The Impact of HIV/AIDS on Households

A Methodology For Indirectly Estimating The Welfare Impact of AIDS on Households Using Household Structure And Characteristics

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Abstract

This study presents a method of indirectly estimating the welfare impact of HIV/AIDS on households in Sub-Saharan Africa through a descriptive analysis as well as cross-sectional and longitudinal regression analysis of household structure and characteristics. We use survey micro data from 7 sub-Saharan African countries to examine households and family structure, focusing on households headed by single parents or a child below 18, households with missing generations and households missing parents. We investigate changes in the counts and characteristics of these households and also examine how the wealth index, an asset based measure of household economic wellbeing, correlates with various indicators of household structure. Using the fact that the HIV/AIDS epidemic is the single most important determinant of change, regression and other statistical analyses provide insights into a better understanding of the relationships between demographic and economic variables. We also use this approach to suggest a method of estimating the welfare impact of AIDS on households.

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1. Introduction

The devastating effect of HIV/AIDS on community and family structures in sub-Saharan Africa is well documented in the literature (Monasch and Boerma, 2004). Impact studies propose various mechanisms through which households are dissolved and family structure altered in response to AIDS related death (United Nations, 2004). The credibility of such models and the predictions based on them are buoyed by studies demonstrating the growing orphan crisis (UNICEF, 2003) in Sub-Saharan Africa that is largely attributed to HIV/AIDS. This study seeks to provide insights into the extent of the impact of AIDS related mortalities on households in sub-Saharan Africa. We advance this line of enquiry by proposing an indirect assessment strategy applied to comprehensive data from nationally representative Demographic Health Survey (DHS) studies from 7 countries between 1992 and 2004. Our strategy involves a close examination of family structures, isolating and analyzing types of households most likely affected by HIV/AIDS. In this study, we define family or household "structure" as the composition of the family and in particular the relationship of the household head to the children in the household.

The reported, as well as underlying causes of parental death are often unknown and hard to ascertain from demographic studies and survey data. As a result, a direct impact assessment of the economic impact of AIDS-related mortalities on households is impossible to formulate. However, an indirect indicator of the economic impact of AIDS mortalities on households can be constructed by examining household structure. Particularly, changing counts of family structures betraying a high likelihood of having experienced an AIDS related mortality, examined against corresponding changes in household characteristics and welfare allows us to propose a way to assess the demographic and economic impact of the pandemic in Sub-Saharan Africa.

The rest of this paper is organized as follows. Section 2 provides a brief overview of the HIV/AIDS pandemic and justifies the approach we take in this paper. In section 2, a literature review situates our contribution within the research already done on the impact of AIDS. In section 3, we present the main analysis and the section is divided into 3 parts. Part 1, presents the data used in this study and describes it characteristics. It is followed by a descriptive analysis in Part 2 that uses summary statistics to motivate the empirical analysis in Part 3. In the last section, we conclude with our main findings and discussion.

2. Background

2.1 Overview

The recent *Report on the Global AIDS epidemic* (UNAIDS 2006) paints a startling picture of the severity of the HIV/AIDS pandemic. Less than three decades after the first incidences of AIDS were diagnosed in 1981, the UNAIDS (2006) report estimates that more than 25 million people have died of AIDS worldwide. An estimated 40 million people are currently living with HIV and sub-Saharan Africa accounts for more than 25 million cases. Sub-Saharan Africa also has the highest annual number of new cases, estimated at 2.8 million (out of a global estimate of 4.3 million), for the year 2006 alone, and has the highest infection rates. Additionally, the highest estimates of AIDS-related deaths for 2006, at about 2.1 million, are in sub-Saharan Africa.

The statistics above show how HIV/AIDS is overwhelmingly a sub-Saharan African problem. Within sub-Saharan Africa, the most affected populations are in Eastern and Southern Africa, along a broad band running southwards from Ethiopia, Kenya and Uganda to Namibia and South Africa (UNDESA, 2004). Malawi and Zambia have had relatively more recent outbreaks (and the effects of the mortality impact of AIDS

through increased orphan-hood are only beginning to show (UNAIDS, 2006). The map in Figure 1 below depicts the global distribution of HIV prevalence.

