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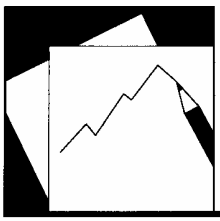

IMF Working Paper

HIV/AIDS:
The Impact on Poverty and Inequality

Gonzalo Salinas and Markus Haacker

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African Department

HIV/AIDS: The Impact on Poverty and Inequality

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Abstract

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Using available data on the distribution of HIV/AIDS prevalence across population groups for four sub-Saharan African countries and transposing this information to household income and expenditure surveys, we simulate the impact of HIV/AIDS on poverty and inequality. We find that the epidemic lowers average income and increases poverty, and that the jump in poverty is larger than expected from the fall in average income. This disproportionate increase in poverty reflects the large share of the population living on the threshold of poverty and the higher HIV prevalence rates in those segments of the population.

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I. INTRODUCTION

HIV/AIDS stands as one of the largest obstacles to development in many countries, particularly in Africa. Most evidently, the disease jeopardizes significant health-related improvements attained during the past decades—in some of the worst-affected countries, life expectancy is estimated to have declined by more than 20 years (United Nations Populations Division, 2005). While the situation in the region differs very substantially across countries,[2], average life expectancy in Africa has been declining as a consequence of HIV/AIDS since 1990 (by 2½ years overall)—the only example in recent history that a major world region has experienced a sustained decline in life expectancies.[3]

In addition to its direct effects on population health and life expectancy, HIV/AIDS affects many other dimensions of what is commonly subsumed under development. Taking the United Nations Millennium Development Goals (MDGs) as an example, we find not only that an MDG explicitly refers to HIV/AIDS ("halt and begin to reverse the spread of HIV/AIDS"), but also that HIV/AIDS has a bearing on most of the other MDGs, most obviously on MDGs 4 and 5 (to "reduce child mortality" and to "improve maternal health"). To the extent that orphanhood impedes access to education, MDG 2 ("to achieve universal primary education") is affected, and the higher prevalence of HIV/AIDS among women (and, frequently, their role in care) mean that HIV/AIDS also affects gender equality (MDG 3). The present paper is concerned with the impact of HIV/AIDS on poverty, i.e., with the implications of the disease for attaining MDG 1 (to "eradicate extreme poverty and hunger").

One of the channels through which HIV/AIDS can affect overall poverty levels is its effect on economic growth. Because the disease claims lives primarily from the working-age segments of the population, the affected countries experience major reductions in their workforces, unambiguously lowering GDP growth rates. However, for the impact on poverty rates, changes in GDP per capita are more relevant, and the evidence on this is mixed at present. Initial research modeled the effect of the epidemic focusing only on the consequences of mortality and treated the disease as an exogenous shock on the labor force. In countries with an underutilization of the labor force, the dying workers would be replaced by the unemployed, mitigating the adverse impact on output—some studies actually predict an increase in GDP per capita as a decreasing population shared the existing stock of factors of production (capital and natural resources). More elaborate estimates from simulations on general equilibrium models implied that income per capita would be largely unaffected by the HIV/AIDS epidemic (ING Baring, 2000; and Kambou and others, 1993). Studies focusing on the longer run typically arrive at significantly more negative assessments, by considering that higher domestic production costs mean that the respective country becomes less attractive as an investment location (see Haacker, 2002),

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[2] HIV prevalence for the population of age 15–49 in sub-Saharan Africa ranges from about 1 percent (comparable to some European countries) to almost 40 percent.

[3] See Haacker (2006).

or that HIV/AIDS adversely affects the availability and the accumulation of human capital (see Bell and others, 2004). [4]

In addition, there are several factors implying that the disease fuels poverty beyond its effect on per capita income growth. Reviewing studies on the impact of HIV/AIDS at the household level, Whiteside (2002) concludes that the final effect of the disease clearly depends on the availability of resources in the community and the broader resources available to households. With much lower access to financial mechanisms, the poor are also less able to cope with the sudden and considerable increase in expenditures and reduction in income caused by HIV/AIDS. Despite considerable efforts in South Africa, Steinberg and others (2002) find that home-based assistance from the government rarely reaches the poorest segments of society.

Evidence from Steinberg and others (2002) also points out that the cost of the disease relative to household income is twice larger in rural than in urban areas, which means that the lowest deciles are bearing disproportionately large expenses. Booysen (2003) in turn shows that in South Africa the incidence, depth, and severity of poverty are higher among households affected by HIV/AIDS, and their members are more likely to experience chronic poverty and income variation.

Still, most of this evidence is limited to rather unrepresentative groups of the population, and the analysis is limited to a short time horizon. In order to assess the impact of the disease on poverty, one has to take into account both morbidity and mortality costs in the context of the particular income distribution and demographic patterns in each country. The present study uses simulation analysis to evaluate more thoroughly and comprehensively the initial evidence on the impact of HIV/AIDS on poverty. We focus on four sub-Saharan African countries (Ghana, Kenya, Swaziland, and Zambia), which were chosen because they represent very different settings in terms of size, level and distribution of HIV/AIDS prevalence, demographic structure, geographical location, and type of data sources. This will provide an opportunity not only to analyze the overall impact of HIV/AIDS, but also to learn from the cross-country differences.

Our analysis incorporates the costs and effects of increased mortality and of rising morbidity associated with the epidemic. Morbidity costs include a fall in the income of infected working members in a household, as well as higher HIV-related expenditures of all sick individuals in the household. The death of a household member results in an income loss and incurs funeral expenses. Beyond the immediate effects on households, we analyze the impact on poverty outcomes and income distribution of the mechanism through which employment vacated by AIDS victims is filled, and the social insurance mechanisms to support destitute households. Finally, we explore various factors that have a bearing on our results and contribute to different outcomes across countries, such as the

[4] According to Bell and others (2004), this negative impact on human capital is the result of household poverty and parent mortality impeding access to education and reflects the fact that returns to investments in human capital decline owing to higher mortality.

demographic structure and the distribution of HIV prevalence rates across population groups in the sample countries.

An initial effort in this direction was undertaken in Greener and others (2000) and Greener (2004) for the case of Botswana. These studies suggest that the headcount poverty index rises substantially, and that the income losses of the poorest quartile (in relative terms) are twice those of the average household. This simulation primarily considers the disease as a one-time mortality shock, and does not fully take into account the significant morbidity costs of the disease. Compared with this earlier study, the present paper thus offers a richer analysis of the costs of HIV/AIDS, broadens the analysis to cover several countries—including some with much lower HIV prevalence—and, owing to this cross-country dimension, allows us to more clearly relate the impact of HIV/AIDS to the respective country's demographic and socioeconomic characteristics.

Section II discusses the data and projections used in the main simulations; Section III presents the methodology used in the paper; Section IV presents estimates of the impact of HIV/AIDS on welfare for selected countries under different scenarios; Section V aims to identify and quantify the factors driving the results; and Section VI offers conclusions.

