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## Linking Health and Economic Development: HIV/AIDS Prevalence as an Indicator of Economic Growth

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# Linking Health and Economic Development: HIV/AIDS Prevalence as an Indicator of Economic Growth

Luis Chia

## **Abstract**

Today we are witnessing what may amount to the biggest health and development challenge the world has ever faced. Having caused the deaths of 20 million people globally since its discovery in 1981, HIV/AIDS is unique in its devastating impact on the social, economic and demographic foundations of development. Today, the number of people infected with HIV in the world has already reached an estimated 39.4 million, with over 95% of them living in the developing world. Like clockwork, as every minute passes, 6 people die from AIDS, amounting to a daily loss of 8500 lives. Despite increased funding, political commitment, progress in expanding access to HIV treatment, and major developments in the fight against HIV and AIDS, including anti-retroviral medicines, rates of infection are still on the rise. Time and time again, the AIDS epidemic has outpaced the global response. Thus, if we are to turn the tide, effective intervention strategies are needed now.

**Linking Health and Economic Development:  
HIV/AIDS Prevalence as an Indicator of Economic Growth**

By Luis Chia

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## INTRODUCTION

Today we are witnessing what may amount to the biggest health and development challenge the world has ever faced. Having caused the deaths of 20 million people globally since its discovery in 1981, HIV/AIDS is unique in its devastating impact on the social, economic and demographic foundations of development.<sup>i</sup> Today, the number of people infected with HIV in the world has already reached an estimated 39.4 million, with over 95% of them living in the developing world. Like clockwork, as every minute passes, 6 people die from AIDS, amounting to a daily loss of 8500 lives.<sup>ii</sup> Despite increased funding, political commitment, progress in expanding access to HIV treatment, and major developments in the fight against HIV and AIDS, including antiretroviral medicines, rates of infection are still on the rise.<sup>iii</sup> Time and time again, the AIDS epidemic has outpaced the global response. Thus, if we are to turn the tide, effective intervention strategies are needed now.

In order to develop an effective health policy initiative, it is necessary not only to understand the epidemiology of the disease but to also understand its impact on economic development. Classical economic theory sees improved health as the product of wealth. Though the correlation between GDP and life expectancy may help support this argument, this relationship is by no means a mechanical one. Improved health does not always come with high-income growth. Recent research does suggest, however, that healthy populations do tend to grow faster.<sup>iv</sup> Although the exact nature of this relationship is not fully understood, findings suggest that this apparent correlation is the result of the effects that improved health has on demography, education, the economy, and investment. Given these findings, **I believe that depending on the political environment, good health (low HIV/AIDS prevalence) can contribute directly to economic growth, while poor health (high HIV/AIDS prevalence) and poverty can become mutually reinforcing.**

## METHODS

To determine whether or not a relationship exists between HIV prevalence and economic development, statistical yearbooks were examined focusing on data about demography (**life expectancy, crude death rate, and population growth with and without AIDS**), education (**school life expectancy, education enrollment ratio, and literacy rates**), and the economy (**per capita GDP**) — more specifically, investment (**foreign direct investment inflows**). Because of limitations of each of the data sets, multiple data sources were used in order to give a more complete picture of the impact that HIV/AIDS has on development.

By examining demographic trends and comparing education statistics across countries, one can assess the impact of AIDS on growth and development. Life expectancy, crude death rate, and population growth trends with and without AIDS were analyzed because together they can project demographic changes which may shed light on the relationship between HIV/AIDS prevalence and poverty. This coupled with an assessment of school life expectancy, the education enrollment ratio across countries, and literacy rates can give a good picture of the current and future labor market of a specific nation and thus provide insight into future growth and development.