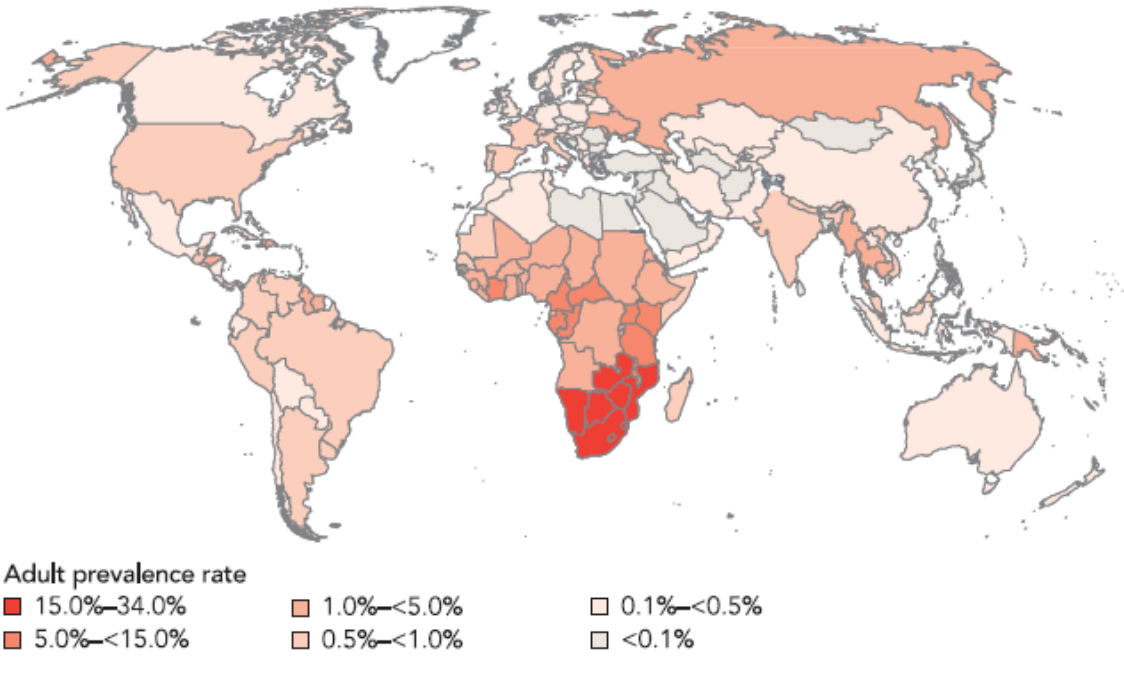

Figure 1: Source: UNAIDS (2006) Report on the Global AIDS Epidemic

The significant mortality increases caused by AIDS in sub-Saharan Africa are almost exclusively confined to middle-aged adults (Porter and Zaba, 2004; Blacker, 2004), in the most productive age groups, and children (Newell et al, 2004). These facts are crucial for the approach we adopt in this paper in two ways:

- First, we concentrate on a select number of sub-Saharan countries from which detailed survey data are available. We narrow our focus to countries with available data from the early 1990s, when AIDS mortality rates were low, and from the turn of the century.
- Secondly, and of particular relevance to this study, as a result of the affected groups, the HIV/AIDS pandemic has been associated with massive demographic shifts over

the past two decade. Its differential mortality impact across age and sex implies significant compositional/structural changes for households and family units.

This latter point is what enables us to construct our indirect measure of the economic impact of AIDS on households. In particular, we focus on household structure because we can use the fact that an important indicator of the impact of AIDS has been the increasing numbers of orphans or households caring orphans in the sub-region. This growing orphan crisis has in turn lead to a rise in the percentage of households headed by children, widows and widowers or grandparents (with a missing generation) whose characteristics and welfare we can examine.

2.2. Literature Review

The literature on the social and economic consequences of the first-order impact of AIDS shows higher mortality of societies' most productive members (Porter K and Zaba B, 2004). Case studies confirm that adult mortality due to AIDS is often accompanied by diminished economic status (Rugalema 1999), greater mobility of the surviving family members (Urassa et al, 2001) and a dramatic increase in household dissolution, especially for poorer households (Hosegood, et al, 2004). However, less empirical research has been done on these secondary effects of HIV/AIDS, associated with the structural changes to the affected households and the coping mechanisms they adopt.

Changes in household composition, characteristics and the activities of the remaining members after an AIDS death provide inroads to understanding the longer-term economic and social effects of HIV/AIDS. Heuveline (2004) considers these compositional changes and argues that the impact of HIV/AIDS mortality at the household level is diffused throughout the entire population through kinship links. He notes that the "adaptive nature of the household [… after an AIDS death …] is key to an understanding of the aggregate and dynamic impact of the HIV epidemic." In this sense, changes in the composition of family units and the household characteristics can be

seen as the intermediary link between the more immediate effect of the death of an individual and the more distant, “downstream” socio-economic consequences of the pandemic (Barnett and Blaikie, 1992).

Current evidence suggests an increasing trend of “orphanhood, widowhood and incomplete co-residence” in Sub-Saharan Africa (Palloni A, Lee YJ , 1992). Empirical studies based in small communities such as rural populations in Angola, Tanzania, and Malawi suggest some limited evidence of the negative effects of HIV/AIDS related mortality on household structure and characteristics (Floyd S et al, 2003). However most of these studies also concede that the family systems and some societal support structures have been resilient (Caldwell JC, 1997). This paper seeks to take advantage of micro data from surveys done in some of the most affected countries in sub-Saharan Africa to test this hypothesis.

This paper addresses some of the work done on links between child welfare and orphanhood. One of the pressing questions in this literature is whether children who are not raised by their biological parents necessarily fare worse (Case A, et al, 2004). Identifying a related research question addressed by this paper, Case et al (2004) quotes work by Foster et al. (1995) that argues that “orphans are not at any particular disadvantage over equally poor non-orphans”. Furthermore, research elsewhere has been done to suggest that kinship networks, through private transfers, may minimize the cost of changes in household composition after an AIDS death (Lundberg et al, 2000). The insurance of households from the shock of an AIDS mortality through kinship networks could imply an unjustified bias in the targeting of international HIV/AIDS aid funds and development efforts to groups that might not necessarily be most in need, such as child-headed household and children identified as AIDS orphans. Meintjes and Giese (2006) use this to argue that “the majority of orphans are portrayed as experiencing the social circumstances which evidence indicates are in fact exceptions”. Meintjes and Giese (2006) also conclude that the global preoccupation with the orphans

might be “shifting the terrain of orphanhood” reinforcing a stereotypical categorization that has some economic valence at the local level but completely unhelpful in understanding children’s circumstances.