II. DATA DESCRIPTION

Our discussion spans countries with very different situations as regards demographic profile and overall HIV prevalence rates. Table 1 summarizes some of the data most commonly used to describe the overall demographic impact of HIV/AIDS in the countries under consideration. Of the countries sampled, HIV prevalence rates for Ghana are relatively low (3 percent—the median rate for the region at end-2003 was 5 percent), but the country group also includes the country currently estimated to have the highest HIV prevalence rates worldwide (Swaziland, 39 percent). Note that HIV/AIDS can have a perceptible demographic impact even in countries with relatively low prevalence rates such as Ghana, where about 10 percent of all deaths can be attributed to HIV/AIDS. For the high-prevalence countries, the increase in mortality is very substantial, making HIV/AIDS the most important cause of death. Because of increased mortality, life expectancy in many countries has dropped sharply, and orphan rates have increased.

Table 1. The Demographic Impact of HIV/AIDS: Selected Indicators

Indicator	Ghana	Kenya	Swaziland	Zambia
HIV prevalence, end-2003 1/	3.1	6.7	38.8	16.5
Crude death rate, 2003 2/	1.1	1.6	2.7	2.3
Of which: AIDS	0.1	0.5	1.6	0.8
Life expectancy at birth, 1985-1990 3/	56	59	57	49
Life expectancy at birth, 2000-2005 3/	57	47	33	37
Total orphans, 2003 4/	10.0	11.3	16.7	18.3
of which: AIDS orphans	1.7	4.3	10.8	10.5

1/ In percent of population, ages 15-49. Source: UNAIDS, 2004.
2/ In percent. Source: U.S. Bureau of Census.
3/ In years. Source: United Nations Population Division, 2004.
4/ In percent of population, ages 0-17. Source: UNAIDS/UNICEF/USAID, 2004.

Our statistical analysis and simulation exercise uses disaggregated data from both HIV prevalence datasets and income/expenditure household surveys (Table 2). For Swaziland, data on HIV prevalence are obtained from the 8th Serosurveillance Report, which samples pregnant women attending antenatal clinics (ANC) and presents prevalence rates by region, location, and age (Swaziland, 2002). Notice that besides failing to capture prevalence rates for males, ANC data are not representative of prevalence rates for the entire female population—younger women are overrepresented, HIV-positive women have lower fertility, and women who avoid pregnancy through various prevention methods are also at lower risk of becoming HIV positive. However, ANC data are the best source on prevalence rates for the majority of countries in the region. For the rest of the countries in our sample we use HIV prevalence data from the new generation of Demographic and Health Surveys (DHSs) that present HIV/AIDS prevalence data for a large and representative sample of the adult population (Ghana, 2004; Kenya, 2003, and Zambia, 2003). The latest DHS for Zambia provides only limited information on individuals tested for HIV (age, province, sex, etc.), while those for Ghana and Kenya link HIV testing results to the entire set of socioeconomic information collected in these surveys.

Table 2. Data Sources

	Ghana (1998/99)	Kenya (1997)	Swaziland (1995)	Zambia (1998)
HIV prevalence data				
Source	Demographic and health survey	Demographic and health survey	8th sentinel report	Demographic and health survey
Year	2003	2003	2002	2001/02
Prevalence rates by...	Region, urb. vs rur., sex, age, wealth	Region, urb. vs rur., sex, age, wealth	Region, urb. vs rur., age	Region, urb. vs rur., sex, age
Prevalence linked to all demographic survey information	Yes	Yes	Not applicable	No
Sample size	9,760 individuals	8,486 individuals	2,787 pregnant women	3,950 individuals
Overall HIV prevalence (In percent)	2.1	6.7	31.4	15.6
Income/expenditure data				
Source	Living standards measurement survey	Welfare monitoring survey	Household income and expenditure survey	Living conditions monitoring survey
Year	1998/99	1997	1995	1998
Household characteristics used	Income, expenditure, employment	Expenditure, employment	Income, expenditure, employment	Income, expenditure, employment
Sample size		50,713 individuals; 10,874 households		
Coverage	All regions	All regions	All regions	All regions

Sources: Macro International Inc. (ORC Macro) kindly supplied DHS surveys. The World Bank similarly provided income and expenditure household surveys, with the authorization of the statistics institution of each sample country.

Income data are unavailable for many countries in the region, and generally less reliable than consumption data. As a result, reports on poverty and inequality for countries in sub-Saharan Africa frequently base their estimates on expenditure rather than income data. We follow this approach, and use household expenditure data as a proxy for household income. Table 3 summarizes the key indicators for the extent of poverty and inequality in the respective samples.

Table 3. Key Indicators for Poverty and Inequality

	Ghana	Kenya	Swaziland	Zambia
Average daily per capita income (US$)	2.05	2.43	2.06	1.53
Population below $1 per day (in percent)	44.7	27.8	39.7	56.9
Population below $2 per day (in percent)	73.7	63.6	74.4	83.0
Poverty gap ($2 per day; in percent)	41.1	28.6	38.1	46.0
Gini coefficient	0.54	0.48	0.51	0.48
Income dependency ratio	3.06	2.68	3.47	2.81

Source: Authors' estimates, based on household surveys listed in Table 2.

The demographic distribution of HIV prevalence has important implications for the potential impact of the disease on poverty and inequality indicators (Table 4). Regarding the distribution by age, the surveys show the expected pattern.[5] Prevalence rates tend to be higher in urban areas, although the size of the gap differs among countries. Where data are available by wealth quintile (i.e., in our sample, for Kenya and Ghana), prevalence rates appear lower in the poorest segments of the population.

For the impact of HIV/AIDS on poverty, HIV prevalence among the population at risk of falling into poverty is also important. Here, we find that prevalence rates tend to be high just above the poverty line (which is located toward the upper end of the second quintile in Ghana, and toward the lower end of this quintile in Kenya). Prevalence rates in Ghana and Kenya are highest in those categories that characterize migrant workers involved in urban activities (young, spending several days away from home, and involved in sales and services activities) and that the development literature has usually identified as a major force in pulling households out of poverty.

III. METHODOLOGY

Our analysis proceeds in two major steps: First, we randomly assign an HIV status to individuals in the sample, based on the respective individual's socioeconomic characteristics and the information available on HIV prevalence by category (which is summarized in Table 4). Second, using certain assumptions about the costs of HIV/AIDS to the affected households, the income effects, and the existing (formal or informal) social insurance mechanisms, we simulate the impact of HIV/AIDS on income per capita, the income distribution, and poverty rates.[6]

[5] With the exception of Ghana, where prevalence rates are very low, and few outliers may have skewed the distribution.