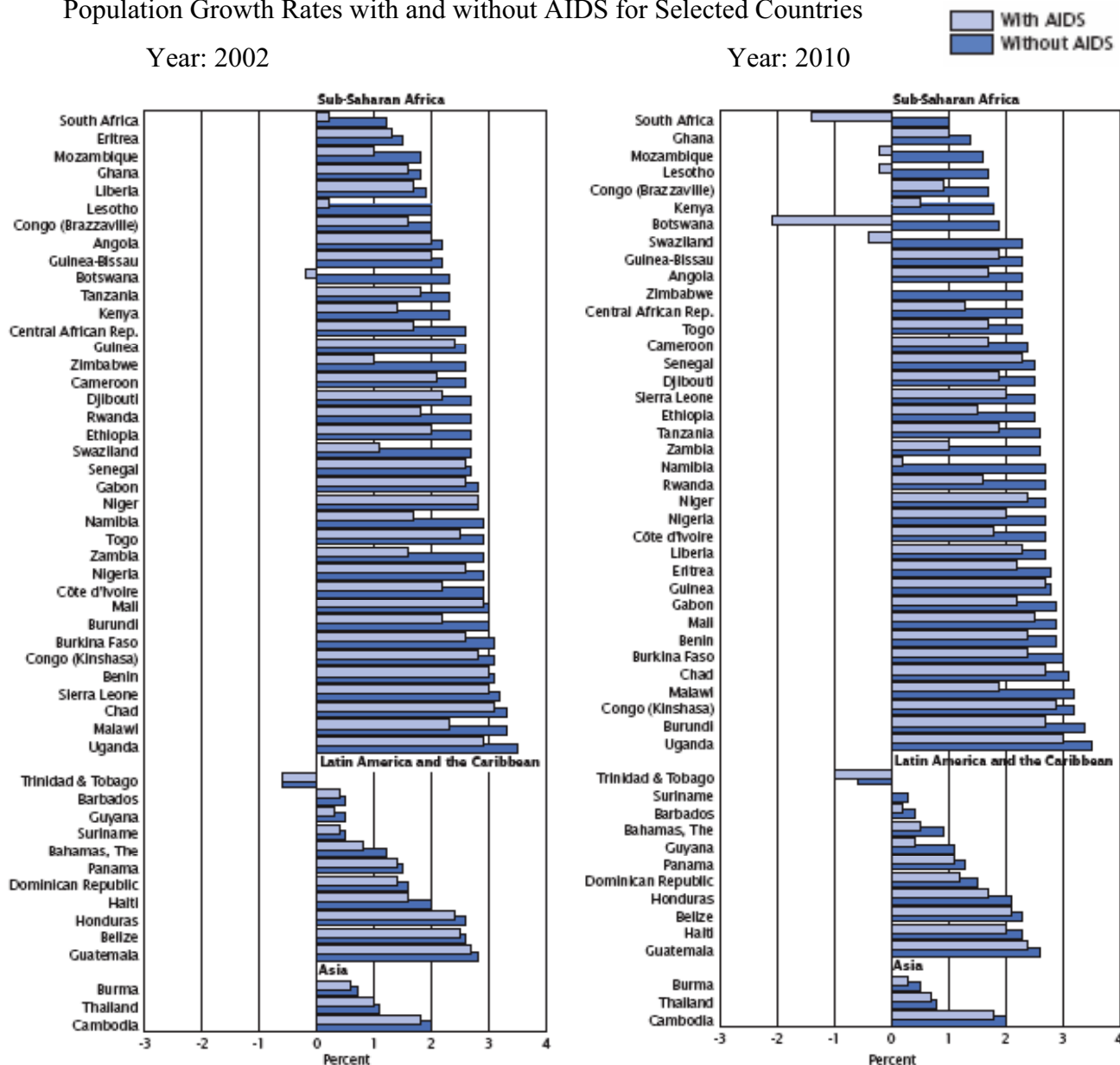
To further test whether a correlation exists between HIV/AIDS prevalence and poverty, per capita GDP and foreign direct investment (FDI) inflow data were studied to see if economic development has been hindered since the advent of HIV/AIDS in 1981. These two economic markers were chosen because they give insight into the economic environment of a country. In this study, per capita GDP was used despite its shortcomings as a development measure. Even though per capita GDP only reflects average national income and says nothing about the distribution of that wealth, it can still act as a relative index for economic development. Likewise, although FDI inflow data alone gives an incomplete picture of investment in any country, this study only examines FDI inflow because economic theory suggests that inflow of FDI increases with the “attractiveness” of the country. Thus, FDI inflow can give information about market potential, existence of a skilled work force, and pro-business government regulations, all of which affect development.<sup>v</sup>

## RESULTS

### Impact on Progress and Development

Figure 1

Population Growth Rates with and without AIDS for Selected Countries



These two figures show population growth of 51 countries where AIDS is having an impact on demographic indicators. The light blue series shows the affects that AIDS has had on population growth (left) and what is projected to happen by 2010 (right). The

dark blue series show what the U.S. Census Bureau’s modeling indicates would have happened if a country had not been affected by HIV/AIDS. These figures suggest that where HIV prevalence is high, more than 20% in this case, such as in Botswana and South Africa, population growth is projected to be negative by 2010 — a result of the devastating combination of high HIV prevalence and low relative fertility rates.

