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The Impact of HIV/AIDS on Poverty and Inequality

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Most studies on the economic impact of HIV/AIDS focus on such variables as GDP growth or income per capita. Early studies, incorporating the impact of HIV/AIDS in a one-sector neoclassical growth model, found that although the impact of HIV/AIDS on GDP growth is substantial, the impact on GDP per capita may well be small. Later studies refined this approach, for example by considering a larger number of sectors, including some demand-side effects, or allowing for an impact of changes in life expectancy on individuals' decisions.¹

However, these studies provide little information about how changes in income are distributed among the population. Empirical studies and more casual evidence show that HIV/AIDS does have a serious adverse effect on the households it strikes, through the costs of care (both financial costs and the opportunity cost of otherwise productive time reallocated to care) and loss of income. Other households may provide support to households affected directly or may take care of children whose parents have fallen ill or died. More generally, HIV/AIDS affects all households through its macroeconomic repercussions, for example through changes in wages, and these macroeconomic effects may also differ among households.

In light of these facts, the average change in income per capita contains very little information that is relevant from a policy perspective.

¹For a broader discussion of studies of the impact of HIV/AIDS on economic growth, see Haacker (Chapter 2, this volume).

More generally, studies of the impact of HIV/AIDS on economic growth, imputing aggregate changes in saving or focusing on the behavior of some representative agent, can yield misleading results. For example, HIV/AIDS can affect the accumulation of human capital at the level of individual households, in particular if children have to take time off from school to care for sick dependents, or if households can no longer afford to send children to school. A macroeconomic analysis focusing on a representative individual would not capture many of these effects.

These concerns have motivated new research on the impact of HIV/AIDS on economic growth, focusing on the effects on households. Most notably, Bell, Devarajan, and Gersbach (Chapter 3, this volume) use an overlapping-generations framework in which the death of a parent affects the children's education through a loss in household income, through a breakdown in the direct transfer of human capital from parent to child, and as the decline in returns to human capital associated with higher expected mortality makes investment in children's education less attractive. In this framework HIV/AIDS has the potential to increase poverty, as children of parents who died of AIDS are endowed with less human capital and will receive lower salaries in their working years. With less human capital and less family income, their children, in turn, will end up with less human capital, and so on. In this framework, then, HIV/AIDS can have adverse effects that persist over generations.

This chapter pursues a different and in some ways complementary approach. Rather than discussing the repercussions of the impact of HIV/AIDS on households for the economy and economic growth, it describes a method of analyzing the impact of HIV/AIDS on households that draws on an aggregate macroeconomic framework and uses existing household income and expenditure surveys.² Thus it is possible to draw inferences about the impact of HIV/AIDS for different types of households. In particular, the chapter will assess how HIV/AIDS may alter poverty levels (as affected households are pushed below some poverty line) or the extent of inequality (if more poor households than rich households are affected, or if the income shock to the poor is relatively greater than for the rich households).

²Although the chapter's emphasis is more general, the analytical part draws on and uses numerical examples from an earlier study focusing on Botswana (Greener, Jefferis, and Siphambe, 2000).

The chapter is organized as follows. The first section provides some context, in particular on the links among poverty, inequality, and welfare. The second discusses the impact of HIV/AIDS on households, as well as some methodological issues and additional data requirements pertaining to the analysis of poverty and inequality. The third section reports estimates of the impact of increased HIV/AIDS-related mortality on inequality and poverty in Botswana, and the final section concludes.

Poverty, Inequality, and Welfare

Before outlining the chapter's approach to assessing changes in poverty and inequality due to HIV/AIDS, it is worth taking a step back to discuss how these measures of the impact of HIV/AIDS relate to welfare more generally. First, the analysis focuses on household income and, because of data limitations, does not take into account household wealth. This is an important limitation: the ownership of assets enables households to mitigate the impact of income shocks on consumption, because it enables them to smooth consumption over time, and because the volatility of income from assets is presumably less volatile than income from labor in the present context.

