Bongaarts and Over suggest that funding for HIV/AIDS is disproportionately high despite comprising <5% of the mortality burden in the developing world. However, in many countries death certificate misclassifications underestimate mortality attributed to HIV/AIDS by as much as 50% because the cause of death is often classified as an AIDS-related opportunistic infection (including tuberculosis, pneumonia, and meningitis) without reference to HIV (1).

Next, Bongaarts and Over propose that HIV/AIDS “distorts health priorities.” In Haiti and Rwanda, where adult HIV prevalence is <3% and the highest causes of morbidity and mortality are attributed to diseases other than HIV, global health initiatives focused on providing HIV treatment have directly and indirectly strengthened primary healthcare systems beyond HIV/AIDS, including maternal and child health (2–4).

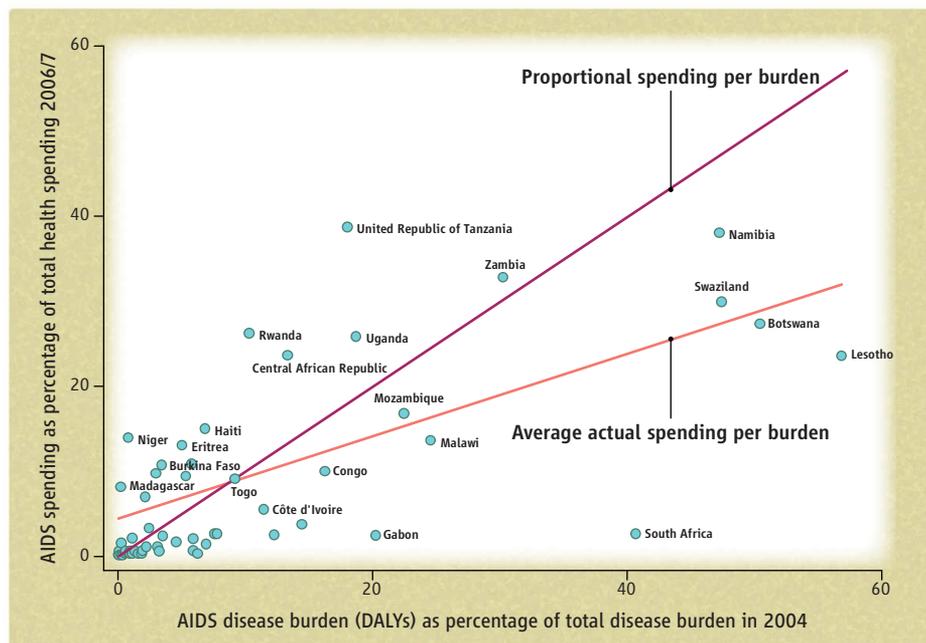
The authors claim that HIV treatment scale-up is not cost-effective. Several studies demonstrate that failure to use HIV/AIDS antiretroviral treatment is even more expensive than the provision of medication (5–7). Walensky and Kurtzkes emphasize that cost-effectiveness analysis may not be appropriate without considering the context; the treatment, population, and program must be comparable for conclusions to be drawn (8).

Finally, Bongaarts and Over argue in favor of HIV prevention over treatment. This logic contradicts recent studies suggesting that HIV/AIDS antiretroviral treatment may actually serve an important role in preventing new HIV infections, both by lowering viral loads in HIV positive persons and by encouraging people to present for voluntary counseling and testing (9, 10).

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11. A.R. is on the board of directors of the AIDS Healthcare Foundation. The opinions expressed do not necessarily represent any position or policy of AHF.

## AIDS Funds: Rwanda

IN THEIR POLICY FORUM "GLOBAL HIV/AIDS policy in transition" (11 June, p. 1359), J. Bongaarts and M. Over conclude that anti-retroviral therapy for AIDS is not a cost-effective use of donor funding for global health. We believe that Bongaarts and Over omitted key aspects of a complete cost-effectiveness assessment: numerous positive spinoffs to other services, the effect on increased attention on global health, and the ability to mobilize resources that would not otherwise have been available for global health.

The situation in Rwanda serves as an example. Rwanda's total health expenditure declined from 1998 through 2002, but because of advocacy for HIV resources, total health expenditure doubled between 2002 and 2003 (1). HIV funding, even before the current focus on integration, provided resources for the renovation of health facilities, equipment, training, and management, as well as a culture of openness for best practices. With integration of HIV services into other health services, resources have had an even wider benefit, especially for maternal health services. Integration is still in progress, but successful steps have been made (2, 3).

Rwanda's 2006 National Health Accounts reported that although reproductive health spending did not grow as rapidly as overall spending, it increased by 15% between 2002 and 2006 (4), and maternal mortality rate decreased from 1071 (in 2000) to 750 per 100,000 births (in 2005) and is expected to fall to about 350 in 2010. Rates of assisted deliveries, use of family planning, and receipt of four standard prenatal care services have seen a marked increase (4–6). Consistent with the results in Rwanda, a recent *Lancet* article correlated maternal mortality with HIV mortality in women (7). These improvements cannot be attributed to reproductive health spending alone; major health initiatives made possible by HIV funding are largely responsible.

