

Published in final edited form as:

Health Aff (Millwood). 2012 July ; 31(7): 1470–1477. doi:10.1377/hlthaff.2012.0217.

HIV Treatment Produces Economic Returns Through Increased Work And Education, And Warrants Continued US Support

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Abstract

Federal expenditures are under scrutiny in the United States, and the merits of continuing and expanding the President's Emergency Plan for AIDS Relief (PEPFAR) to support access to antiretroviral therapy have become a topic of debate. A growing body of research on the economic benefits of treatment with antiretroviral therapy has important implications for these discussions. For example, research conducted since the inception of PEPFAR shows that HIV-infected adults who receive antiretroviral therapy often begin or resume productive work, and that children living in households with infected adults who are on treatment are more likely to attend school than those in households with untreated adults. These benefits should be considered when weighing the overall benefits of providing antiretroviral therapy against its costs, particularly in the context of discussions about the future of PEPFAR. A modest case can also be made in favor of having private companies in HIV-affected countries provide antiretroviral therapy to their employees and dependents, thus sharing some of the burden of funding HIV treatment.

Since its inception in 2003, the President's Emergency Plan for AIDS Relief (PEPFAR) has enabled resource-constrained countries to treat millions of HIV-infected children and adults with antiretroviral therapy. The direct clinical benefits of antiretroviral therapy—reduced patient morbidity and mortality—have been well documented and are the most immediate and important returns on PEPFAR's investments. However, these are not the sole benefits. A small but important body of literature has documented substantial improvements in the socioeconomic well-being of those who receive antiretroviral therapy and of their household members.

Amid the recent focus of donors and international agencies on reducing the costs of antiretroviral therapy¹ and on strategies for increasing the cost-effectiveness of treatment delivery,² the economic benefits generated by antiretroviral therapy provision have received

relatively limited attention. Moreover, cost-effectiveness estimates of antiretroviral therapy have been used to influence resource allocation decisions, even though such estimates rely on narrow metrics and exclude important social and economic benefits.³

Any examination of the economic consequences of treatment for HIV/AIDS must draw on the substantial amount of evidence on the effects of HIV/AIDS itself at the individual, household, and community levels. Prior to the expansion of large-scale treatment in the developing world, several studies quantified the extent to which labor productivity declined as HIV infection progressed.⁴ The studies showed a large reduction in economic activity for people whose condition had progressed to AIDS.

Moreover, because those most likely to acquire HIV and eventually develop AIDS were working-age adults, their reduced productivity and eventual death had consequences for the well-being of other household members. These consequences included the added burden placed upon household members to compensate for the lost labor of the sick adults. Children living in a household with an HIV-infected adult also had a greater risk of poorer nutrition and schooling outcomes. Other studies found that premature adult mortality in Africa, most of it due to HIV/AIDS, had a detrimental effect on employer production costs⁵ and the efficiency of government services delivery.⁶

The overall magnitude of these effects varied widely among and within countries, but it was frequently large. We argue that the potential for antiretroviral therapy programs to reverse these effects is an important consideration, and that the social and economic benefits of these programs should be considered when discussing not only the future of PEPFAR but also global investments in HIV treatment more generally.

In this article we synthesize the findings of key studies of the economic impact of antiretroviral therapy programs that have been supported by PEPFAR and others. We believe that these studies indicate that economic returns on investments in antiretroviral therapy programs are likely to be large and important enough to warrant consideration in policy debates.

A comprehensive review of these studies is beyond our scope, and in any case, our overall aim is to identify the general conclusions of the studies and consider their implications. As we discuss further below, the economic effects of the programs occurred at the levels of the people receiving antiretroviral therapy, their households, and their employers.

In view of the potential benefits that employers can realize by providing antiretroviral therapy to employees, we consider the prospects for private-sector support for antiretroviral therapy programs. We conclude by discussing the implications of these results in light of the ever-increasing number of adults who face a lifetime of reliance on antiretroviral therapy and the recent evidence showing the preventive benefits of treatment.

We do not discuss the literature about possible macroeconomic impacts of antiretroviral therapy programs or HIV/AIDS, but interested readers should consult the paper by Erik Lamontagne and coauthors⁷ for a discussion of this topic.