A second and somewhat related point is that a household's welfare depends not just on its consumption but also on the risks to living standards that the household faces. These risks are related to, but go well beyond, the risk to household income. For example, Crafts and Haacker (Chapter 6, this volume) focus on the link between increased mortality risk and welfare. Also, HIV/AIDS can erode existing support instruments, for example from the extended family or the community (see also Whiteside, 2002). Certain public services—for example, free health services—can also mitigate the economic burden of the disease. There is evidence that, in countries with escalating HIV epidemics, health services at first cannot fully cope with the greatly increased demand and have to resort to rationing. However, very substantial efforts are under way to rapidly increase access to antiretroviral treatment in developing countries. Since poor households would not be able to afford the costs of such treatment, these efforts also have implications for the impact of HIV/AIDS on poverty. HIV/AIDS also results in a substantial increase in the number of orphans. Children living in families affected by HIV/AIDS see their living standards fall as household income declines and expenditure is reallocated to the care of the infected family member. Orphaned children tend to live in poorer households and may have limited access to

education.³ For various reasons, the impact of HIV/AIDS on children is likely to be more severe in low-income households. A government policy of universal access to education, together with other measures to support children affected by HIV/AIDS, can mitigate this adverse impact. For example, the decline in school attendance for orphans is lower in countries with higher overall enrollment rates, suggesting that impediments to education for the poor are low in those countries.

Third, the emphasis of this chapter's analysis is on the short run, treating HIV/AIDS as a mortality shock that affects wage rates and the distribution of income across households. In the longer run it is necessary to address how the distribution of income among households evolves over time, as households dissolve and new ones are formed, and as income shocks not related to HIV/AIDS change the distribution of income. This is discussed in more general terms in Haacker (Chapter 2, this volume), using an approach similar to that of Booyesen (2003); Bell, Devarajan, and Gersbach (Chapter 3, this volume) offer an analysis of the long-term effects of HIV/AIDS as income shocks, the loss of parents, and a decline in returns to human capital affect the accumulation of human capital.

Measurement Issues

The study of the impact of HIV/AIDS on poverty and income inequality draws on many different types of data. Numerous studies analyze the impact of HIV/AIDS at the household level. These studies, however, are typically based on relatively small samples and not representative of the overall population; also, the data are presented in a way that yields few insights in terms of changes in poverty and inequality.

To arrive at estimates of the impact of HIV/AIDS on poverty and inequality, this chapter therefore uses additional data on households' composition, income, and expenditure; estimates of the macroeconomic effects of HIV/AIDS; and demographic estimates of the impact of HIV/AIDS. Appropriate definitions of poverty and inequality are also required.

³The United Nations Children's Fund (UNICEF, 2003) reports that school attendance rates for orphans were 13 percent lower than for nonorphans in sub-Saharan Africa. The median dependency ratio for households with orphans (1.8) was 20 percent higher than that for nonorphan households (1.5).

Households

HIV/AIDS typically begins to affect a household's income during the illness of an HIV-positive household member. If the infected person's income depends on his or her productivity (as it often does, for example, in smallholder agriculture), the income loss sets in during the illness. If the individual works in the formal private sector or the public sector, however, provisions for sick leave or disability benefits, or both, may mitigate the loss. In addition, to the extent that the working time of household members is diverted from productive activities to the care of the ill family members, the household's income will decline further. Eventually, if an HIV-positive member dies, his or her income is lost to the household. However, for employees in the formal private or the public sector, life insurance or a pension scheme (possibly including pensions for surviving dependents) can mitigate the loss.