[6] We carried out all simulations in Stata/SE 8.0, reiterating the procedure fifty times for each scenario (to minimize random error in our estimates); our final estimates are the average value of the fifty outputs. DHS and Income and Expenditure household surveys are available in Stata format for all sample countries.

Table 4. HIV Prevalence by Socioeconomic Characteristic (In percent)

	Ghana	Kenya	Swaziland	Zambia
By sex				
Male	1.5	4.6	30.9 1/	12.9
Female	2.7	8.7	38.6 1/	17.8
By residence				
Urban	2.4	9.7	36.5	23.8
Rural	2.0	5.3	32.3	10.2
By age				
15-19	0.3	2.1	29.2	5.5
20-24	1.1	5.8	40.8	11.1
25-29	2.4	10.0	42.9	19.5
30-34	3.4	9.3	26.6	23.1
35-39	3.7	9.6	21.5	20.3
40-45	3.1	8.8	21.7	17.1
45-49	2.3	4.7	21.7	15.7
50-54	3.6	4.9	n.a.	6.0
55-60	2.4	n.a.	n.a.	11.1
By income				
Poorest quintile	1.4	3.3	n.a.	n.a.
Second quintile	2.2	6.0	n.a.	n.a.
Middle quintile	3.1	4.7	n.a.	n.a.
Fourth quintile	2.3	7.3	n.a.	n.a.
Richest quintile	2.1	9.7	n.a.	n.a.
By profession				
Not working	0.9	4.5	n.a.	n.a.
Professional, technical, manager	2.8	9.0	n.a.	n.a.
Clerical	0.00	8.3	n.a.	n.a.
Sales	3.9	10.0	n.a.	n.a.
Agriculture self-employed	2.1	5.4	n.a.	n.a.
Agriculture employee	0.0	n.a.	n.a.	n.a.
Household and domestic	n.a.	11.1	n.a.	n.a.
Services	4.0	10.3	n.a.	n.a.
Skilled manual	1.8	6.5	n.a.	n.a.
Unskilled manual	1.8	8.2	n.a.	n.a.
Times away from home				
None	1.6	3.1	n.a.	n.a.
1-14 times	1.3	4.8	n.a.	n.a.
15+ times	2.5	8.4	n.a.	n.a.
Total	2.1	6.7	31.4	15.6

Source: Authors' estimates, based on HIV prevalence surveys listed in Table 2.
1/ Based also on UNAIDS estimates. See footnote 10.

We impose HIV prevalence data on the expenditure household surveys for each country.[7] This process differs according to the information available on HIV-positive individuals in each source survey. For Ghana and Kenya, we obtain prevalence rates according to age group, sex, province/region, urban/rural residence, and wealth quintile, of each sampled individual.[8] We then assign prevalence rates to individuals in the expenditure household survey, according to their particular age group, sex, province/region, urban/rural residence, and expenditure quintile, assuming the latter are significantly related to the wealth quintiles of the source database.[9] In the case of Zambia we transpose prevalence rates according to age group, sex, province/region, urban/rural residence; while for Swaziland we transfer them according to sentinel site and age group.[10]

Once we assign HIV prevalence rates to each subgroup in the expenditure surveys, we randomly assign an HIV status to individuals.[11] For this initial group, assuming that HIV-infected individuals live an average of ten years with the infection, we randomly determine from a uniform distribution the year in which the individual became infected. Every year after these initial assignments we determine a group of newly infected individuals through a similar random selection procedure.

HIV/AIDS economically affects a household by both increasing its required expenditures and by reducing its income because of morbidity and mortality. The

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[7] While our approach can equally be applied to an evolving epidemic, we assume that HIV prevalence rates remain constant at the rates obtained from the household surveys. Also, we make some simplifying assumptions regarding the underlying demographics: The population does not age, and the structure of households, apart from the changes induced by increased mortality, remains constant.

[8] Age groups are five-year categories ranging from 15–19 up to 55–59 years old. The wealth index is an estimate of the household wealth (assets) and classifies both HIV-tested and non-HIV-tested individuals accordingly in quintiles.

[9] In some subgroups, no individual tested HIV-positive, partly due to a small sample size (especially for Ghana and Kenya, where overall prevalence rates are low and data are highly disaggregated). In this case, we assign to these individuals the average prevalence rate of the entire population. The one exception to this rule is the case in which the individual actually corresponds to an age group not covered by the prevalence surveys (younger than 15 years or older than 60 years). If an individual is below (above) the age range tested for HIV, the individual is assigned a prevalence rate that is half of the prevalence rate of the youngest (oldest) age group sampled. This implies, for instance, that a 65-year-old individual is assigned a prevalence rate that is half of that for the age group of 55–59 years.

[10] On the basis of the latest estimates from UNAIDS (UNAIDS, 2004), we assume the ratio between male and female HIV prevalence to be about 82 percent.

[11] It is important to note that this procedure does allow for a clustering of HIV infections within households, most importantly because cohabitating couples may infect each other. Our procedure thus overestimates the number of households with at least one infection, and underestimates the number of households with multiple infections.

additional HIV-related expenditures include both health-care-related expenditures to support infected members and funeral expenditures for the fatalities. Since these expenditures are indispensable to the household, we reflect them as an addition to their minimum expenditure defined in the poverty line. In particular, we assume that HIV health-related expenditures are equivalent to 25 percent of the income of a household worker in urban areas, and to 50 percent in rural areas, and increase the poverty line of the household by that amount.[12] Funeral expenditures for every HIV casualty are equivalent to four months of household expenditures.

HIV/AIDS affects individual and household incomes through higher mortality and morbidity. When a household member dies, the income of this household member is lost, and the average household income declines correspondingly. If a household member without income dies, the remaining income is divided among fewer household members. We further assume that there is a reduction of 15 percent in the income of any worker in the household who is HIV-infected and in the last two years of the infection.[13]

While households who lose an income-earner experience a loss in income, others may gain financially—for example, by filling a vacated job or by taking advantage of other opportunities for income-earning activities that open up. To understand the impact of HIV/AIDS on household income and poverty, it is therefore important to take into account these indirect "general equilibrium" effects. To address this issue, we utilize a very simple model of the labor market: a job (or other gainful employment) vacated by the death of an individual is filled by a previously unemployed individual within half a year. The matching occurs in a largely random fashion; however, in order to account for differences in education or skill requirements for a particular job, we assign vacated jobs only to unemployed individuals from households in the same income decile. Thus, we restrict upward or downward mobility according to economic status, but we assume perfect geographical, gender, and age mobility in the labor market.