In this paper, we shift the focus slightly away from orphans as the quintessential category most impacted by AIDS related death. We direct our analysis on household structure classes whose proportion has increased as a result of AIDS such a households missing a generation (where relatively young grandparents care for their orphaned grandchildren) or headed by a child. This shift makes it possible for us to understand coping mechanisms adopted by surviving family members and to answer the question whether orphaned children, and the households within their kinship networks that take them in, necessarily fare worse than other children or households of the same socioeconomic class. Secondly, by directing our analysis to the welfare of household structure types while controlling for household level characteristics, we can isolate the independent effect on aggregate welfare of the increase in households affected by an AIDS related death. Tracing changes in the welfare of different household structure types also provides inroads to understanding the increasing stresses applied by the HIV epidemic on kinship networks.

Additionally, in analyzing survey data, which lack information about the serological status of individuals, we can propose an indirect estimate of the impact of HIV/AIDS on affected households. This indirect approach relies on changing counts, composition and characteristics of households with a deceased parent(s) and identified to have a high probability to have suffered an HIV/AIDS death.

3. Analysis

3.1 Data

The descriptive and empirical analysis in this paper is based on data of household structure and characteristics collected through the Demographic Health Surveys (DHS) from 7 sub-Saharan countries. The countries we study are Ghana, Kenya, Malawi, Tanzania, Uganda, Zambia and Zimbabwe. We selected these countries based on the availability of at least two DHS studies and also took into consideration whether a country had experienced a significant HIV epidemic. The countries selected have a range of HIV prevalence and the epidemic is at varying stages of maturity for comparative analysis and to provide a representative picture of AIDS in sub-Saharan Africa.

DHS studies collect nationally representative samples that are mostly identical across countries and over time. A two stage sampling design is used in the collection of data and sample sizes are often large (usually between 5,000 and 30,000 households). In participating countries, the survey is usually repeated every 5 years. Each participating household is given a household questionnaire which collects information about all household members, household living conditions, educational attainment and current school enrolment status for children and the vital status of their parents (Case et al, 2004). Reported datasets include information about sample design such as stratification and clustering and they also include sample weights to aid data analysis.

3.1.1: HOUSEHOLD WEALTH

The household schedule of DHS studies also collects information about the quality of housing and the ownership of various assets and durable goods. Most recent DHS datasets use this information to construct a measure of household wealth or economic status, called the wealth index factor score. The method used to construct this composite index was adopted from work by Filmer and Pritchett (1999, 2001) and it

uses principal components analysis (PCA) (Dunteman 1989). In this paper we adopt this proxy for economic status as our measure for household wealth.

3.2.1: HOUSEHOLD STRUCTURE AND ORPHANHOOD

A measure for the number of orphans (single parent and double orphans) per household is constructed using responses given about the vital status of the parents of all children under 15 in the household. This information, together with responses to questions about the marital status of the household head and how he/she is related to all the other household members, is used to indentify each household with various household structure types. Household structure types used in this analysis include:

1. Single Parent households in which the household head is a widow or widower.
2. Child-headed households in which the household head is under 18 years old.
3. "Missing generation" households in which there exists at least one orphaned child who is a grandchild to the household head.
4. "Missing parents" households in which there is at least one adopted child whose biological parents are either dead or missing or at least one child with at least one dead/missing parent and who is not the child of the household head.

Indicator variables are used to classify each household and the 5th household structure class not mentioned above includes the other households not already coded. In this paper, we propose that the 4 household structure classes listed above have the highest probability of having been affected by an AIDS death, especially in high HIV prevalence countries. We analyze changing counts and characteristics of these households to arrive at an estimate of the impact of AIDS on households.

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3.2 Descriptive Analysis

In Bicego et al (2003), a comprehensive descriptive analysis of various dimensions of the orphan crisis in sub-Saharan Africa is given, including a detailed outline of the scope of the problem. In our descriptive analysis, we follow the methodology adopted in Bicego et al (2003) on DHS data. However, we pay particular attention to household structure, instead of orphanhood, focusing on households classified as single parent or child headed households or households missing parents or missing a generation.