HIV/AIDS also affects households' incomes indirectly through its macroeconomic effects, whether any household member is affected by HIV/AIDS or not. If, for example, increased mortality makes certain categories of labor more scarce while demand is largely unaffected, wages for that labor will rise, and with them the incomes of the households that receive those wages. More generally, HIV can affect the level of wages across all skill categories. For example, the neoclassical growth model predicts that a decline in the rate of growth of the working-age population will result in an increase in the capital-labor ratio; as the marginal product of labor then rises, so will wages. Some studies suggest that when large numbers of workers in the formal sector with relatively high incomes die, they are replaced by "surplus labor" from the informal sector, thus raising average income. On the other hand, the deteriorating economic outlook and higher production costs can result in a decline in investment and thus in employment opportunities.

Households affected by HIV/AIDS face additional costs of two major kinds. The first is the increased cost of medical treatment for HIV-positive members who are beginning to develop symptoms of AIDS and are experiencing more frequent illnesses. The total expenditure of a household will depend on its income and circumstances. Wealthy households may opt for very expensive private treatment, using the results of the latest medical research, which can keep infected people asymptomatic for extended periods. The poorest households will be forced to rely on public medical provision but will still face additional costs for transport and food. The second additional cost is the cost of a funeral when the ill household member dies. Funerals can be very expensive, often requiring a large number of people

to be fed for many days, in addition to the costs of the casket and ceremony. The total expenditure will again depend upon the household's income.

Impact on Poverty and Inequality

The household studies referred to above yield limited insights into the impact of HIV/AIDS on poverty and inequality, mainly because of the limited sample size. One important study from a methodological point of view is Booysen (2003), which is based on a panel of 355 South African households, with three observations for each. Booysen shows that the incidence of poverty is higher for households affected by HIV/AIDS (35 percent of which were classified as poor) than for those not affected (21 percent were classified as poor). Dividing the sample into five income quintiles, Booysen then shows that the income ranking of households affected by HIV/AIDS is more likely to deteriorate and less likely to improve than that of other households. These results are reinforced by several regressions suggesting that HIV/AIDS did indeed contribute to the observed differences in poverty levels and income mobility.

The data on the distribution of income across households that form the basis of this chapter's assessment of the extent of and changes in income inequality come from a national household income and expenditure survey in Botswana. This survey provides data on household composition (the number, age, and sex of household members), household income and its sources, and detailed household expenditure.

The extent of inequality in the analysis below makes use of the Gini coefficient, which measures the difference between the observed distribution of income (across households or individuals) and perfect income equality. The Gini coefficient lies between zero and one. A value of zero corresponds to the situation in which every person in a group has exactly the same income, and a value of one corresponds to the opposite extreme where one person receives all the group's income and everyone else has none. Thus a higher Gini coefficient indicates greater income inequality.

Poverty can be defined in absolute or relative terms. As an example of the former, one can define a critical income level, based on household composition, a basket of basic needs, and the cost of that basket in the household's location. Households are classified as poor if their income is less than this *poverty datum line* (PDL). The *household poverty rate* then refers to the percentage of households with income below the PDL, and the *individual poverty rate* (or the poverty head count) is defined as the

percentage of all individuals who live in households with income below the PDL.

However, in assessing the impact of HIV/AIDS on poverty, it is necessary to determine how additional, HIV/AIDS-related expenses interact with the PDL by adding to the cost of the basic basket the required cost of medical treatment or, in the case of death, a funeral. Later on, once a household member dies from HIV/AIDS-related causes, the household no longer has to meet the deceased person's expenditure requirements (medical and cost of living), and the PDL for the household needs to be adjusted accordingly. Such a household is less likely to be classified as poor. Whether the expenditure effects described here increase or decrease total poverty depends on the magnitude of the expenditures considered.

Another useful statistic is the *income dependency ratio*. This is the average number of people within a household who are supported by a household member who is employed and earning an income. This is usually considered to be a sensitive indicator of household poverty and of the vulnerability of a household to the loss of an income earner. The situation of the poorest households is represented by the lowest income quartile: the 25 percent of households with the lowest incomes per capita. The two statistics chosen below to measure the situation of the poorest households are lowest-quartile household income and the lowest-quartile income dependency ratio.