A second important consideration is the impact of any formal or informal social insurance mechanism. A household afflicted by disease, death, or unemployment may receive some support, through some form of insurance (in the formal sector), from the government, or through direct support from the community. A full discussion of specific interventions to mitigate the impact of HIV/AIDS is beyond the scope of the paper. However, we allow for some forms of income support within income deciles. For example, in our baseline scenario, a household left without any income earner will receive an allowance of 25 percent of its initial income.[14] The intuition behind this is that for the

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[12] These increases are consistent with estimates of actual expenditures presented in Steinberg and others (2002) for the case of South Africa. The assumed differences between urban and rural areas reflect lower average incomes in rural areas, as well as higher costs of accessing health services.

[13] This is similar to findings reported in Fox and others (2004) for Kenya, who find that the income falls by around 17 percent for individuals in their penultimate and last years before death from AIDS.

[14] The issue of social insurance mechanisms is discussed in more detail in Section IV.

upper-income deciles, this would capture the mechanics of a formal social insurance scheme, whereas for the lower-income deciles, this could capture some of the effects of informal support mechanisms within communities.

Finally, it is important to be specific about the strengths, but also the limitations, of the approach just described. First, by using the available data on the distribution of income and household structures across the population, we are able to also analyze the distributional aspects of HIV/AIDS, rather than the average impact across the population. This is relevant because the impacts are very uneven across households. By relating our socioeconomic data with the available information on HIV/AIDS by population subgroup, we are also able to provide a broader analysis of the impact of HIV/AIDS, drawing inferences about the impact across the entire population rather than only about those households covered by specific studies on the impact of HIV/AIDS. Second, our approach, by including an (admittedly simplistic) model of the labor market and allowing for transactions between households in support of those worst affected by HIV/AIDS, includes effects that impact analyses focusing only on the affected households would not capture. Thus, our analysis of the economic impacts is much broader than those impact studies.

The primary limitations, we believe, arise in two areas. First, our matching of HIV prevalence rates to population subgroups is only as good as the underlying data. In particular, data on HIV prevalence are much less differentiated than the key social categories we employ in the present study, and the structure of the data differs among countries. A related issue, also referred to above, is that we currently do not consider the dynamics of infection between individuals, most notably cohabitating couples.

Second, we severely restrict the dynamics of household composition, which we treat as fixed apart from the direct impact of HIV/AIDS. This may not make a big difference from an aggregate point of view (so long as the fixed composition of households in our sample continues to match the overall distribution across the population). However, it creates some distortions regarding the age structure of people living with HIV/AIDS. “Allowing” individuals to age, however, would have required modeling how household earnings evolve over time—in the interest of transparency and focus, we decided against this approach. Regarding the impact of HIV/AIDS, the most important restriction in this area is that we cannot accommodate changes in the household structure in response to fatalities. For example, double orphans may join another household, or surviving partners may enter new relationships. Other than through simple financial support mechanisms (which may represent nonpecuniary support), we do not allow for such movements between households—doing so in an empirically and analytically sound fashion is a daunting task, beyond the scope of the present paper.

IV. IMPACT OF HIV/AIDS ON POVERTY AND INEQUALITY

We measure poverty indicators focusing on the $1-a-day poverty line since it is also the one adopted in the MDGs,[15] and based on it we monitor the poverty headcount index and the poverty gap. We also present the headcount index based on the $2-per-day line, though noting that this line is more applicable to middle-income countries and none of our sample countries qualifies as such. We further assume morbidity costs in line with recent estimates of the effect of HIV/AIDS on income of the affected individuals and on household expenditures. Most important, our simulation is rather dynamic—as opposed to the one-time shock approach taken in Greener and others. (2000)—estimating year by year the effect of both mortality and morbidity effects, though restricting some key demographic dynamics.

Base Case Scenario

Table 5 presents the base case scenario in which jobs are replaced after half a year following the death of a worker and in which households left without any income earner receive a 25 percent allowance. The following subsections describe the results under different scenarios regarding the replacement of deceased workers and social insurance mechanisms.

Table 5. Impact of HIV/AIDS on Poverty and Inequality Indicators in Sample Countries: Base Case Scenario

	Ghana			Kenya			Swaziland			Zambia		
	Year 0	Year 10	Change (%)	Year 0	Year 10	Change (%)	Year 0	Year 10	Change (%)	Year 0	Year 10	Change (%)
Income per capita (US$)	2.49	2.47	-0.55	2.80	2.78	-0.90	2.87	2.65	-7.51	1.75	1.57	-9.95
Poverty headcount ($2/day,%)	66.38	66.38	0.003	58.92	60.53	2.7	59.90	64.00	6.9	79.17	81.48	2.9
Poverty gap ($2/day,%)	34.21	34.99	2.3	25.17	27.06	7.5	26.00	33.36	28.3	41.67	48.59	16.6
Poverty headcount ($1/day,%)	34.15	35.74	4.6	23.46	25.80	10.0	23.28	33.00	41.8	51.04	57.52	12.7
Income dependency ratio	2.44	2.44	-0.4	2.68	2.64	-2.0	3.47	3.00	-14.3	2.81	2.67	-4.7
Gini coefficient	53.85	54.49	1.2	48.43	50.41	4.1	50.63	55.74	10.1	47.77	53.23	11.4

Source: Authors' calculations.

Under base case assumptions, the fall in average income because of HIV/AIDS is significant in those countries with high prevalence of the disease (Swaziland and Zambia), whereas in the two countries with single-digit prevalence rates (Ghana and Kenya), HIV causes a fall in income below 1 percent over 10 years. The relation between income impact and prevalence rates is not strictly positive. Average income falls by a considerably larger share in Zambia (10 percent) than in Swaziland (7.5 percent), although HIV prevalence is much higher in the latter country. This is largely the result of the distributional characteristics of the disease in both countries, an issue that we will investigate further in Section V.

[15] Note, however, that the $1-a-day line is recalculated in 1993 purchasing power parity (PPP) terms at about $1.08 a day; this recalculation is more thoroughly explained in World Bank (2005).

The increases in headcount poverty and in poverty gaps are sizable in most sample countries. The share of the population living with incomes below $1 per day increases closely in line with HIV prevalence rates. Thus, poverty increases most dramatically in Swaziland, by 10 percentage points, and only slightly in Ghana, by 1.5 percentage points. Increases in headcount poverty are also aligned with prevalence rates if we consider the $2 -per-day poverty line, but are of a much lower magnitude. There is also a clear correspondence between prevalence rates and increases in poverty gaps; hence, the disease substantially raises the poverty gaps in Swaziland and Zambia. Notice that the effects of HIV/AIDS on average income and poverty measures are not perfectly correlated, which again demonstrates that distributional factors have a bearing on the impact of the disease.