Figure 2

Life Expectancy at Birth with and without AIDS for Selected Countries

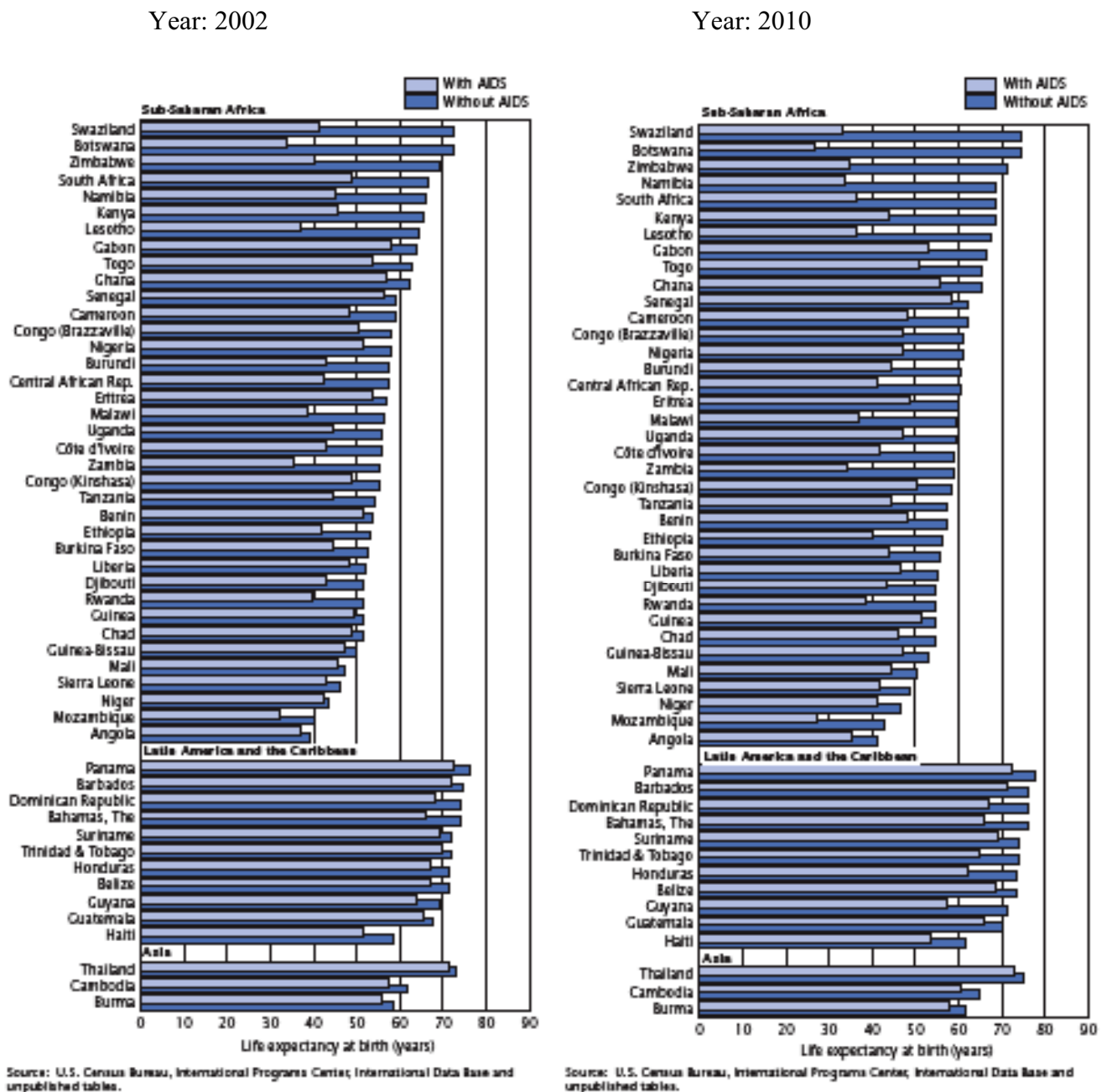


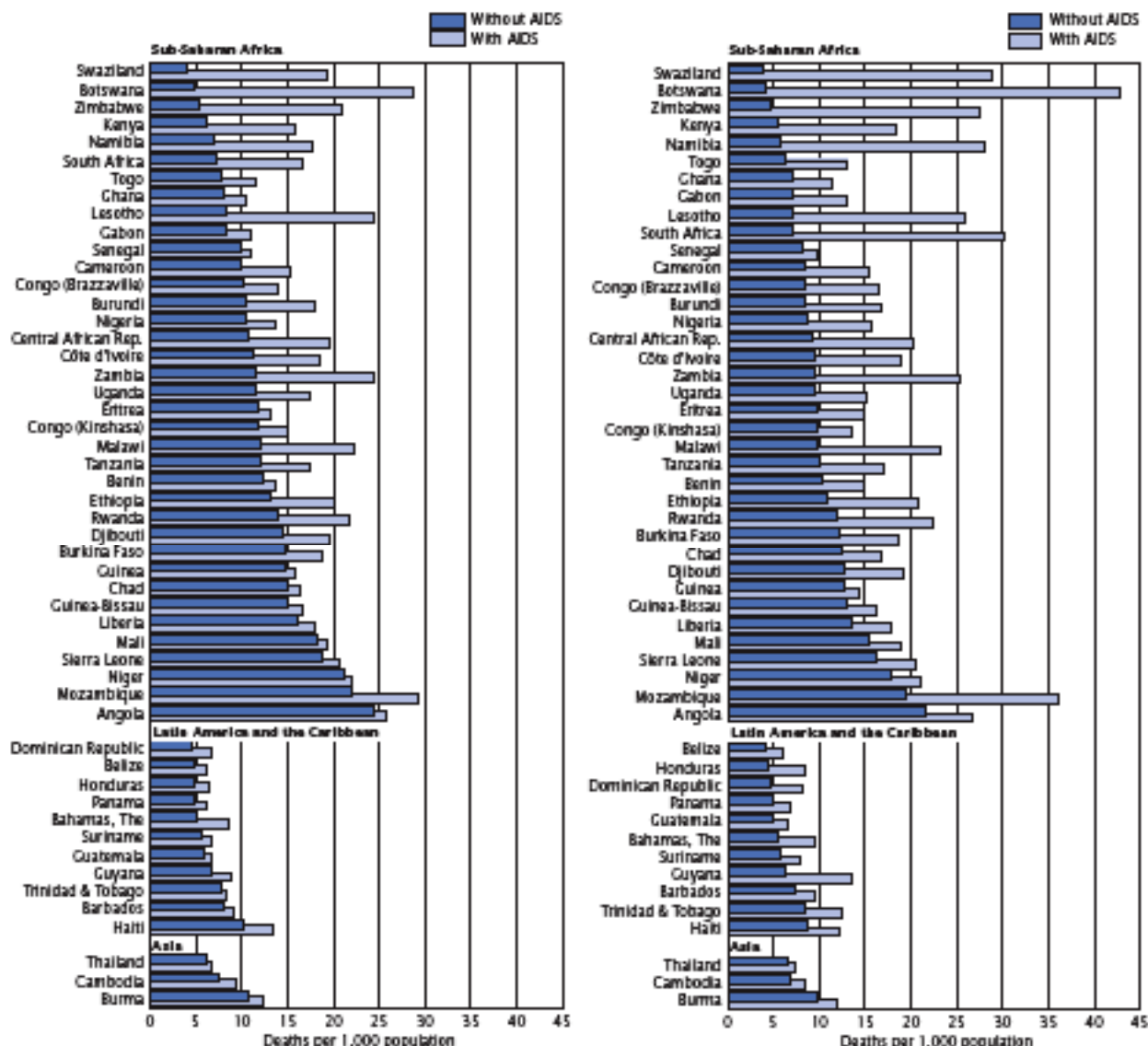
Figure 2 depicts life expectancy at birth for the same 51 countries in Figure 1. This graph illustrates the impact that rising HIV prevalence, and therefore rising AIDS mortality, has had on life expectancy.