Data on HIV prevalence are usually obtained from sentinel surveys, most commonly from blood tests at antenatal clinics. These data are available only for subgroups of the population such as pregnant women, sex workers, or hospital patients. To draw inferences from these data on HIV prevalence for the whole population by age and sex, a model of the spread of HIV infection and of AIDS in a population is required; estimates of HIV prevalence by population group are then obtained by fitting the parameters of the model to the available observations (see Epstein, Chapter 1 of this volume, for a more detailed discussion of this approach).

For the analysis performed here, it is necessary to draw inferences on HIV prevalence at the household level from the available estimates by age cohort and sex. The principal challenge here is that the likelihood that a household member is infected depends on the other household members' HIV status. For example, regular sexual partners are likely to infect each other, and infants are often infected at birth or during breastfeeding if the mother is HIV-positive. In the absence of sufficient data to estimate the correlation of HIV status among household members, researchers often use aggregate estimates of HIV prevalence for individual household members; this approach, however, overestimates the share of HIV-affected

households and underestimates the share of households with multiple HIV infections.

An Application to Botswana

The analysis presented here makes use of household income and expenditure data from the Botswana Household Income and Expenditure Survey (HIES) conducted in 1993/94.⁴ The survey recorded household characteristics, such as the age and sex of all household members and the location of the household, and measured all sources of income and items of expenditure. Because these data on household characteristics are static, they are not suitable for a dynamic analysis. In particular, they cannot be used to trace how households' income changes over time, as does Booysen (2003), or to model how households dissolve over time and new households are formed.

The definition of poverty (the PDL) used here comes from a major study of poverty and poverty alleviation carried out by the Botswana Institute for Development Policy Analysis (BIDPA) in 1996 on behalf of the Botswana Ministry of Finance and Development Planning (1996). The study made use of data from the HIES conducted in 1985/86 and 1993/94 and added a definition of poverty based on the cost of a basket of basic goods and the structure and location of individual households.

Macroeconomic Effects

Estimates of the macroeconomic impacts of HIV/AIDS also come from a Botswana Ministry Finance and Development Planning study (Botswana Ministry of Finance and Development Planning, 2000). An equilibrium model comprising two sectors and three factors was constructed for the Botswana economy, following the approach used for Tanzania by Cuddington (1993). The model distinguished between skilled and unskilled labor and between the formal and informal sectors. The impacts of HIV/AIDS operated through the supply of labor and through investment growth.

The study considered a number of different scenarios in order to deal with uncertainties in the assumptions. Under the most likely scenario,

⁴The analysis in this section is based on earlier work by Greener, Jefferis, and Siphambe (2000).

HIV/AIDS reduced the growth rate of GDP by 1.5 percentage points, so that after 25 years the economy would be 31 percent smaller than it would otherwise have been. GDP per capita for the survivors was virtually unaffected by HIV/AIDS because of the projected population impact. However, GDP in Botswana has a significant rent component arising from mining revenue, which accrues almost entirely to the government rather than to households. In this situation, where HIV/AIDS leaves the rent component unchanged but GDP per capita remains the same, household income per capita nevertheless falls by 5 to 10 percent.

The same scenario predicted that unemployment among unskilled workers would be 8 percent lower as a result of HIV/AIDS. The existing shortage of skilled workers would be exacerbated, causing skilled wages to rise by 12 to 17 percent. The model also predicted an 18 percent rise in the capital-output ratio, confirming the expected factor substitution away from labor.

Demographic Effects

To assess the impact of HIV/AIDS at the household level, AIDS was assigned in a random fashion to individuals in the population. Given the structure of households in Botswana, this leads to the outcome that 49 percent of households are affected by HIV/AIDS (that is, have at least one infected member). To the extent that HIV occurs in “clusters,” such that individuals are more likely to be infected if other family members are, the total share of households with an infected member would be less than 49 percent, but more households would be affected with multiple infections. The analysis then assumed that all infected household members die within 10 years, and the income and expenditure of each household were recalculated based on the resulting, depleted household structure.