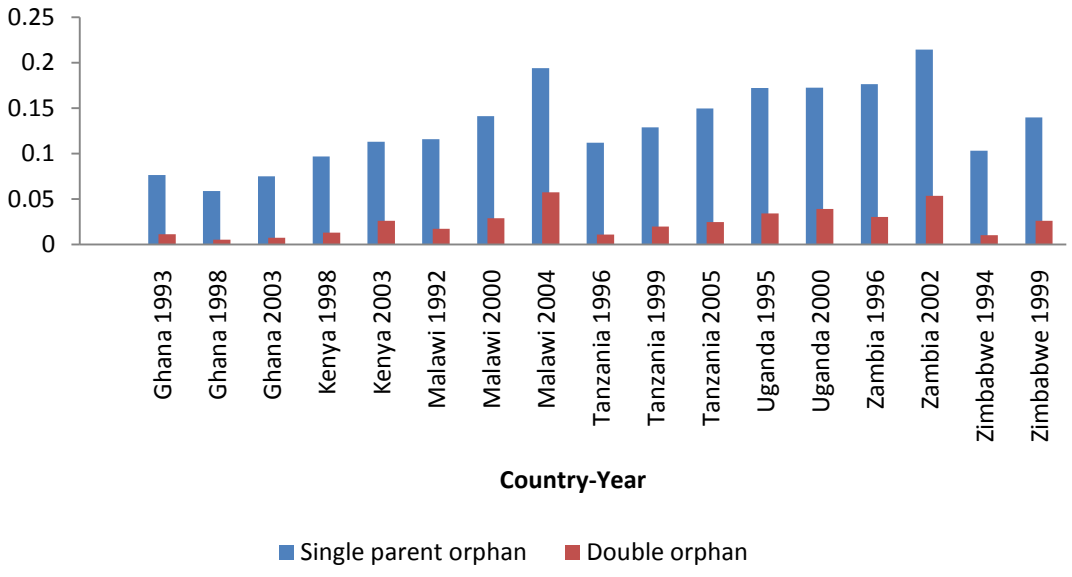
3.2.1: Prevalence Rates

Orphanhood

To set up the stage for the analysis of household structure, Table 1 below shows the prevalence of orphans in the 7 countries studied. Each country has results from at least 2 survey periods for trend analysis. Since our analytical units are individual households instead of individual orphans such that we treat households with multiple orphans the same as households with only one orphan, our findings depart slightly from other studies of the general prevalence of orphans in these countries. The numbers in Table 1 show the proportion of all households that have at least 1 orphan.

Table 1: Scope of the Crisis: Orphan Prevalence

Country	`Year	Proportion of households with at least 1 orphan	
		Single parent orphan	Double orphan
Ghana	1993	0.0764	0.0113
Ghana	1998	0.0589	0.0053
Ghana	2003	0.0751	0.0074
Kenya	1998	0.0969	0.0130
Kenya	2003	0.1131	0.0260
Malawi	1992	0.1160	0.0172
Malawi	2000	0.1414	0.0289
Malawi	2004	0.1939	0.0573
Tanzania	1996	0.1121	0.0109
Tanzania	1999	0.1290	0.0198
Tanzania	2005	0.1498	0.0246
Uganda	1995	0.1720	0.0340
Uganda	2000	0.1726	0.0392
Zambia	1996	0.1765	0.0302
Zambia	2002	0.2146	0.0537
Zimbabwe	1994	0.1032	0.0101
Zimbabwe	1999	0.1399	0.0259



Despite the difference in analytical approach, our finding mirror results in general studies of the prevalence of orphans, including those in Bicego et al (2003). We observe an increase in the proportion of households with at least one orphan in all the 7 countries. Single parent orphan prevalence rates are mostly above 10% and the highest rates are observed in Malawi and Zambia with, respectively, 19.3% and 21.5% of all households caring for at least 1 single-parent orphan. Meanwhile the single-parent orphan prevalence rates in Uganda were remarkably stable at 17.2% between 1995 and 2000. In Ghana, the prevalence of both single parent and double orphans actually initially fell in the early 1990s, but have eventually risen slowly between 1998 and 2003.

The prevalence rates of double orphans echo the prevalence rates of single parent orphans. However, the changes in the proportion of household with at least 1 double orphan over time are especially dramatic in Malawi and Zambia where the double orphan prevalence rates are more than 5%. Similarly high double orphan prevalence rates are observed in Kenya, Tanzania and Zimbabwe, where the rates doubled between the early 1990s and the early 2000s, to around 2.5% of all households.

Country proportions of households with at least 1 orphan and changes in the proportion of such households over time summarized in Table 1 and described above mirror epidemiological data on the level and maturity of the HIV epidemic in these countries. While it is impossible to tell from DHS survey data whether any parent-less child was orphaned due to AIDS, it is possible to deduce that in countries with high prevalence rates and where the HIV epidemic has had time to significantly impact adult mortality rates, a greater proportion of all orphans would be due to AIDS. For example, we found that in Ghana, whose HIV prevalence rate in 2003 was 2.14 (UNAIDS, 2006), making it lowest and slowest growing HIV prevalence of the 7 countries in this study, the corresponding orphan prevalence was also very low and growing slowly. Similarly for Uganda, we found that though the proportion of households with a single-parent

orphan was high, the rate was stable at approximately 17.2% between 1995 and 2000, which corresponds to findings (UNAIDS/WHO 2000) that the epidemic hit the country much earlier and that prevalence rates have since fallen and adult mortality stabilized. Finally, in Zambia, Malawi, Kenya, Tanzania and Zimbabwe, the high and still growing HIV prevalence rates there have been accompanied by a growing proportion of households with at least 1 orphan. The changes have been even more dramatic in Malawi and Zambia, whose HIV prevalence rates in 2004 were 14.1 and 16.9 respectively, because of the rising adult mortality rates that have accompanied the maturity of the epidemic in these countries. The graphs below provide a visual demonstration of the positive relationship between HIV prevalence rates and the orphan prevalence rates in the 7 countries studied.