Figure 3

Crude Death Rates with and without AIDS for Selected Countries

Year: 2002

Year: 2010

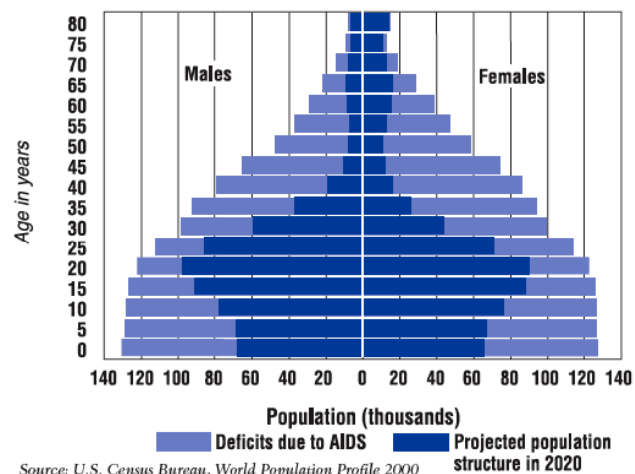


Source: U.S. Census Bureau, International Programs Center, International Data Base and unpublished tables.

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Like Figure 2, Figure 3 shows the devastating correlation of high HIV prevalence and higher crude death rates. What is startling, however, is not the mere rise in crude death rates. Rather, it is this rise despite expected declines in mortality due to non-AIDS causes. This brings us to the question of what a decrease in population growth, a decrease in life expectancy, and an increase in crude rates actually mean for a country. Although more detailed analysis, on age-specific mortality for example, is necessary, these general trends suggest that the population structure of high prevalence rate countries is beginning to shift. With AIDS as the leading cause of death in Africa today, findings reveal that it does not predominately kill the weak and elderly, but rather attacks the most productive adults. Thus, with population growth and life expectancy reduced, and a continued rise in crude death rates due to AIDS, resulting population demographics will be unlike anything we have seen before. Instead of “population pyramids,” we will see “population chimneys,” where a small proportion of people support the very young and the very old. Take for example the projected change in demographics due to AIDS in Botswana (Figure 4).

**Figure 4. Projected Change in Demographics due to AIDS in Botswana**



The exact effects of this new population structure are unclear. What is clear is the issue raised by the increasing number of children who are orphaned by AIDS, who today number in the millions. As evidenced by Uganda, the number of AIDS orphans will remain high even if HIV prevalence is brought down. In Uganda, HIV rates peaked in about 1991-92 and have decreased significantly since. But the number of children orphaned by AIDS is only peaking now.<sup>vi</sup>

When we graph school life expectancy, literacy rates, and education enrollment against HIV prevalence, however, we find that there is no noticeable correlation between these education indicators and the prevalence of HIV. This may be a result of the fact