As a result of the employment structure in Botswana, 26 percent of households in the analysis lose income as a result of the death of an income earner. This is less than the total percentage affected by HIV/AIDS because of the country’s high rate of unemployment. A key assumption in this analysis is that susceptibility to HIV is not related to employment status or skill level. If otherwise,⁵ the percentage of households losing income

⁵Evidence from the 2000 and 2001 sentinel surveys suggests a weak relationship between HIV status and employment status for pregnant women, with HIV prevalence slightly higher among employed women.

would be lower or higher than 26 percent: lower if the unemployed are more susceptible, and higher if they are less susceptible to HIV.

The analysis predicts that many small households will be wiped out by AIDS. Approximately 6.9 percent of households disappear altogether over the 10-year period, because all of the household members are infected. This represents about 1.9 percent of the total population. These percentages would be even higher if HIV clusters within households.

Impact on Inequality and Poverty

As a first step, to separate the direct impact of increased mortality on households from the macroeconomic repercussions, the impact of HIV/AIDS on inequality associated with the deaths of HIV-positive household members is analyzed on the assumption of no changes in the macroeconomic environment (wage rates) or HIV/AIDS-related expenditure. In this simplified analysis, households face a loss of income but also experience a corresponding fall in their long-run basic needs (since there are fewer people in the household) and hence have a lower PDL. The top panel of Table 5.1 shows the results for this base case.

The analysis indicates that the income per capita of households will fall by 10 percent as a result of HIV/AIDS and the loss of income earners, in the absence of any effects on unemployment or wages. The analysis predicts no overall change in the level of inequality as measured by the Gini coefficient. This means that, despite an overall downward shift in income per capita and a change in the ordering of households by income (those affected by AIDS see their income fall, but unaffected households do not), the resulting pattern of inequality appears to be not measurably different from the starting point.

However, the analysis also predicts rising poverty as a result of HIV/AIDS. The share of households below the PDL (the household poverty count) rises by 6 percentage points, and the share of individuals in poor households rises by 4 percentage points. The difference between these two figures reflects a difference in impact among households of different sizes: large households are more likely than small households to become poor as a result of AIDS. The income dependency ratio increases from 5.4 to 6.4, or by about 20 percent. This means that every income earner can, on average, expect to acquire one extra dependent as a result of HIV/AIDS over the next 10 years.

The situation is considerably worse for households in the lowest quartile of the income distribution. The income dependency ratio for this group is expected to rise from 16 to 24, or by 50 percent. In other words,

Table 5.1. Estimated Impact of HIV/AIDS on Income, Inequality, and Poverty in Botswana

	All Households				Poorest Quartile		
	Income per capita (pula a month) ¹	Gini coefficient	Household poverty count (percent)	Individual poverty count (percent)	Income dependency ratio	Income per capita (pula a month) ¹	Income dependency ratio
Base case							
Without HIV/AIDS	215	0.51	37.7	47.8	5.4	43	15.8
With HIV/AIDS	193	0.51	43.7	51.9	6.4	36	23.7
Difference							
Absolute	-22	0.00	6.0	4.0	1.1	-8	7.9
In percent	-10	0	16	8	20	-18	50
Including macro-economic effects							
Without HIV/AIDS	215	0.51	37.7	47.8	5.4	43.3	15.8
With HIV/AIDS	199	0.51	42.7	50.9	5.9	37.6	19.7
Difference							
Absolute	-16	0.00	5.0	3.1	0.5	-5.6	3.9
Percent	-8	0	13	6	10	-13	25

Source: Greener, Jefferis, and Siphambe (2000).

¹In 2000, one dollar was worth about 5.12 pula (year average).

every income earner in this category can, on average, expect to support an extra eight dependents as a result of HIV/AIDS. There is a corresponding fall of 18 percent in the average income of households in the lowest quartile—nearly double the income loss among the population as a whole. This analysis implies that the poor are particularly vulnerable to the impacts of HIV/AIDS.