Economic Benefits To Individuals

At the most basic level, antiretroviral therapy leads to a dramatic improvement in the survival and health of HIV-infected people who have progressed to the latter stages of the disease. In principle, this improvement in health status and functional capacity should be accompanied by a greater ability to do productive work. Considerable evidence now shows that this is indeed the case.

Two early studies conducted in Kenya focused on populations of patients who were primarily engaged in subsistence or estate agriculture.^{8,9} Both studies showed that within twelve months of initiating antiretroviral therapy, patients were working in excess of 30 percent more (as measured in hours or days worked) than they had before starting antiretroviral therapy. The increase in employment levels as a result of anti-retroviral therapy would be even greater if the likelihood of reduced employment levels in the absence of antiretroviral therapy were used as the relevant comparison.

Studies that observed treated patients over a longer period of time, up to three years after the initiation of treatment, confirmed that initial employment increases were sustained. In South Africa, employment rates among treated patients rose from 27 percent to 42 percent in the three years after the patients began antiretroviral therapy.¹⁰ In India, the percentage of patients who were employed rose from 28 percent to 65 percent in a two-year period.¹¹

Two comprehensive reviews of these and many other studies^{12,13} suggest that the findings described above can be generalized to various settings, such as countries with high and low prevalence of HIV/AIDS and rural and urban areas.

A treatment program alone, however, may not provide all the necessary conditions for HIV-infected adults to fully restore their livelihoods. The available, albeit limited, evidence suggests that men see more employment gains after initiating antiretroviral therapy than women do.^{11,14} This, in turn, suggests a gender disparity in the economic benefits of treatment.

Antiretroviral therapy is much less likely to improve health outcomes if patients seek care at very late stages of HIV.¹⁵ Finding ways to detect HIV cases early and retain patients in care before beginning antiretroviral therapy, and then initiating the therapy as soon as patients are determined to be medically eligible, is desirable not only for clinical reasons but for a number of economic reasons, as we discuss below.

Socioeconomic Benefits To Households

Households are interconnected groups of people who jointly allocate their time and resources to earn income, save, and consume. Because of these interconnections, the productivity benefits realized by adults initiating antiretroviral therapy can directly benefit other household members.

Previous studies have identified three benefits that are particularly important to households in resource-limited settings: averted end-of-life health and funeral expenditures; adjustments in time allocated by children to schooling and work; and preventing children in the household from becoming orphans. A common theme in this literature is that these benefits are particularly relevant for poorer and more labor-constrained households.¹⁶

AVERTED END-OF-LIFE EXPENDITURES

Prior to the antiretroviral therapy era, when adults with HIV/AIDS experienced deteriorating health, their households accessed and paid for substantial amounts of health care services.^{17,18} After death, expenses for conducting funerals and social events according to cultural norms placed a burden on household members, extended families, and local communities.

Several early studies documented the magnitude of such costs. For lower-income households in South Africa, funerals were estimated to cost the equivalent of several months of household income.¹⁷ In Tanzania, one study estimated that medical costs incurred by an

HIV/AIDS patient just prior to death, combined with funeral expenses, were equivalent to the estimated annual per capita household income for that country.¹⁹

These catastrophic expenditures could be major factors in instances of nonpoor households falling into poverty. The reduction of mortality due to HIV/AIDS made possible by antiretroviral therapy programs has meant that end-of-life expenditures have been avoided or, at the very least, delayed by a number of years. Of course, even when there is no user fee to patients, antiretroviral therapy has associated indirect costs, such as transportation to the clinic and time lost from work. Even so, these recurrent costs of accessing so-called free antiretroviral therapy are much less damaging to household finances than the costs of funerals and treating opportunistic illnesses.

LESS WORK AND MORE SCHOOLING FOR CHILDREN

Antiretroviral therapy may influence the outcomes of children in several important ways. School attendance and work are two competing uses of time among children. Our theory is that as adults return to work after initiating antiretroviral therapy, income and health improvements allow households to make adjustments in children's education and labor. Women and especially children do not have to spend as much time in care-giving activities throughout the day.