Furthermore, in most of our sample countries, the disease fuels poverty beyond what would be expected given its impact in average income. International evidence suggests a 1 percent decrease in income per capita is on average associated with a 1.11 percent increase in poverty incidence as measured by the $1-per-day line (Kraay, 2004). Our simulations suggest a much stronger impact on poverty, given the change in income. Scaling the estimates in Table 5 appropriately, our simulations suggest that, if average income were to decline by 1 percent, the prevalence of poverty would increase by 8 percent in Ghana, 11 percent in Kenya, 6 percent in Swaziland, and 1.3 percent in Zambia. Thus, only in Zambia is this correlation in line with cross-country evidence. Similarly, the increase in the poverty gap is significantly higher than expected from the reduction in average income. Although Kraay (2004) finds that a 1 percent decrease in average income leads to a 1.44 percent increase in the poverty gap, our results show that poverty gaps increase by more than 4 percent with every 1 percent increase in average income in all sample countries, again with the exception of Zambia.

Worker Replacement

Table 6 presents the annual evolution of the target indicators under different labor market assumptions. In one case, we assume that unemployed workers immediately fill jobs vacated by AIDS victims. Under this assumption, increased HIV-related expenditures and morbidity costs are the main determinants of the economic effect of the disease, while the effect of mortality only arises when worker replacement depletes the pool of unemployed. This can happen in countries with double-digit HIV prevalence. In the opposite scenario, we assume that there are no replacements to workers who die of AIDS. Several factors could limit worker replacement such as rigid labor legislation, geographic barriers, as well as job specificities regarding skills, age, gender, and social status. This scenario overestimates the impact of these factors and maximizes the impact of AIDS mortality. We compare these two scenarios to the base case in which vacant jobs were filled after half a year. We replace employed AIDS deaths by unemployed persons as described in the Section III.

As expected, when the unemployed immediately replace deceased workers the impact of the disease on all indicators is the lowest. The fall in income per capita is still significant under this scenario in Swaziland and Zambia, where HIV prevalence is much higher than unemployment. In the cases of Ghana and Kenya, where the unemployed immediately fill all vacated jobs, the reduction in income per capita is negligible and only a small fraction

of the fall experienced under the base case scenario. Changes in poverty and inequality indicators are also less dramatic, especially in Ghana and Kenya. Moreover, with random unemployed household members taking over vacated jobs, the income dependency ratio falls considerably more than in the base case scenario.

Table 6. Impact of HIV/AIDS According to Different Labor Market Assumptions

	Ghana			Kenya			Swaziland			Zambia		
	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)
Baseline scenario ("Worker replacement after half a year")												
Income per capita (US$)	2.49	2.47	-0.55	2.80	2.78	-0.90	2.87	2.65	-7.51	1.75	1.57	-9.95
Poverty headcount ($2/day,%)	66.38	66.38	0.0	58.92	60.53	2.7	59.90	64.00	6.9	79.17	81.48	2.9
Poverty gap ($2/day,%)	34.21	34.99	2.3	25.17	27.06	7.5	26.00	33.36	28.3	41.67	48.59	16.6
Poverty headcount ($1/day,%)	34.15	35.74	4.6	23.46	25.80	10.0	23.28	33.00	41.8	51.04	57.52	12.7
Income dependency Ratio	2.44	2.44	-0.4	2.68	2.64	-2.0	3.47	3.00	-14.3	2.81	2.67	-4.7
Gini coefficient	53.85	54.49	1.2	48.43	50.41	4.1	50.63	55.74	10.1	47.77	53.23	11.4
"Immediate worker replacement"												
Income per capita (US$)	2.49	2.48	-0.18	2.80	2.80	-0.26	2.87	2.79	-4.12	1.75	1.62	-6.25
Poverty headcount ($2/day,%)	66.38	66.38	0.001	58.92	59.38	0.8	59.90	62.14	3.8	79.17	80.62	1.8
Poverty gap ($2/day,%)	34.21	34.46	0.7	25.17	25.72	2.2	26.00	30.03	15.5	41.67	46.02	10.4
Poverty headcount ($1/day,%)	34.15	34.67	1.5	23.46	24.13	2.9	23.28	28.61	22.9	51.04	55.11	8.0
Income dependency ratio	2.44	2.42	-1.0	2.68	2.60	-2.9	3.47	2.59	-25.4	2.81	2.44	-13.0
Gini coefficient	53.85	54.06	0.4	48.43	49.00	1.2	50.63	53.43	5.5	47.77	51.20	7.2
"No worker replacement"												
Income per capita (US$)	2.49	2.46	-1.29	2.80	2.68	-4.60	2.87	2.46	-14.38	1.75	1.51	-13.65
Poverty headcount ($2/day,%)	66.38	66.74	0.6	58.92	61.72	4.8	59.90	66.96	11.8	79.17	82.47	4.1
Poverty gap ($2/day,%)	34.21	35.21	2.9	25.17	27.70	10.0	26.00	35.92	38.1	41.67	49.91	19.7
Poverty headcount ($1/day,%)	34.15	35.90	5.1	23.46	26.53	13.1	23.28	35.53	52.6	51.04	58.66	14.9
Income dependency Ratio	2.44	2.47	0.9	2.68	2.75	2.4	3.47	3.75	8.0	2.81	2.91	3.5
Gini coefficient	53.85	54.45	1.1	48.43	49.63	2.4	50.63	56.35	11.3	47.77	53.48	11.9

Source: Authors' calculations based on HIV-prevalence and income/expenditure surveys listed in Table 2.

When assuming no worker replacement, the impact of the disease on income per capita and poverty measures are larger in all countries. The divergence between this scenario and the base case in each country is lower when HIV prevalence is higher than unemployment, as was the case in the "immediate worker replacement" scenario. The fall in average income is notoriously high in Swaziland (-14.4 percent) and Zambia (-13.7 percent), but becomes also significant in Kenya (-4.6 percent). Poverty headcounts and the poverty gap increase more significantly under this scenario, notably in Swaziland where $1-a-day poverty increases by more than 50 percent. As opposed to the other two scenarios, income dependency ratios fall without worker replacement. Interestingly, changes in income

inequality are not significantly different from those under base case assumptions, except for the case of Kenya.

It is worth noting that most of the patterns described in the previous subsection are robust to changes in labor market assumptions. In all cases, there is a positive relation between HIV prevalence and reduction in average income, which is not strictly positive since the reduction in income is larger in Zambia than in Swaziland. Changes in poverty indicators are linearly related to HIV prevalence but not to changes in income per capita. Finally, under the three scenarios, increases in headcount poverty and the poverty gap are much higher than what the fall in income per capita would predict based on international evidence.

Social Insurance Mechanisms

The impact of increased morbidity and mortality on poverty due to HIV/AIDS also depends on the workings and the coverage of any "social insurance mechanisms." We use this term in a very wide sense, covering both monetary insurance schemes in the formal sector and possibly nonmonetary support mechanisms within larger families or communities (notwithstanding our formal treatment of all different forms of support as monetary transfers).