HIV resources also paid for the community-based health insurance premiums of many of the poorest segments of the

population; the funding thus contributed to the increase in community-based health insurance enrollment rate from 7% in 2003 to 85% in 2008.

The literature cited by Bongaarts and Over failed to consider all benefits gained beyond direct HIV services, including the value of saving a mother and its contribution to quality of life for her children and family and societal productivity. In doing so, Bongaarts and Over have greatly underestimated the impact of HIV funding on both HIV and non-HIV health results.

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## AIDS Funds: Prevention

WE ARE INTRIGUED BY THE PROVOCATIVE Policy Forum "Global HIV/AIDS policy in transition" (11 June, p. 1359), in which J. Bongaarts and M. Over reconsider the balance between global health funding for HIV treatment and HIV prevention. The authors rightly emphasize the need to boost prevention efforts. Sustainable scale-up of antiretroviral therapy (ART) requires more effective prevention. To further stretch our prevention dollars, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) supports the authors' call for greater reliance on cost-effective interventions. In addition, it is imperative that we focus our efforts and funds on those prevention services with the greatest demonstrated impact, such as male circumcision, effective behavioral interventions, and prevention of mother-to-child transmission (PMTCT), and that we ensure that new prevention programs include impact evaluations. However, several important considerations overlooked by Bongaarts and Over serve as arguments in favor of maintaining substantial funding for AIDS treatment.

By quoting global rates of HIV, Bongaarts and Over underemphasize the enormous bur-



den of HIV in sub-Saharan Africa, where 67% of the people infected with HIV live (60% of whom are women), and where HIV is the leading cause of death among adults (1).

To argue for a substantial reduction in the pace of ART scale-up, Bongaarts and Over use cost-effectiveness estimates from the Disease Control Priorities Project (DCPP) (2) that were generated 5 to 6 years ago. ART costs today are in many cases less than one-half of what they used to be, due in large part to efficiencies gained in service delivery and commodities prices (3–5). Bongaarts and Over's estimate also omits the use of antiretroviral drugs (ARVs) for the prevention of vertical HIV transmission (PMTCT), which the same report lists as having a cost per disability-adjusted life year saved as low as \$34. PEPFAR is currently making substantial additional investments in PMTCT, an intervention that when provided as full ART, saves the life of the mother and protects an infant from HIV infection and orphanhood.

The Policy Forum overlooks the important benefits of ART in reducing sexual transmission; results from randomized clinical trials published recently point to a 92% reduction in the rate of new infections from HIV-infected persons on treatment to their regular partners (6).

Treatment programs in Africa have shown convincingly that ART not only saves lives, but also restores the labor productivity of treated adults and improves the nutrition and educational outcomes of their children (7–12). The cost-effectiveness comparisons quoted by Bongaarts and Over fail to appropriately capture these benefits, which are particularly salient for ART compared with health interventions for other diseases because HIV/AIDS is a chronic illness that affects individuals in their most productive years.

The benefits from prevention and those from treatment also accrue across different time horizons. Benefits from resources used to prevent new infections will be realized years from now. Failing to scale up ART in the interim would mean a sizable reduction in national economic activity, many fewer healthcare workers and teachers, and worse educational outcomes for today's generation of children, in addition to the humanitarian impact of increased mortality (11, 12).

Finally, we agree that programs need to link treatment with prevention. However, given the challenges in scaling up prevention (13, 14), linking treatment dollars to the demonstration of effective prevention would be excessively proscriptive. Even so, it is clear that national governments in both low- and middle-income countries, as well as international partners, must set higher sights for intensified and more effective prevention in the coming years.

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#### Response

THE LETTERS BY BARRY *ET AL.*, NATTRASS *ET AL.*, Reddi *et al.*, Asimwe *et al.*, and Holmes *et al.* dispute our conclusion that donor funds spent on AIDS treatment save fewer years of life than would the same resources allocated to prevention or to many other health problems of poor countries.

We share Barry *et al.*'s belief that donors should spend more than they currently do on improving the health of poor people and that,

other things equal, they should respect their prior commitments to such spending. However, in this era of financial crisis, insisting that tax payers in the developed world provide enough financing to pay both for universal access to AIDS treatment (as world leaders promised in 2005) and to fully fund all the more cost-effective health programs is unrealistic and does more harm than good for the health of the poor. When everyone else is forced to confront tradeoffs and prioritize expenditures, we in global health must do the same.

We expressed concern that AIDS consumes 23% of foreign assistance for health but causes less than 5% of deaths and disability-adjusted life years (DALYs). In response, Natrass *et al.* argue that we must consider allocated AIDS spending as a percentage of total health spending, not just as a percentage of health-related foreign assistance as we discussed. We agree, especially regarding South Africa, where AIDS spending has been notoriously unequal to the size of the problem. However, we have two reservations.