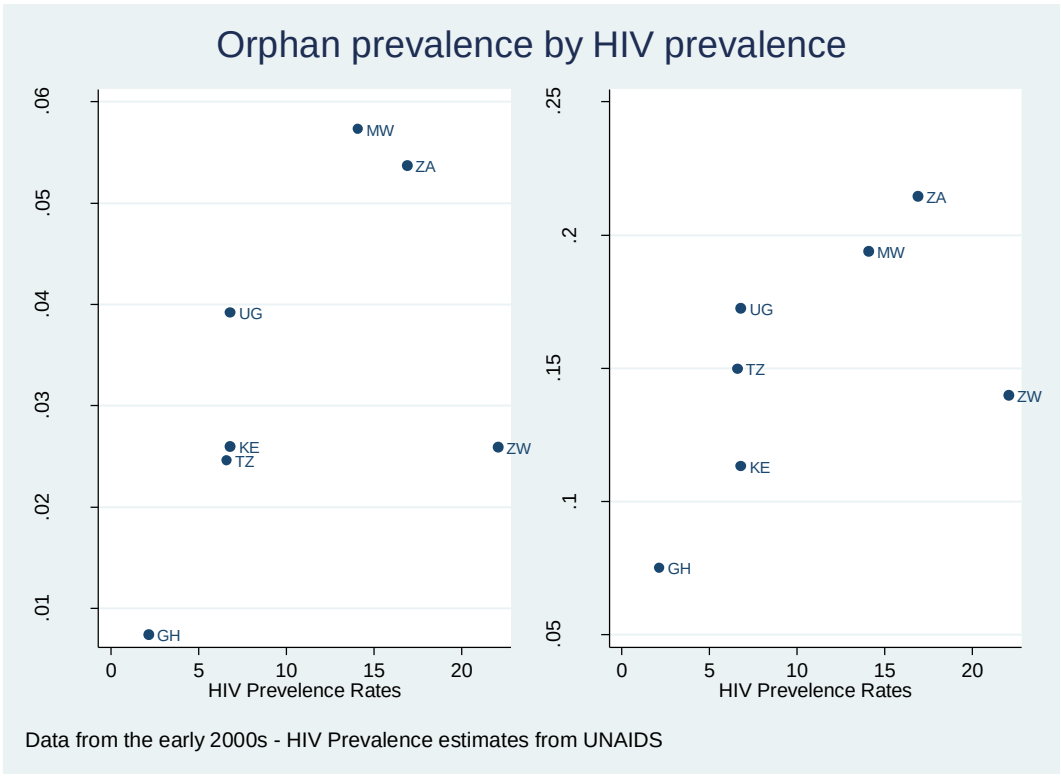


Figure 2: Relating Orphan Prevalence rates to HIV Prevalence

The key assumption of the rest of this paper, that the HIV epidemic in sub-Saharan Africa is the single most important determinant of observed demographic changes

generally and changes in household structure more specifically, is given credence by the findings above. High HIV prevalence countries had a corresponding high proportion of households with at least 1 single-parent or double orphan. Conversely, this implies that we should observe similar trends in the prevalence of widowhood and households missing parents, missing a generation or headed by a child.

Household Structure

This section extends the analysis above to shows the proportions of households with different household structures from the survey data.

Table 2: Proportions of Household Structure Classes by Country

Country	Year	Proportion of all Households				
		2 or more adults in household	Single parent household	Child headed household	Missing parents household	Missing generation household
Ghana	1993	0.5663	0.4323	0.0052	0.0441	0.0101
Ghana	1998	0.5918	0.4069	0.0050	0.0496	0.0044
Ghana	2003	0.6763	0.3221	0.0023	0.0629	0.0061
Kenya	1998	0.7331	0.2651	0.0038	0.0529	0.0114
Kenya	2003	0.7587	0.2389	0.0027	0.0644	0.0229
Malawi	1992	0.8164	0.1809	0.0028	0.0989	0.0129
Malawi	2000	0.8117	0.1857	0.0040	0.1099	0.0251
Malawi	2004	0.7963	0.2003	0.0054	0.1533	0.0487
Tanzania	1996	0.8484	0.1512	0.0024	0.0856	0.0096
Tanzania	1999	0.8457	0.1534	0.0034	0.1168	0.0182
Tanzania	2005	0.8420	0.1574	0.0018	0.1201	0.0209
Uganda	1995	0.7797	0.2191	0.0062	0.1158	0.0293
Uganda	2000	0.7772	0.2219	0.0053	0.1337	0.0343
Zambia	1996	0.8889	0.1103	0.0022	0.1433	0.0264
Zambia	2002	0.8773	0.1207	0.0014	0.1827	0.0494
Zimbabwe	1994	0.7685	0.2296	0.0063	0.0611	0.0088
Zimbabwe	1999	0.7452	0.2539	0.0073	0.0966	0.0213

The summarized results in Table 2 show that while households with at least two adults still make up a larger proportion of the total number of households, single-parent households make up the second largest proportion and have been increasing in most of the countries since the early 1990s. The class of households that show the most striking and consistent increases are households with missing parents and households missing a generation. In line with our investigation of the prevalence of orphans, we find that Ghana has the most conservative changes in the proportion of households with a high likelihood to have been affected by AIDS related mortality. The most dramatic changes are observed in Malawi, Zambia and Zimbabwe, especially in the country proportions of child-headed households and households missing parents and households missing a generation.

The graph below shows the relationship between HIV prevalence rates and country proportions of households with a structure that betrays a high likelihood to have been affected by AIDS.