As indicated earlier, we model social insurance schemes as income transfers between households starting out within the same income decile, i.e., a transfer to households affected by the loss of an income earner, financed by a "tax" on all households starting out at a similar income level. The intuition for this is twofold. For the formal sector, these transfers imitate a tax- or contribution-financed formal insurance mechanism. For the informal sector, these transfers represent direct support within communities, such as monetary support, food, or care.

One element that is missing from our discussion of social insurance mechanisms is vertical transfers, e.g., a program to support orphans and vulnerable children, financed by the central government or by a grant. We do not discuss such social policy options, for two reasons. First, even though our approach could be utilized for an exercise in social policy programming, modeling such policy options would require a much more elaborate model. Second, we find that there is value (including for the design of social policy) in improving our understanding of the impact of HIV/AIDS on poverty and inequality, which—according to our analysis—is complex and by no means uniform across countries.

To illustrate the workings of such forms of social insurance, we present three scenarios (Table 7). The first ("free fall") represents a scenario in which there is no support to households affected by death or illness of a member. In the second and third scenario, there is a transfer to households whose income would otherwise fall to zero, of 25 percent (as in the baseline scenario) and 75 percent of the initial income, respectively, the cost of which is spread across the households from the same income decile.

Table 7. Social Insurance and Poverty Indicators

	Ghana			Kenya			Swaziland			Zambia		
	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)	Without AIDS	With AIDS (Year 10)	Change (In percent)
"Free fall" scenario												
Poverty headcount ($2/day,%)	66.38	66.57	0.3	58.92	61.04	3.6	59.90	65.33	9.1	79.17	82.53	4.3
Poverty gap ($2/day,%)	34.21	34.99	2.3	25.17	27.12	7.7	26.00	33.54	29.0	41.67	49.98	19.9
Poverty headcount ($1/day,%)	34.15	35.74	4.6	23.46	26.12	11.4	23.28	33.04	41.9	51.04	58.02	13.7
Gini coefficient	53.85	54.46	1.1	48.43	50.26	3.8	50.63	55.93	10.5	47.77	52.93	10.8
Baseline scenario ("25% allowance")												
Poverty headcount ($2/day,%)	66.38	66.38	0.0	58.92	60.53	2.7	59.90	64.00	6.9	79.17	81.48	2.9
Poverty gap ($2/day,%)	34.21	34.99	2.3	25.17	27.06	7.5	26.00	33.36	28.3	41.67	48.59	16.6
Poverty headcount ($1/day,%)	34.15	35.74	4.6	23.46	25.80	10.0	23.28	33.00	41.8	51.04	57.52	12.7
Gini coefficient	53.85	54.49	1.2	48.43	50.41	4.1	50.63	55.74	10.1	47.77	53.23	11.4
"75% allowance"												
Poverty headcount ($2/day,%)	66.38	66.51	0.2	58.92	60.95	3.4	59.90	64.76	8.1	79.17	82.00	3.6
Poverty gap ($2/day,%)	34.21	34.93	2.1	25.17	26.43	5.0	26.00	31.51	21.2	41.67	46.52	11.7
Poverty headcount ($1/day,%)	34.15	35.73	4.6	23.46	25.23	7.6	23.28	32.64	40.2	51.04	57.31	12.3
Gini coefficient	53.85	54.34	0.9	48.43	49.61	2.4	50.63	53.34	5.3	47.77	49.68	4.0

Source: Authors' calculations, based on HIV prevalence and income/expenditure surveys listed in Table 2.

Our analysis shows that social insurance mechanisms are somewhat effective in alleviating the adverse economic impact of HIV/AIDS. Because we model these mechanisms as transfers within each country, the impact of the epidemic on average income per capita does not vary among scenarios. Nevertheless, such forms of social support mitigate the depth of poverty resulting from increased mortality. Even for the "25 percent" scenario, the increase in headcount poverty and the poverty gap is much less pronounced. In addition, the existence of such mechanisms also translates into lower increases in income inequality due to the disease. Hence, in order to estimate the impact of HIV/AIDS on households, it is important to take into account any forms of social support, which can mitigate the impacts for the households directly affected, but which also represent a burden to households providing support. An analysis focusing on the direct impact of the epidemic does not capture this latter dimension.

V. Determinants of the Impact on Income and Poverty

As mentioned in Section IV, most of the differences in the impact of HIV/AIDS on income and poverty among countries reflect the underlying variation in average HIV prevalence. However, we noted that the fall in income per capita in Zambia is the highest, although Swaziland has a much higher prevalence rate, revealing the importance of distribution factors in determining the effect of the epidemic on income. To better illustrate the importance of factors other than the scale of the epidemic, we have normalized the estimates of the impact, assuming a 5 percent HIV prevalence rate. Table 8 summarizes this, showing that the impact of the disease on economic and social indicators differs

substantially across countries despite the assumption of a unique prevalence rate. The fall in income is disproportionately large in Zambia.

Table 8. Normalized Impact of HIV/AIDS: Baseline Scenario Assuming a 5 Percent HIV Prevalence Rate

	Ghana	Kenya	Swaziland	Zambia
Income per capita (US$)	-1.30	-0.67	-1.20	-3.19
Poverty headcount ($2/day, in percent)	0.01	2.05	1.09	0.94
Poverty gap ($2/day, in percent)	5.40	5.59	4.51	5.33
Poverty headcount ($1/day, in percent)	11.05	7.43	6.65	4.07
Income dependency ratio	-0.85	-1.50	-2.27	-1.52
Gini coefficient	2.79	3.05	1.61	3.66

Source: Authors' calculations based on HIV-prevalence and income/expenditure surveys listed in Table 2.

The heterogeneous impact on income per capita seems the result of higher HIV prevalence in higher-income population groups. Table 9 presents the impact of the epidemic under baseline assumptions by income decile. Here we observe that income falls considerably more in higher-income deciles in Zambia and in lower-income deciles in the rest of the sample. Thus, since HIV affects the wealthiest groups in Zambia, its impact on aggregated average income per capita is higher than in other countries. The age profile and the geographic distribution of the epidemic appear to affect the impact on income per capita. HIV prevalence in Zambia peaks in the 30-39 age range (presumably commanding higher incomes), whereas it is highest for the 20-29 range for the Swazi sample. For this pair of countries, location (urban vs. rural) also acts as the main proxy for economic differences, and we find that the adverse impact of HIV/AIDS on income in Zambia is reinforced by the fact that the distribution of HIV prevalence is highly skewed toward urban areas.

Another finding from Section V relates to the impact of HIV/AIDS on poverty rates, relative to its impact on income. We find that HIV/AIDS can result in substantial increases in poverty, even if average income per capita does not change much. To understand this, it is necessary to look specifically at the population at risk of poverty, i.e., households that would fall below the poverty line if afflicted by HIV/AIDS.