The results with respect to poverty rates also suggest that the finding, based on the Gini coefficient, of little change in inequality needs to be qualified. In fact, the impact of HIV/AIDS on poor households (whether measured by income loss or by a higher income dependency ratio) is worse than for the rest of the population. Taken by itself, the differential effect on poor households' incomes alone indicates that the Gini coefficient should rise. The fact that it does not means that a second effect must be at work: although the bottom of the income distribution drops further, HIV/AIDS appears to reduce inequality for the higher-income quartiles.

At the very bottom of the income distribution, the analysis also predicts a dramatic increase in the number of destitute households, defined for this purpose as households with no income earners. The proportion of households with zero income rises by 1.5 percentage points, the proportion with income per capita of less than 10 pula a month rises by 2.1 percentage points, and the proportion with income per capita of less than 25 pula a

month rises by 2.5 percentage points. Thus, however destitution is defined, it is likely to rise by 1.5 to 2.5 percent of all households over the next 10 years. Applied to the population of Botswana, this implies an increase in the number of destitute households by 4,000 to 7,000 over the decade.

Adding the Macroeconomic Effects

The macroeconomic scenario described above (Botswana Ministry of Finance and Development Planning, 2000) projects that unemployment falls by 5.7 percent with HIV/AIDS and the incomes of skilled workers rise by 12.2 percent. Thus some households experience an income gain as a household member finds new employment, and households with skilled wage earners benefit from an increase in the overall wage level.

The addition of the macroeconomic effects reduces the impact on overall income per capita from 10 percent to 8 percent (bottom panel of Table 5.1). This analysis therefore predicts a fall of at least 8 percent in household income per capita, despite the earlier finding that aggregate GDP per capita is unlikely to fall as a result of HIV/AIDS. The Gini coefficient is not sensitive to the addition of income effects and does not change significantly from the base value. The addition of the income effects also mitigates the impact on poverty to a small extent. The impact on the household poverty rate falls from 6 percentage points to 5, and the impact on the individual poverty rate from 4 percentage points to 3. However, owing to the decline in the unemployment rate, the rise in the income dependency ratio is mitigated considerably, increasing by 10 percent rather than 20 percent in the base case. This means that each wage earner can, on average, expect to bear “only” half an extra dependent.

The income dependency ratio for the lowest quartile of households is projected to rise from 16 to 20, or by 25 percent. The income effects thus halve this expected impact as well. Nevertheless, every income earner in this category can, on average, expect to support an extra four dependents as a result of HIV/AIDS. There is a fall of 13 percent in the average income of households in the lowest quartile when the income effects are included, compared with 18 percent in the base case. This supports the conjectures about the vulnerability of the poorest households.

Expenditure Effects

This analysis of the demographic effects of HIV/AIDS is limited to the effect of increased mortality on the structure of households. Thus it does not lend itself easily to an analysis of HIV/AIDS-related expenditures,

because these (with the exception of funeral expenses) are mostly linked to the treatment of and care for HIV/AIDS-related health conditions. However, it is possible to draw some more general inferences regarding the role of expenditure effects.

High-income households are likely to be covered by medical aid schemes and to fall within their rules and restrictions. This option is clearly not available for households in the lowest income quartile, whose income per capita is around 75 pula a month (at current prices), and who are not in any case covered by medical aid schemes. These poorer households will be forced to make use of the state health system, which will bear any costs of treatment. However, these households will still face a variety of additional costs—for example, for transportation to and from clinics and hospitals and for additional nutrition requirements. Those households that consult traditional healers will have to meet those costs directly.

The middle two income quartiles in Botswana spent about 3 percent of their income for medical purposes in the 1993/94 HIES. If this were quadrupled, to 12 percent, their total monthly expenditure at current prices would be about 32 pula, which is about one-tenth the amount available to high-income households—and nowhere near the amount needed for effective treatment. Many households, even those above their PDL, will be forced to choose between AIDS treatment and other, basic needs such as food and shelter. This will inevitably lead to both an increase in and a deepening of poverty.