Substitution of adult labor for child labor, especially in farming activities, also frees up more time for children to participate in school. Finally, with increases in income, households have more resources to pay children's education expenses, such as the cost of uniforms and school supplies, as well as school fees, where required.

Although antiretroviral therapy is likely to have the above effects, the empirical evidence remains limited and ambiguous. Before the reach of antiretroviral therapy was substantially expanded, HIV/AIDS deaths in a household had little empirical impact on the time use of other household members, including children, perhaps because labor was not particularly scarce in study regions.

A clear negative impact on schooling was estimated in some studies²⁰ but was not uniform across countries.^{21,22} Nonetheless, antiretroviral therapy for adults has been linked to improvement in children's outcomes.

One study from Kenya reported that school attendance, measured as hours attending school per week, of children living in households with at least one HIV-infected adult increased by more than 20 percent within six months of that adult's initiating treatment.²³ The timing of the school attendance improvements, usually within six months after an adult household member initiated antiretroviral therapy, coincided with large improvements in the employment outcomes of the treated adults.

Related studies also showed that young boys and girls worked substantially less after adults in their households began receiving antiretroviral therapy.^{9,24} Additional studies to examine what happens within households of antiretroviral therapy recipients would strengthen the evidence base about the broader economic consequences of treatment programs and enable more accurate calculations of the economic benefits of investments in antiretroviral therapy.

PREVENTING THE ORPHANING OF CHILDREN

Between 2005 and 2010, PEPFAR spent more than \$1.5 billion on programs providing support to orphans and vulnerable children. PEPFAR will spend an even larger amount on support for orphans and vulnerable children in 2012.²⁵ Orphans and vulnerable children typically live in households with a surviving parent, grandparent, and other relatives, as well

as nonrelatives on occasion. Many of these households are poor, which is often a major justification for programs designed to help orphans and vulnerable children.

Rigorous impact evaluations of the economic benefits of PEPFAR-supported programs for orphans and vulnerable children do not exist, but assessments of other effects can be found. By keeping adults with children alive and productive, antiretroviral therapy keeps children from becoming orphans. On average, for every two adults who initiate treatment, one child does not become orphaned.¹³ A reduction in orphaning also results in less recurrent psychological trauma, exploitation, and sexual abuse experienced by children.²⁶

Although national AIDS programs and local communities save resources if there are fewer orphans to support, such cost savings are likely to remain modest unless orphans and vulnerable children programs change considerably. For example, PEPFAR-supported programs for orphans and vulnerable children, as actually implemented, have been estimated to cost \$20–40 per person per year in direct program expenses at the local level. Part of the reason for the relatively low cost is that these programs have taken advantage of large quantities of free time provided by volunteers in the local community.^{27,28}

Savings on orphans and vulnerable children programming would be substantially larger if such programs were funded to provide a fuller package of services (see, for example, the article by Stover and colleagues²⁹ for a description of a full package of services, along with annual costs).

Economic Benefits To Employers

Formal-sector employment, although low in most low-income countries, also stands to gain from making antiretroviral therapy accessible. Several countries have models of employer-sponsored antiretroviral therapy programs that have included on-site treatment and facilitated access to private or public HIV clinics through targeted subsidies. In addition, a number of multinational and other large companies operating in sub-Saharan Africa offer antiretroviral therapy to employees and their dependents. The Heineken International brewing company is one example.^{30–32} The presence of such employer-sponsored HIV programs and their benefits may help spur other employer-based programs.

Some evidence suggests that making antiretroviral therapy accessible to employees may generate positive financial returns to companies.^{5,33} Certain types of job-specific experience and institutional memory may not be easily replaced after the loss of existing employees. The business argument for making antiretroviral therapy accessible to workers is that by reducing morbidity and mortality among employees, companies can limit disruptions in their production processes and avoid costs associated with the hiring and retraining of new employees.³⁴

A few studies have documented this effect, especially at companies with relatively high-value output, such as utility companies and diamond companies.^{35–37} On balance, the evidence suggests that private companies may have incentives to contribute at least partially to making antiretroviral therapy accessible to employees, particularly when there is an option to refer employees to public health facilities that offer free or heavily subsidized treatment. The benefits to companies can be large enough to motivate some to cover the full costs of antiretroviral therapy, and companies are more likely to do so as treatment costs decrease.