Table 9 shows that the impact of the disease is indeed highest in those deciles right above the $1-a-day poverty line.[16] Looking at Ghana and Kenya, the countries for which a richer dataset is available (see Table 4), we recall that HIV prevalence is concentrated among the population group just above the poverty line (in Kenya, the second quintile; in Ghana, the middle quintile). Such a concentration would exacerbate the impacts of

[16] The 1$-a-day line is located between deciles 3 and 4 in Ghana, 2 and 3 in Kenya and Swaziland, and 4 and 5 in Zambia.

HIV/AIDS on poverty, compared with a situation where HIV prevalence is similar across population groups.

Table 9. Impact on Income Per Capita by Decile

	Decile									
	1	2	3	4	5	6	7	8	9	10
Ghana										
a) Without HIV/AIDS (year 0, PPP US$)	0.39	0.63	0.84	1.06	1.28	1.58	1.97	2.56	3.72	9.16
b) With HIV/AIDS (year 10, PPP US$)	0.38	0.63	0.83	1.05	1.24	1.53	1.96	2.54	3.75	9.12
Change a) to b) (%)	-0.8	-0.9	-0.8	-0.8	-3.1	-3.0	-0.1	-0.9	0.6	-0.5
Kenya										
a) Without HIV/AIDS (year 0, PPP US$)	0.61	0.87	1.11	1.36	1.62	1.95	2.39	2.99	4.05	10.11
b) With HIV/AIDS (year 10, PPP US$)	0.61	0.87	1.10	1.35	1.60	1.95	2.36	2.98	4.15	10.09
Change a) to b) (%)	-0.2	-0.2	-1.0	-0.6	-1.4	-0.1	-1.1	-0.3	2.3	-0.2
Swaziland										
a) Without HIV/AIDS (year 0, PPP US$)	0.47	0.85	1.12	1.36	1.62	1.92	2.35	2.96	4.16	10.68
b) With HIV/AIDS (year 10, PPP US$)	0.42	0.75	0.99	1.24	1.46	1.75	2.16	2.82	4.12	9.88
Change a) to b) (%)	-10.3	-12.0	-11.3	-9.1	-10.0	-8.8	-8.2	-4.8	-1.1	-7.5
Zambia										
a) Without HIV/AIDS (year 0, PPP US$)	0.20	0.43	0.62	0.82	1.07	1.34	1.69	2.19	3.08	8.20
b) With HIV/AIDS (year 10, PPP US$)	0.19	0.40	0.58	0.77	0.98	1.22	1.54	2.02	2.91	7.42
Change a) to b) (%)	-5.4	-6.5	-5.6	-6.5	-8.1	-8.8	-8.9	-7.5	-5.5	-9.5

Sources: Authors' calculations based on HIV-Prevalence and Income/Expenditure Surveys listed in Table 2

The second determinant of impact of HIV/AIDS on poverty is the size of the population at risk, i.e., the proportion of the population with incomes just above the poverty line. The histograms in the Appendix show the distribution of daily income in the four sample countries. We find a much higher percentage of the population with incomes just above the poverty line in Swaziland (as compared with Zambia), which partly explains why the impact of HIV/AIDS on poverty is higher (especially relative to the impact on income) in Swaziland. Similarly, the proportion of the population just above the poverty line is somewhat higher in Kenya than in Ghana, and so is the impact on poverty, relative to the impact on income.

VI. CONCLUSIONS

Simulation analysis based on household survey information confirms recent evidence that the impact of HIV/AIDS on poverty indicators often goes beyond its impact on average

incomes. In three of our sample countries, poverty incidence and the poverty gap increase more than would be expected from the decline in income per capita. Key determinants of the impact of HIV/AIDS on poverty are the size of the population at risk of falling into poverty, and the HIV prevalence among this population group. These results are robust to different assumptions about worker replacement and the functioning of a social insurance system that takes care of destitute households. Thus, the disease can throw a considerable share of the population into poverty even in cases where researchers do not expect a significant fall in income per capita.

These results have important policy implications. Even if increased mortality and morbidity associated with the epidemic do not result in a significant decline in income per capita, the economic repercussions can be significant, since poverty increases (or attempts to reduce poverty are frustrated). Taking a broader perspective, our results reinforce the view that HIV/AIDS is threatening to derail the attainment not only of the MDGs in the areas of public health, but also of MDG 1 ("eradicate extreme poverty and hunger") and of other MDGs affected by increased poverty (e.g., in the area of education).

Our analysis, although quite simple in this regard, also has implications for the design of social safety nets. We model social support primarily as transfers in a horizontal fashion, trying to capture essential features both of formal insurance mechanisms in the formal sector and of informal insurance networks at the community level. We find that such forms of social support have some effect in mitigating the depth of the impact of HIV/AIDS on poverty, but not in terms of mitigating the width of the impact on poverty, since the burden of providing support to households primarily affected by HIV/AIDS can drag households providing support below the poverty line. This suggests that the capacities of informal social support networks between households with similar income levels to mitigate the impact of HIV/AIDS on poverty are limited, and that an effective social safety net would have to rely on some form of vertical transfers.

From a methodological perspective, our results show that researchers assessing the welfare implications of HIV/AIDS cannot limit their analysis to the impact of the disease on income per capita, and that studies confined to the impact of HIV/AIDS on households that are directly affected can be misleading. Future research in this area will benefit from the new generation of household surveys with more reliable and frequent data on income and consumption, and the increasingly available Demographic and Health Surveys (DHSs), which allow for a better understanding of the socioeconomic dimension of the epidemic.

REFERENCES

Barbone, Luca, and Luis-Alvaro Sanchez B., 1999,"Pensions and Social Security in Sub-Saharan Africa: Issues and Options," World Bank Africa Region Working Paper No. 4 (Washington:World Bank).

Baruti, Elias, 2003, "Extension of Social Security Coverage to the Poor in the Informal Urban Sector in Tanzania Through Micro Credit," paper presented at the Inaugural Tanzanian Biennial Development Forum.

Bell, Clive, Shantayanan Devarajan, and Hans Gersbach, 2003, "The Long-Run Economic Costs of AIDS: Theory and an Application to South Africa," Policy Research Working Paper No. 3152 (Washington:World Bank).

———, 2004, "Thinking About the Long-Run Economic Costs of AIDS," in Haacker (2004).

Booysen, 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.

Ghana, 2004, "Ghana Demographic and Health Survey 2003," Ghana Statistical Service (GSS), 2004, Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro, Calverton, Maryland: GSS, NMIMR, and ORC Macro.

Greener, Robert, 2004, "Impact of HIV/AIDS on Poverty and Inequality," in Haacker (2004).

———, 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.

Haacker, Markus, 2002, "The Economic Consequences of HIV/AIDS in Southern Africa." Working Paper WP/02/38 (Washington DC: International Monetary Fund).

——— (ed.), 2004, *The Macroeconomics of HIV/AIDS* (Washington DC: International Monetary Fund).