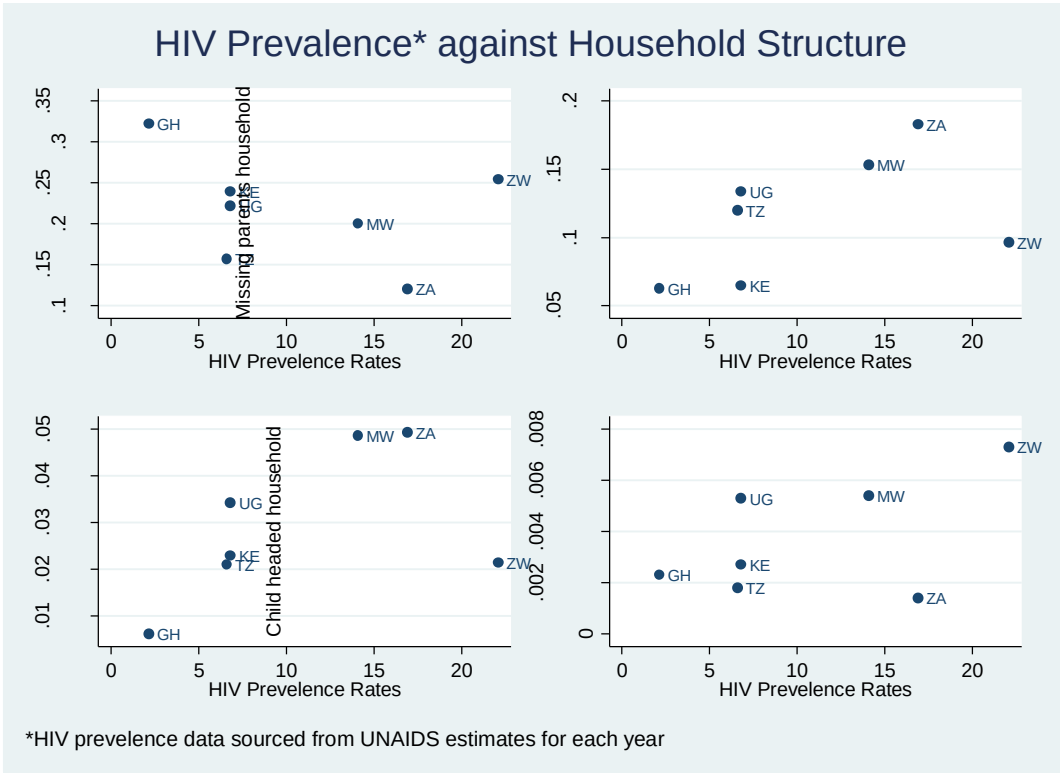


Figure 3: Relating the Proportion of Household Structure classes to HIV Prevalence Rates

It demonstrates the strong positive correlation between the proportion of households missing a generation, missing parents and child-headed households. The relationship between single parent households (with a deceased spouse) and HIV prevalence rates is weaker perhaps because of high re-marriage rates in some high HIV prevalence countries.

Summary of Findings

In this first section of our descriptive analysis, we examined the scope of the orphan crisis in 7 countries, paying particular attention to changing counts over time. Our results confirm research done elsewhere of a burgeoning orphan crisis in sub-Saharan Africa. Our approach demonstrates that, not only is the *number of orphans* increasing, but a cursory descriptive analysis also confirms that, between the 1990s and early 2000s, there has been a growth in the proportion of households caring for at least 1 orphan. We showed how these trends are closely related to trends in HIV prevalence and argued that this provided some support for the assumption that the HIV epidemic in sub-Saharan Africa has been accompanied by large demographic changes and possibly changes in household structure.

Next, we conducted an analysis of the levels and trends of household structure in the 7 countries. This analysis confirmed earlier findings, demonstrating that in high HIV prevalence countries, there has been a growing number of households with family structures that betray a high likelihood to have been affected by AIDS. Such household structures include child-headed households, households missing a generation and households with missing parent(s). We also found that the proportion of balanced households with at least two adults (male and female) is decreasing while the proportion of households that are headed by a single parent with a deceased spouse is increasing.

3.2.2: HOUSEHOLD CHARACTERISTICS

This section provides some answers about the general characteristics of households that show a high likelihood of having been affected by AIDS. Having demonstrated the magnitude of the orphan crisis in sub-Saharan Africa and also demonstrated the rise in the proportion of households headed by children, single parents and grandparents (missing a generation) and households with a missing parent, we turn to a descriptive analysis of each of these family structure classes. Of particular concern to us is to investigate their welfare relative to other household structure classes and to conduct some trend analysis.

Table 3 Average Wealth Index Score per country year

Country	Year	Wealth index (1-5 where 5=richest)					
		All Households	More than 2 Adults in Household	Single Parent Household	Child headed Households	Missing Parents	Missing Generation
Ghana	1993	3.033	3.037	3.026	3.100	3.070	3.186
Ghana	1998	3.125	3.049	3.233	2.745	3.007	2.892
Ghana	2003	3.165	3.063	3.379	2.436	3.013	3.090
Kenya	1998	3.160	3.088	3.354	2.966	3.041	3.205
Kenya	2003	3.224	3.117	3.549	3.498	2.863	2.862
Malawi	1992	2.906	2.984	2.553	2.824	2.955	2.910
Malawi	2000	2.993	3.032	2.820	3.193	3.051	3.199
Malawi	2004	2.897	3.016	2.427	1.862	2.966	3.147
Tanzania	1996	3.040	3.029	3.103	2.717	3.027	3.242
Tanzania	1999	3.063	3.057	3.088	4.147	3.078	3.134
Tanzania	2005	3.059	3.060	3.051	3.446	3.195	3.731
Uganda	1995	2.982	2.969	3.031	3.059	3.196	3.370
Uganda	2000	2.906	2.925	2.839	2.944	3.194	3.481
Zambia	1996	2.924	2.937	2.817	3.041	3.067	3.324
Zambia	2002	2.866	2.924	2.446	2.670	2.955	3.171
Zimbabwe	1994	3.211	3.182	3.302	3.019	2.849	2.803
Zimbabwe	1999	3.213	3.170	3.339	2.972	2.698	2.677

Table 3 summarizes the average wealth index scores of the various household structure classes for the 7 countries for different years. The average wealth index factor scores of the different household structure classes show that relative to other household structure types, child-headed families always score lower, especially in surveys from the late 1990s and early 2000s. The results for the other household structure classes of interest are much harder to generalize. For most countries, households with a missing generation and households with missing parents actually have a wealth index score that is higher than the corresponding national average. This finding supports the contention discussed in the literature review above that in the absence or death of parents, children often end up getting absorbed into kinship networks in such a way as to minimize the negative welfare impact on the whole clan/family. Such optimization may imply that orphans get assigned to households that can afford to care for them and may actually be wealthier than the average household. Furthermore, young adults from wealthier backgrounds may find it convenient to assign the responsibility of raising their children to their parents. This effect may actually become stronger when HIV infection stresses young families so that older generations and wealthier relatives have to step in to raise the grandchildren or relatives. Admittedly, there are many confounding factors at play here and it is impossible to draw any concrete conclusions using a simple descriptive analysis.