Providing private health insurance for employees and their families is another way that employers can increase access to antiretroviral therapy. Incentive programs have also been

proposed, such as tax exemptions for companies that make antiretroviral therapy accessible to employees.

Governments may try to reduce the costs of providing public-sector antiretroviral therapy programs by incentivizing employer-based programs. These may not effectively address the fiscal problem for governments, however, because cost savings would be offset by a loss of tax revenues. Other strategies, such as coordinated drug procurement and price negotiation could also be explored.

In countries where the formal sector constitutes a larger share of the economy, public-private partnerships may present a source of cost savings to PEPFAR if government programs can take advantage of private companies' resources for providing insurance or direct treatment to employees. But even in countries where PEPFAR-supported programs provide antiretroviral therapy to employees, the economic benefits that accrue to companies should not be overlooked. Although the public sector bears the cost of providing antiretroviral therapy, the private sector realizes benefits, and these benefits should be included in cost-benefit calculations along with the impact on individuals and households.

In sum, after nearly a decade of expanded access to antiretroviral therapy in developing countries, numerous studies have shown that the benefits of the treatment extend beyond direct health improvements among patients. Increased employment and labor productivity, better outcomes for the children of patients, and improved household welfare all contribute to the positive story that unfolds when a population gains access to HIV/AIDS treatment.

Looking Ahead: Implications For PEPFAR's Next Decade

At a time when the United States is slowly recovering from a severe economic recession, when federal budget deficits are high, and all budgetary expenditures are under increased scrutiny, questions may be raised about the value of maintaining PEPFAR as a major US foreign assistance program. The growing body of research on the economic gains achieved by antiretroviral therapy programs has several important implications for this debate.

ECONOMIC RETURNS

We have not quantified the dollar value of the benefits stemming from PEPFAR's support for antiretroviral therapy. Such an exercise would require accounting for the various beneficial effects of treatment and falls beyond the scope of this article. Additional empirical estimates of the effects of antiretroviral therapy would also enable more careful estimation of the total benefits of the therapy.

However, on balance, findings suggest that the economic benefits of antiretroviral therapy are an important addition to the fundamental benefits of survival and reduced morbidity. In fact, there are reasons to believe that the benefits are substantial and might offset the costs of treatment.

To start with, estimates from studies conducted in just one site in Kenya, with assumptions about various parameters such as the return to education, can be used to calculate the value of employment and education gains enabled by antiretroviral therapy.^{9,23} These calculations—as well as a recent analysis of the Global Fund for AIDS, Tuberculosis, and Malaria¹³—have shown positive returns on investment in antiretroviral therapy programs. Money spent on financing treatment programs is thus likely to provide substantial economic returns to individuals, households, and employers in HIV-affected countries.

TREATMENT AS PREVENTION STRATEGIES

There have been increased calls for earlier initiation of antiretroviral therapy in HIV-infected people based on the recent HPTN-052 study's findings that early initiation of therapy dramatically reduced HIV transmission risk.³⁸ The study showed that among discordant couples (in which one person is infected with HIV and the other is not), provision of antiretroviral therapy at an early stage to the HIV-infected person resulted in a 96 percent reduction in the rate of HIV transmission to the uninfected person. Thus, there is a growing appreciation of strategies that include more proactive detection of HIV in the community and earlier initiation of antiretroviral therapy. The existing evidence on the socioeconomic impact of antiretroviral therapy can provide some guidance for policy decisions in this realm.

We believe that economic outcomes of HIV-infected individuals typically begin to decline well before treatment is initiated. If this is true—and, admittedly, the evidence at the moment is limited to a relatively few economic assessments of people in the early stages of HIV infection—then earlier initiation of antiretroviral therapy could help prevent household economic losses and setbacks in children's schooling. Clearly, more research is needed on this question. Findings from such research would allow for a more comprehensive evaluation of HIV prevention approaches like the “test and treat” strategy that calls for universal HIV testing and immediate antiretroviral therapy initiation.