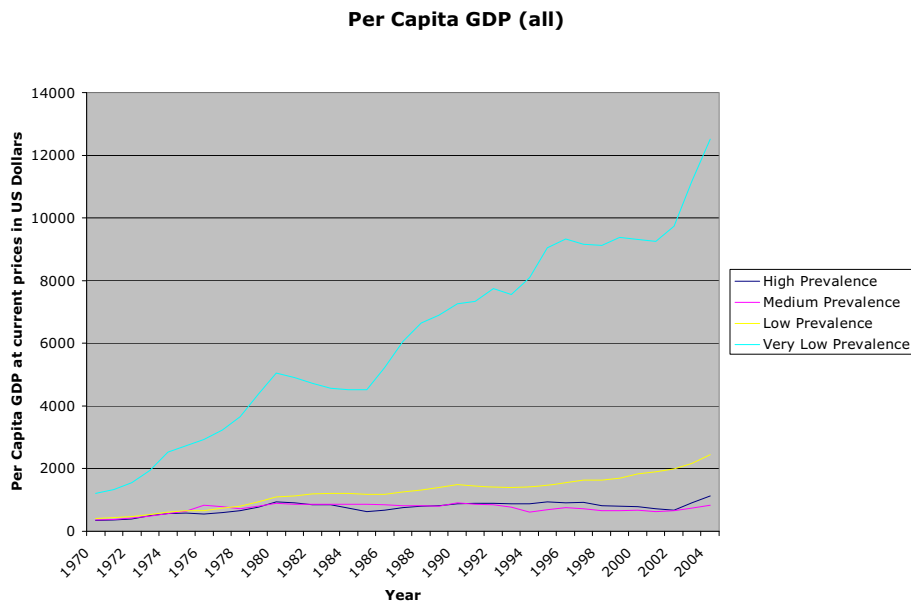
that education results are a product of social policy. Thus, even high prevalence rate countries may fare well in each of these categories if education policies call, for example, for universal education. However, I believe that a correlation does exist. I believe that HIV and AIDS have not yet had an affect on education indicators and that in the next decade or two, we will see an inverse relationship between HIV prevalence and school life expectancy, literacy rates, and education enrollment.

As death rates continue to rise and target the most productive sectors of society, the new generation of AIDS orphans will, at an earlier age, have to take on roles that were traditionally reserved for post-scholastic years. This means that children will have to drop out of school before completing their education in order to work to support themselves. This will result in decreased school life expectancy, education enrollment, literacy rates, and other education indicators. The loss of skilled workers and educated citizens means a roll-back of any development progress that has been made in the last few decades. More importantly, such loss makes it difficult for struggling countries to pull themselves out of poverty, as they continue to shrink their human capital, perpetuating a vicious cycle of poverty.

### **Impact on Economic Prosperity**

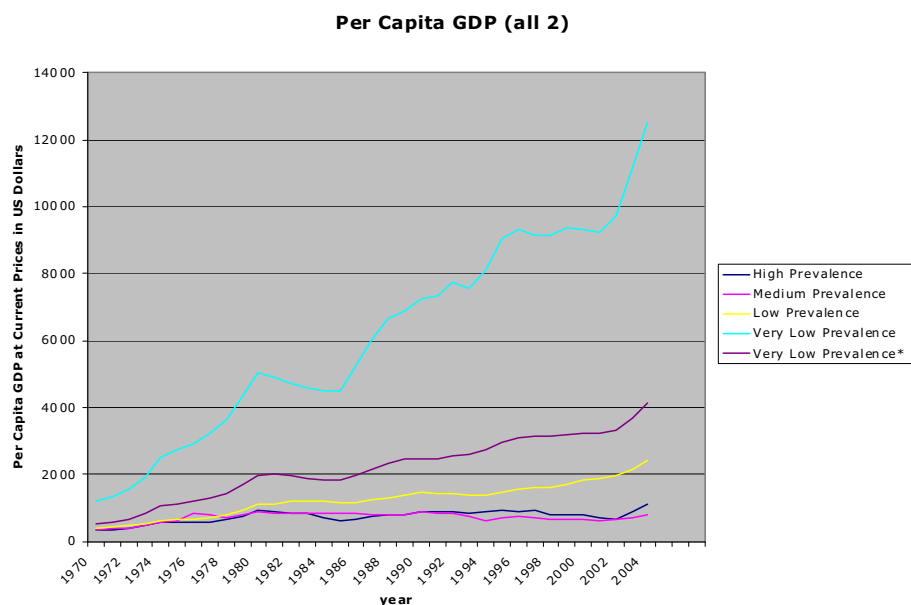
When we examine per capita GDP trends since 1970, we see that world prosperity has grown tremendously, driven almost entirely by countries with very low HIV prevalence rates (less than 1%). When we compare per capita GDP of countries with low, medium, and high HIV prevalence rates, 1%-4.99%, 5%-9.99%, 10%-19.99%, and those >20% respectively, we can see a negative correlation between HIV prevalence and economic growth as measured by per capita GDP. As previously mentioned, however, we know that per capita GDP is not the best measure of economic development and prosperity, as it fails to account for the distribution of wealth. Hence, it is misleading to compare per capita GDP of South Africa, where a huge portion of national wealth is concentrated in the hands of a minority, to Botswana, for example. For this reason, per capita GDP is analyzed in several ways.

Figure 5 is a graph of per capita GDP for all countries from 1970 to 2004. To better show the relationship between per capita GDP and HIV prevalence, the fifty richest countries, all of which are very low prevalence rate countries, were removed from the data set.