In Table 4, we summarize how the welfare of the different household structure classes change over time. The rationale behind this is that while it may be true that kinship networks readjust after an AIDS mortality so as to minimize the welfare impact on the entire clan, over time the rapidly growing orphan crises may overburden these kinship networks. An additional factor at play is that the economic impact of the death of a previously economically productive family member is likely to be greater than the loss of their income. It would include morbidity costs such as health expenses and well as post-death income stresses such as funeral expenses. The implication of all this is that over

time, it should be possible to observe a decrease in the average welfare of household structures betraying a high likelihood to have been affected by AIDS.

Table 4: Trends in Wealth Index Score for Various Household Structure Classes

Country	Years	Change in Wealth Index Score					
		All	<2 Adults	Single Parent	Child headed	Missing Parents	Missing Generation
Ghana	1998-2003	0.0403	0.0261	0.353	-0.664	-0.0569	-0.0966
Kenya	1998-2003	0.0639	0.0286	0.194	0.532	-0.179	-0.343
Malawi	2000-2004	-0.0952	0.0328	-0.127	-0.962	0.0113	0.238
Tanzania	1996-1999	0.0229	0.0312	-0.0521	0.729	0.168	0.489
Uganda	1995-2000	-0.0754	-0.0440	-0.192	-0.115	-0.00279	0.111
Zambia	1996-2002	-0.0581	-0.0127	-0.371	-0.371	-0.112	-0.153
Zimbabwe	1994-1999	0.00177	-0.0121	0.0379	-0.0471	-0.151	-0.126

This trend analysis gives slightly more enlightening results. We find that in Ghana and Kenya, while the average wealth index score for all households rose between 1998 and 2003, the wealth index score for households with a missing generation and households missing parents actually fell in this period. We also find that in Malawi, Tanzania, Uganda and Zambia the average welfare index score of single parent household fell disproportionately more that the average household. Similar outcomes are observed in Zimbabwe between 1994 and 1999.

Summary of Findings

In this section we extended the analysis of the general scope of the orphan crisis and the effect of AIDS on household structures by analyzing the welfare of households. We found that child-headed households are on average worse off than other household structure classes. However the descriptive analysis yielded inconclusive results about the average welfare of single parent households, households with missing parents and households missing a generation. The average welfare of the latter two household structure classes hinted that kinship networks may react to minimize the cost of taking care of orphans by assigning them to wealthier relatives. Thus we found that for most

countries, households missing a generation and households missing parents were wealthier than the national average household wealth index score. Nevertheless trend analysis showed that the average income of household classes with a high likelihood of having been affected by AIDS, especially in high HIV prevalence countries such as Zambia, Malawi and Zimbabwe, has been decreasing more relative to the average income of all households together. However the credibility of this conclusion is limited and in the next section, we present the results from an empirical investigation that studies the relationship between household income and household structure. The point of this empirical exercise is to lay the groundwork for the proposal of an alternative indirect measure of the impact of AIDS related mortalities on households. Our indirect assessment strategy relies on changes in the welfare of households with a high likelihood of having been affected by AIDS.

3.3 Empirical Analysis

The descriptive analysis above presents evidence of a growing number of households with at least one orphan and households with compositions that betray a high likelihood of having been affected by AIDS, especially in high HIV prevalence countries. However, the analysis yields ambiguous results about the relationship between household structure and income. We use regression analysis on micro-data, where each observation is a single household, to find out the correlations between different classes of households and their score on the wealth index.

3.3.1: Cross Sectional Analysis

We use the wealth index factor score to capture household welfare and estimate the extent to which it correlates with the structure of the household for each country-year. A vector of indicator variables is used to capture the structure of a household depending on whether the household has a single parent, is headed by a child, has missing parent or has a missing generation. We estimate the following regression model:

$$Wealth_i = \beta_0 + \mathrm{B}' Structure_i + \mathrm{A}' \mathrm{X}_i + \varepsilon_0 \quad (1)$$

where $Wealth_i$ is the wealth index factor score for household i, $Structure_i$ is our household structure vector (containing a dummy variable for each of the following: single parent headed, child headed, missing parent, missing generation) and B' is a vector of the corresponding coefficients ($\beta_1\ \beta_2\ \beta_3\ \beta_4$) that we wish to estimate. The regression model also contains a vector of control variables X_i (with its corresponding vector of coefficients A'), that capture household specific characteristics such as the education level, age and gender of the household head, the number of children in the household, the size of the household, the proportion of children in school and whether the household is located in an urban area or a rural area. Controlling for these household specific characteristics which may independently affect the wealth index score allows us to isolate the effect of household structure on the wealth index score. We estimate equation (1) using weighted OLS and apply jackknife variance estimation to calculate the standard errors while accounting for the complex survey design.