PUBLIC-PRIVATE PARTNERSHIPS FOR COST REDUCTION

Cost considerations and limitations in resource availability are likely to govern decisions about treatment program expansion. A modest case could be made in favor of private companies' using some of their own resources to provide antiretroviral therapy to employees and their dependents. The argument would be most persuasive for large companies, which are more likely than smaller ones to provide some health care benefits already, and for companies that rely on a skilled labor force, where employees cannot be easily replaced.⁵ This would enable some cost savings for PEPFAR, but a key limitation would be the small size of the formal sector in most countries that PEPFAR supports.

LIMITATIONS OF COST-EFFECTIVENESS ANALYSES

The high level of scrutiny applied to the cost of PEPFAR-supported antiretroviral therapy programs should be matched with a corresponding amount of attention to their socioeconomic benefits. Such attention would help ensure that future policy and resource allocation decisions were well balanced.

To date, most research on the economics of antiretroviral therapy has been framed as cost-effectiveness analysis, aimed at determining how the treatment compares to other public health programs in terms of the cost per unit of improvement gained in patient survival and general health.³ Economic gains to patients and their households, employers, and societies at large are usually not taken into account in cost-effectiveness analyses. However, these gains should be recognized when weighing the overall benefits of providing antiretroviral therapy against its overall costs. Crucially, the conclusions that policy makers draw about the desirability of investments in antiretroviral therapy may differ greatly depending on whether they are relying on such cost-benefit analyses or cost-effectiveness analyses.

When PEPFAR was launched in 2003 and re-authorized in 2008, its goal was fundamentally humanitarian. It aimed to save lives and reduce human suffering, and its numerical targets—millions of new infections prevented, patients placed on treatment, children offered care and support—reflected the goal of having a large and rapid impact.

Although criticism can be leveled against some aspects of PEPFAR's programming, its success in expanding access to antiretroviral therapy, and consequently in saving millions of lives, is undeniable. What was not explicitly recognized at the time of PEPFAR's inception, however, is that making treatment available to working-age adults is not solely a compassionate gesture. The benefits of treatment in terms of labor productivity, children's welfare, and retention of skills and experience make PEPFAR a key instrument for investing in economic development.

As debates continue about the level of funding that the United States is willing to commit to the global fight against HIV/AIDS, the potential for PEPFAR to realize positive returns as a productive investment in long-term economic development should be given considerably more weight.

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Biographies



Harsha Thirumurthy is an assistant professor at the University of North Carolina at Chapel Hill.

In this month's *Health Affairs*, Harsha Thirumurthy and colleagues report on their research conducted since the inception of the President's Emergency Plan for AIDS Relief (PEPFAR) showing that HIV-infected adults who receive antiretroviral therapy often go on to productive work, while children in the households of infected adults who are in treatment are more likely to continue in school than those in households with untreated adults. They argue that these important gains should be considered in weighing the overall benefits of providing antiretroviral therapy against its costs, particularly in the context of discussions about the future of PEPFAR.

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Thirumurthy's current research includes several evaluations of cash transfer programs and the development of incentive-based interventions to increase uptake of HIV prevention services. He received a master's degree and doctorate in economics from Yale University.



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Omar Galárraga is an assistant professor in the Department of Health Services, Policy, and Practice at Brown University. He is also a faculty affiliate at the International Health Institute and at the Population Studies and Training Center at Brown University. His work focuses on three main areas of HIV/AIDS research: how economic incentives can be used to improve HIV prevention and treatment, the health and labor-market impacts of HIV prevention and treatment programs in Latin America and sub-Saharan Africa, and the financing of HIV treatment and prevention programs worldwide.

Galárraga was a principal investigator for National Institutes of Health–funded projects on conditional economic incentives to reduce HIV risks in Mexico, and he has served as a consultant for the World Bank; the Joint United Nations Programme on HIV/AIDS; the World Health Organization; the Global Fund to Fight AIDS, Tuberculosis, and Malaria; and the Bill & Melinda Gates Foundation. He holds a doctorate in health economics from the Johns Hopkins University.



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