Even though this methodology is imperfect at best, as a result of it, we are better able to see the relationship between HIV prevalence and per capita GDP over time. By removing those fifty countries we are still able to see from Figure 6 that there is a negative

relationship between the two variables. Per capita GDP growth is higher in countries with lower HIV prevalence.

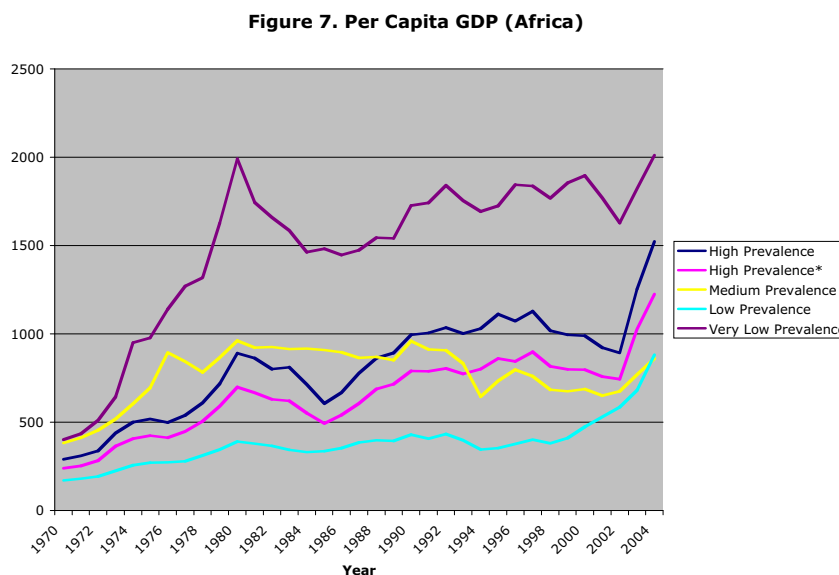


In order to attempt to remove inherent biases present in the way that the data has been aggregated, per capita GDP is also compared among African countries alone. Figure 7 shows that a similar negative correlation, although not as strong, arises

between the two variables. For some reason, high HIV prevalence countries are doing

better, in terms of per capita GDP, than low HIV prevalence countries. This may be a result of the affects of foreign direct investment, which is discussed later. In this figure, “high prevalence\*” denotes high HIV prevalence countries excluding South Africa.

Although the current removal of South Africa appears to be arbitrary, one can clearly see the influence that South Africa has on the data that has been collected. When we note how different South Africa is from its neighbors the removal makes more sense.



GDP is the measure of the output of a nation. So, per capita GDP is only the average national income. Noting growing inequality trends, we can therefore argue that national wealth is not equally distributed. Hence, the significance of per capita GDP is that we can use it to say that the poorest members of society, those who are most likely to be affected by HIV and AIDS, have at most at their disposal this national average. In this way we can see clearly how HIV/AIDS affects individuals and households.

Mutually reinforcing, HIV/AIDS negatively affects household wealth. Because of the many indirect costs that the disease incurs, which include loss of productivity and increased business overhead, HIV/AIDS has a great impact on the economy in general. For the moment, we focus only on the household. Households with HIV/AIDS personnel incur immediate costs in the form of lost wages. This can translate into lower disposable income, as a growing share of the already small family budget is directed towards HIV/AIDS related healthcare costs. Such a decrease in disposable income has disastrous effects on a household. Because of the decrease in perceived life expectancy, households are less likely to save and thus limit their own accumulation of physical capital, lowering

their overall wealth. With a similar effect, children, for example, may be denied educational opportunities because they must now enter the labor force without adequate preparation. This in turn decreases the likelihood of the child obtaining a well-paying job, which further decreases potential wages, further reducing disposable income.

Turning our attention to businesses, HIV/AIDS impacts the business sector because it increases expenditures while reducing revenue. Many industries are currently facing increased levels of absenteeism and are having to recruit replacement labor as their employees fall sick and die; in turn incurring costs in recruitment, training, healthcare, medical insurance,

sickness and burial payment. The effect of this is decreased future investment, which lowers wealth of the region and adds to the cycle of poverty. Since businesses must also face less productive staff and a

shrinking skilled labor force, it is up to the local governments to ensure that necessary policies are in place that will keep business there and encourage new ones to grow.

In addition to looking at per capita GDP as a measure of economic growth and potential economic growth, one can examine inflows of foreign direct investment. High foreign direct investment inflow implies that a country is investment attractive. As a result, by examining whether a relationship exists between HIV prevalence and FDI, we can determine the likelihood of future economic growth. Figure 8 shows a marked difference in foreign investment levels between countries with different HIV prevalence rates. Although the decline in FDI inflow in very low prevalence countries in the late 1990s is unexplained, one can still say that lower HIV prevalence means higher FDI, which reflects country conditions that include the presence of a skilled labor force and market potential, among other things.