Eventually, all households with HIV-positive members will also be required to meet their funeral costs. For the purpose of this analysis, these costs can be annualized over a 10-year period. They will also be related to household income but might be expected to lie in the range of 1,500 to 10,000 pula. A funeral costing 4,000 pula, annualized over 10 years, would cost the average household about 35 pula a month, or about 12 percent of household income per capita.

Discussion and Conclusions

This chapter's analysis of the impact of HIV/AIDS in Botswana suggests that HIV/AIDS does have a substantial effect on inequality and poverty. Although the Gini coefficient, an aggregate measure of the inequality of the income distribution, does not change significantly, it appears that this result masks two different effects working in opposite directions. Whereas poor households appear to be more vulnerable to income losses owing to increased HIV/AIDS-related mortality (an effect that by itself would

increase inequality as measured by the Gini coefficient), income inequality among higher-income households appears to decline. Almost all the changes in poverty derive from the direct income shocks to households that lose the income of a member who dies from HIV/AIDS; the broad macroeconomic effects play a minor role in this regard. This reinforces the point made at the outset that estimates of the impact of HIV/AIDS on aggregate economic variables such as GDP provide little information regarding the impact on poverty.

There are, however, several limitations to this analysis. First, it focuses on the effects of HIV/AIDS on households' earned income—investment income is not affected by the death of a household member. However, to the extent that households invest their wealth in the domestic economy, the macroeconomic effects of AIDS could lead to changes in their investment income. Because the share of investment income in a household's income is typically higher at the top of the income distribution, taking into account the role of this income would presumably result in some reassessment of the impact of HIV/AIDS on inequality.

Second, a more complete assessment of the impact of HIV/AIDS on poverty and inequality would require a more elaborate demographic model than is used here. The example presented in this chapter essentially treats HIV/AIDS as a one-time mortality shock. Although this approach yields indicative estimates of the impact of HIV/AIDS in the longer run, it does not address income losses that result from the illness of a household member or from the diversion of the productive time of other household members to the ill person's care. Nor does it address the changes in household structure that result from the aging of all household members by 10 years, such as gains and losses in potential working members, the dissolution of households as some household members die, and the formation of new households.

References

- Booyesen, Frederick le Roux, 2003, "Poverty Dynamics and HIV/AIDS Related Morbidity and Mortality in South Africa," paper presented at an international conference on "Empirical Evidence for the Demographic and Socio-Economic Impact of AIDS," Health Economics and HIV/AIDS Research Division, University of KwaZulu-Natal, South Africa, March 26–28.
- Botswana Ministry of Finance and Development Planning, 1996, "Study of Poverty and Poverty Alleviation" (Gaborone, Botswana).
- , 2000, "Macroeconomic Impacts of the HIV/AIDS Epidemic in Botswana" (Gaborone, Botswana).

- Cuddington, John T., 1993, "Further Results on the Macroeconomic Effects of AIDS: The Dualistic, Labor-Surplus Economy," *World Bank Economic Review*, Vol. 7, No. 3, pp. 403–17.
- Greener, Robert, Keith Jefferis, and Happy Siphambe, 2000, "The Impact of HIV/AIDS on Poverty and Inequality in Botswana," *South African Journal of Economics*, Vol. 68, No. 5, pp. 888–915.
- Greener, Robert, P. Ward, J. Pitso, and L. Hunter, 2000, "Review and Evaluation of HIV/AIDS Related Data for an Expanded National Response to the HIV/AIDS Epidemic in Botswana" (Gaborone, Botswana: Ministry of Finance and Development Planning).
- United Nations Children's Fund, 2003, *Africa's Orphaned Generations* (New York).
- Whiteside, Alan, 2002, "Poverty and HIV/AIDS in Africa," *Third World Quarterly*, Vol. 23, No. 2, pp. 313–32.