First, Natrass *et al.*'s UNAIDS estimate of AIDS spending (plotted on the vertical axis of their figure) excludes a large proportion of international AIDS funding. The amount of money donated to each country is reported by HIV/AIDS aid donors to the Organisation for Economic Co-operation and Development (OECD), and these figures are often much larger than the amounts that the country governments report having received to the U.N. (reflected in Natrass *et al.*'s UNAIDS data) (1, 2). In 2007, for the 16 Sub-Saharan countries available in the UNAIDS data, the donors report sending about twice as much as the recipients report receiving. The largest discrepancy was for Nigeria, which told the U.N. it received 8.4 million but appears in the OECD data to have received 213 million. To the countries of Botswana, Namibia, Senegal, and South Africa, donors claim to have disbursed more than the countries claim to have received by 70, 35, 82, and 102%, respectively. A key reason for this discrepancy is that a large part of foreign donor expenditures passes directly through contractors to AIDS patients without ever being reported to the government. If the donor-reported OECD data rather than the recipient-reported U.N. data are used, AIDS's share of total health spending is larger than AIDS's share of the disease burden in more countries than Natrass *et al.*'s figure suggests.

Second, regardless of data discrepancies, we believe that health spending should not be allocated in any strict proportion to disease burden, but rather in proportion to the marginal return in terms of reducing disease

burden. We advocate allocating incremental resources to the interventions that save the most life-years per dollar spent.

Reddi *et al.* believe the spending appears disproportionate because AIDS deaths are underreported in many countries. This is true, but we use internationally accepted UNAIDS estimates of AIDS deaths and HIV prevalence, which avoid this problem by modeling both quantities based on verifiable sero-survey data.

Asimwe *et al.*, Natrass *et al.*, Holmes *et al.*, and Reddi *et al.* point out that AIDS treatment has beneficial effects on other diseases, on the health care system, and on labor productivity. We agree that these effects should be taken into account in allocating resources. However, the same logic applies to most other disease interventions. Clearly, various indirect benefits would also be available either for HIV prevention or for other competing, more cost-effective interventions. For example, performance-based financing in Rwanda has strengthened health-care delivery systems independently of whether AIDS treatment was part of the service delivery mix (3).

Natrass *et al.* and Holmes *et al.* note that the cost of ART drugs has decreased. However, the effects of greater competition have largely been exhausted for the last generation of first-line drugs. The next generation will cost more because they are still under patent. Even if the cost of drugs were to decline further, the related health care is more expensive than the drugs. PEPFAR estimates that a year of treatment now costs, on average, \$814, of which only 39% is for drugs (4). We strongly agree with Natrass *et al.* that cost-effectiveness should be the proper way to assess how to allocate funds. Given the continuing relative high cost of treatment, other health interventions and in particular HIV prevention should be given higher priority. In fact, prevention (including of vertical HIV transmission) is the only way to bring the epidemic under control.

As Natrass *et al.* and Holmes *et al.* discuss, ART makes HIV positive individuals less infectious. If all HIV-positive people could be treated as soon as they are infected, the epidemic would likely disappear eventually (5). Unfortunately, the cost of finding and treating tens of millions of people is prohibitive. The current goal of universal treatment for everyone with a CD4 count below the WHO threshold would have a much smaller impact on the epidemic because the majority of infections occur in the years between infection and the onset of treatment.

Like Natrass *et al.*, we are persuaded that political and financial support of health care

improves with increases in the accountability of health care facilities and providers. But instead of using this as a reason to continue growing ART financing, we draw the lesson that HIV prevention and the other health interventions must increasingly be held to equally high accountability standards and that doing so will increase their political support.

We remain convinced that the current allocation of international health resources is far from optimal and that a future reallocation will improve the health and well-being of poor populations.

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5. R. M. Granich *et al.*, *Lancet* **373**, 48 (2009).
6. We thank T. Velayudhan for valuable research assistance.

#### TECHNICAL COMMENT ABSTRACTS

### Comment on "Climate, Critters, and Cetaceans: Cenozoic Drivers of the Evolution of Modern Whales"

Nicholas D. Pyenson, Randall B. Irmis, Jere H. Lipps

Marx and Uhen (Reports, 19 February 2010, p. 993) suggested that correlated diversity changes in the fossil record of whales and diatoms reflects secular evolutionary signals of underlying ecological drivers. We question the meaning of this association and outline avenues for more complete testing of correlations between productivity and marine consumers through geologic time.

Full text at [www.sciencemag.org/cgi/content/full/330/6001/178-a](http://www.sciencemag.org/cgi/content/full/330/6001/178-a)

### Response to Comment on "Climate, Critters, and Cetaceans: Cenozoic Drivers of the Evolution of Modern Whales"

Felix G. Marx and Mark D. Uhen

Pyenson *et al.* raise concerns about the correlation we identified between diatom and cetacean diversity through time. Although the issues raised are of investigative interest, they do not invalidate our conclusions. We agree that localized studies combined with global data sets will further our understanding of the factors that have helped shape cetacean evolution.

Full text at [www.sciencemag.org/cgi/content/full/330/6001/178-b](http://www.sciencemag.org/cgi/content/full/330/6001/178-b)



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