Figure 8. FDI Inflow All

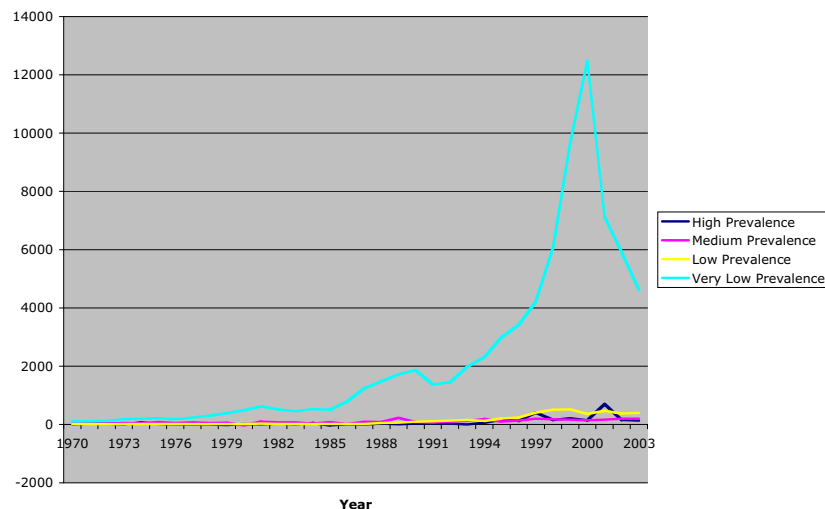
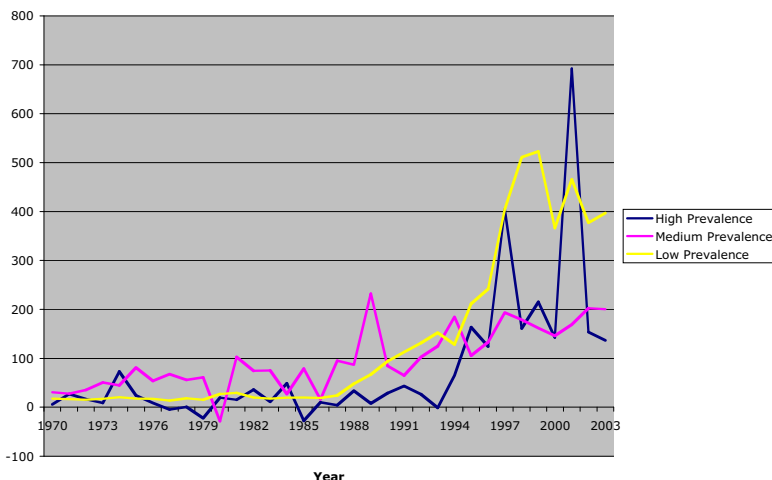


Figure 9 is a close-up of FDI inflow data on low, medium, and high HIV prevalence rate countries. From this figure one can see a weak correlation between the two variables. When you remove South Africa, which alone comprises a huge proportion

Figure 9. FDI Inflow (high, medium, low)

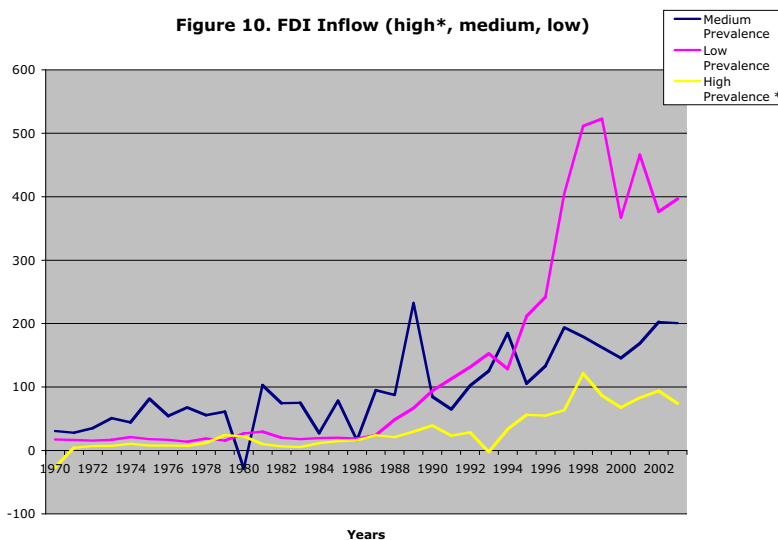


of total FDI in Africa, the relationship becomes stronger (Figure 10). In this case, South Africa is removed from the data set because it can be argued that most of the FDI that the country receives is FDI that is actively sought through government policies. Since we concern ourselves mainly