———, 2006, "Global Trends in Life Expectancy and Income per Capita," unpublished draft (Washington DC: International Monetary Fund).

ING Barings, South African Research, 2000,"Economic Impact of AIDS in South Africa. A Dark Cloud on the Horizon" (Johannesburg, South Africa).

Joint United Nations Programme on HIV/AIDS (UNAIDS), 2004, *2004 Report on the Global AIDS Epidemic* (Geneva: UNAIDS).

Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF), and U.S. Agency for International Development (USAID), 2004, *Children on the Brink 2004* (Geneva, New York, and Washington).

Kambou, Gérard, Shantayanan Devarajan, and Mead Over, 1992, "The Economic Impact of AIDS in an African Country: Simulations with a Computable General Equilibrium Model of Cameroon," Journal of African Economies, Vol. 1 No. 1, pp. 109–30.

Kenya, 2003, "Kenya Demographic and Health Survey 2003," Central Bureau of Statistics (CBS) [Kenya], Ministry of Health (MOH) [Kenya], and ORC Macro. 2004. Calverton, Maryland: CBS, MOH, and ORC Macro.

Kraay, Art, 2004. "When is Growth Pro-Poor? Cross-Country Evidence," World Bank Policy Research Working Paper 3225 (Washington DC: World Bank).

Steinberg, M., Johnson, S., Schierhout, G., and Ndegwa, D., 2002. Hitting Home: How Households Cope with the Impact of the HIV/AIDS Epidemic." The Henry Kaiser Family Foundation.

Swaziland Ministry of Health and Social Welfare, "8th HIV Sentinel Serosurveillance Report Year 2002." Swaziland National AIDS/STDs Programme, Mbabane, Swaziland.

Shisana, O., 2002. "Nelson Mandela/HSRC Study of HIV/AIDS: Household Survey 2002." Human Sciences Research Council Publishers.

Swaziland, 2002, "8th HIV Sentinel Serosurveillance Report Year 2002," Swaziland National AIDS/STDs Programme, Ministry of Health and Social Welfare, 2002, Mbabane, Swaziland.

UNAIDS – see Joint United Nations Programme on HIV/AIDS.

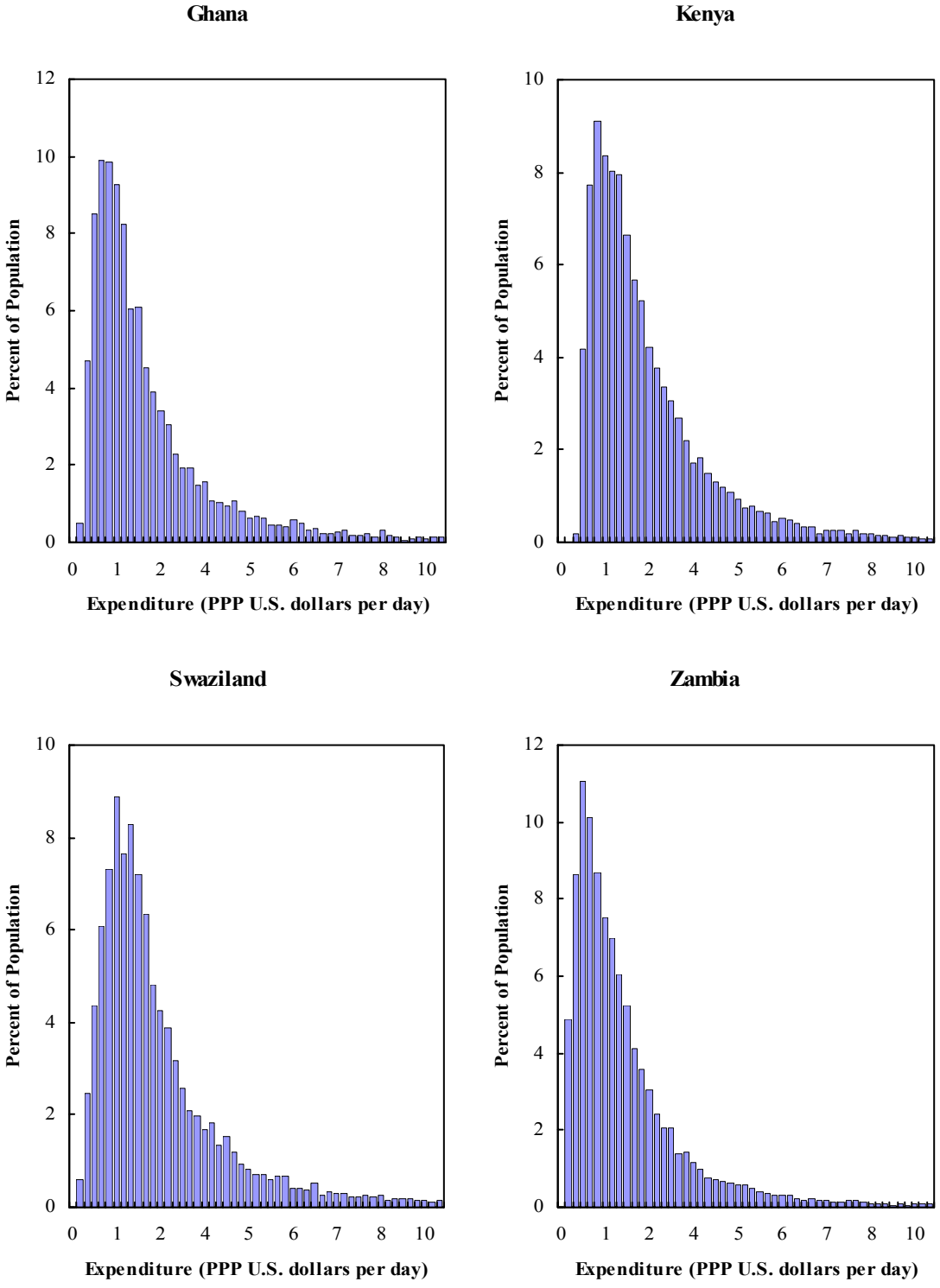
United Nations Population Division, 2005, *World Population Prospects: The 2004 Revision*, CD-ROM Edition - Comprehensive Dataset (New York: United Nations).

Whiteside, Alan, 2002, "Poverty and HIV/AIDS in Africa," Third World Quarterly, Vol 23, No 2, pp. 313-332, 2002.

World Bank, 2005, "World Development Indicators 2004", World Bank World Development Indicators, Washington DC.

Zambia, 2003, " Zambia Demographic and Health Survey 2001-2002", Central Statistical Office [Zambia], Central Board of Health [Zambia], and ORC Macro. 2003, Calverton, Maryland, USA: Central Statistical Office, Central Board of Health, and ORC Macro.

Initial Expenditure Distribution in the Four Countries Covered[17]



[17] Source: Household Income and Expenditure Surveys cited in Table 2.