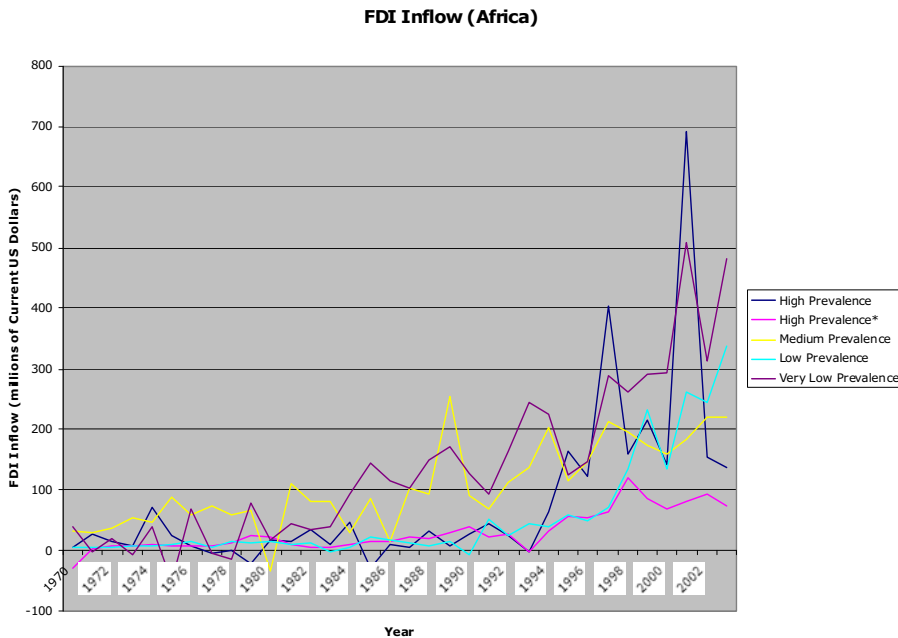
with measures of economic development, an argument can be made to exclude South Africa because high levels of FDI in South Africa may be solely due to investment-friendly government policies.

Like per capita GDP, FDI inflow data is better understood if it is only compared among African countries (Figure 11). This figure shows the reinforced negative relationship between HIV prevalence rates and FDI inflow. Like Figure 10, this figure excludes data from South Africa.

Figure 10. FDI Inflow (high\*, medium, low)



The importance of the relationship between FDI inflow and HIV prevalence is the policy implications that are associated with it. Since FDI inflow is an indirect measure of the business environment, we can now see the effects that HIV/AIDS has on the



development of industry. Because of the high costs that are associated with running a business in a high HIV prevalence country (absenteeism, high turnover, healthcare costs, etc.), businesses are less likely to

invest, which is reflected in the lower FDI. Thus, in order to increase FDI and benefit from it, governments must institute policies that foster business development and FDI, while at the same time protecting domestic industry. In doing so, governments can create sustainable industries that will ultimately benefit their people and help in the fight against HIV/AIDS.

## CONCLUSION

Today, over 95% of those living with HIV/AIDS live in the developing world. In sub-Saharan Africa, the pandemic is changing the demographic structure of Africa and wiping out prior development gains. The estimates of the impact of HIV/AIDS on economic growth rates vary, but the trend is clear. HIV/AIDS has stifled and will continue to stifle economic growth. The future does not look good. But it doesn't have to be like this. Countries such as the United States can step in and help contain the problem. If not for Africa and other regions that are severely affected by the disease, the

United States should do it for itself. The rate of infection is on the rise, and disease does not discriminate nor respect national boundaries.

It is important to recognize that HIV is not only a threat to the health and economic well-being of those affected. Thus, the continued rise of HIV infection is also an issue of international security. HIV/AIDS strains the economic, social, and security fabric of countries, undermining recent development gains and destroying communities while destabilizing regions, posing threats to international security. Another reason to step up to the plate is because of the cost benefits of early intervention. As prevalence rates rise, so do per capita costs of addressing the epidemic. Hence, countries that are able to should act now.

Countries like the United States should develop policies and intervention programs that address immediate concerns as well as long-term ones. The U.S. program should incorporate culture-sensitive prevention, care, and support initiatives, which aim to reduce the number of new infections and risky behavior. More importantly, the United States needs to focus its attention on the problem of rising healthcare costs. It can address this issue by enacting policies that encourage more research and development of antiretroviral drugs that can treat AIDS. Noting the weaknesses of many healthcare delivery systems in many high HIV prevalence countries, the United States should also work on improving and developing the infrastructure that will enable countries to more effectively deliver healthcare. In doing so, the United States can help to fight, offering hope in the war against HIV/AIDS.

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<sup>i</sup>UNAIDS, Report on the Global AIDS Epidemic, Geneva: UNAIDS (2004).

<sup>ii</sup> Ibid.

<sup>iii</sup> African Development Forum, HIV/AIDS and Economic Development in Sub-Saharan Africa, Geneva: UNEC Africa (2000).

<sup>iv</sup> Ibid.

<sup>v</sup> Valentino Piana, Foreign Direct Investment, Economics Web Institute (2005).

<http://www.economicwebinstitute.org/glossary/fdi.htm>

<sup>vi</sup> Erica Barks-Ruggles, Meeting the Global Challenge of HIV/AIDS, The Brookings Institution, Brief 75 (Apr 2001).

Figures 1-3

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Stanecki, Karen. The AIDS Pandemic in the 21st Century. U.S. Census Bureau. Washington, D.C., March 2004.

Figure 4

Barks-Ruggles, Erica. Meeting the Global Challenge of HIV/AIDS. The Brookings Institution. Brief 75. April 2001.

Figures 5-11

United Nations Statistics Division. <http://unstats.un.org/unsd/default.htm>