The regression output from the 7 countries is grouped into 4 tables for visual convenience and taking into consideration HIV prevalence rates and the maturity of the epidemic. In the first set, we group the regression output from Zimbabwe and Uganda together. The HIV epidemic in these two countries is older and both are the only countries to have ever reported a drop in the HIV prevalence rate, hinting at the possible maturity of the epidemic.

The results in Table 5 show that there was a strong negative association between the *wealth index score* and *child-headed households* for Uganda in 2000. The coefficient is significant at 10%. Similarly we find a large, negative correlation between household wealth and single parent-hood in 1994 for Zimbabwe with the coefficient is significant at the 1% level. Both these results indicate that *ceteris paribus*, child-headed households and single parent households were poorer.

Table 5: OLS: Relating Wealth Index Score to Household Structure (Uganda and Zimbabwe)

	Uganda 1995	Uganda 2000	Zimbabwe 1994	Zimbabwe 1999
	Wealth Index Factor Score ($Wealth_i$)			
single-parent household (widow or widower)	0.0084	-0.0059	-0.0525***	-0.0270
	(0.0169)	(0.0188)	(0.0196)	(0.0190)
child headed household	-0.0701	-0.1422*	0.0633	0.0264
	(0.0570)	(0.0791)	(0.0682)	(0.0823)
Missing parents	0.0175	0.0523**	0.0428	0.0131
	(0.0224)	(0.0235)	(0.0288)	(0.0263)
Missing generation	0.1597***	0.0792	0.0037	-0.0219
	(0.0584)	(0.0518)	(0.0603)	(0.0513)
number of people in household	-0.0380*	0.0108	-0.0599	-0.0256
	(0.0223)	(0.1889)	(0.1526)	(0.4043)
age of the household head	0.0033***	0.0019***	0.0079***	0.0028***
	(0.0004)	(0.0004)	(0.0006)	(0.0005)
sex of the household head (Female = 1)	0.0498***	0.1067***	0.0387**	0.0351**
	(0.0156)	(0.0180)	(0.0160)	(0.0152)
school years for household head	0.0608***	0.0688***	0.0715***	0.0499***
	(0.0028)	(0.0022)	(0.0025)	(0.0022)
number of children 5-15 in household	0.0432*	0.0000	0.0551	0.0000
	(0.0223)	(0.1888)	(0.1526)	(0.4042)
proportion of 5-14 yr olds in School	0.1248***	0.1795***	0.0681**	0.0003
	(0.0359)	(0.0335)	(0.0342)	(0.0322)
urban or rural? (rural = 1)	-1.0855***	-1.3447***	-1.6122***	-1.5651***
	(0.0279)	(0.0229)	(0.0191)	(0.0161)
Constant	0.2418***	0.3533***	0.3905***	0.7649***
	(0.0358)	(0.0342)	(0.0420)	(0.0384)
Observations	7348	7715	5850	6313
R-squared	0.4397	0.5915	0.7350	0.7436

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

We also find that in Uganda, there was a positive association between the wealth index score and households missing a generation in 1995, however the effect disappears in 2000. In 2000 for Uganda, we find a positive correlation between households with missing parents and household wealth. These two results are consistent with the earlier hypothesis that through self-selection, wealthier relatives or older generations may step in to take care of orphaned or abandoned children.

Table 6 shows below shows the regression output from Tanzania and Kenya. The concurrency of the incidence and development of the HIV epidemic and the similarity of

the HIV prevalence rates in both countries justifies the joint analysis of the regression output from them. Most of the coefficients on the $Structure_i$ variables are not statistically significant.

Table 6: OLS: Relating Wealth Index Score to Household Structure (Kenya and Tanzania)

	Kenya 1998	Kenya 2003	Tanzania 1996	Tanzania 1999	Tanzania 2004
	Wealth Index Factor Score ($Wealth_i$)				
single-parent household (widow or widower)	-0.0444	0.0014	-0.0070	-0.0148	-0.0180
	(0.0273)	(0.0177)	(0.0276)	(0.0413)	(0.0247)
child headed household	0.0056	0.0202	-0.1167	0.1241	0.0332
	(0.1262)	(0.110)	(0.1508)	(0.2332)	(0.1338)
Missing parents	0.0573	-0.0155	0.0297	-0.0371	0.0139
	(0.0490)	(0.0321)	(0.0341)	(0.0304)	(0.0275)
Missing generation	0.0954	0.0034	0.0361	0.0420	0.1667**
	(0.1034)	(0.048)	(0.0870)	(0.1036)	(0.0698)
number of people in household	0.1091	1.0719	-0.3078**	0.0043	0.0022
	(0.1105)	(1.071)	(0.1419)	(0.0336)	(0.0296)
age of the household head	0.016***	0.004***	-0.0001	-0.0001	0.005***
	(0.0008)	(0.0004)	(0.0006)	(0.0010)	(0.0005)
sex of the head (Female = 1)	0.157***	0.065***	-0.0073	0.0017	0.0320
	(0.0237)	(0.0146)	(0.0232)	(0.0377)	(0.0204)
school years for household head	0.109***	0.067***	0.0295***	0.0240***	0.0998***
	(0.0037)	(0.0018)	(0.0035)	(0.0067)	(0.0028)
children 5-14 in household	-0.121	-1.097	0.3204**	0.0000	0.0000
	(0.1105)	(1.0705)	(0.1420)	(0.0336)	(0.0294)
proportion of 5-14 yr olds in School	-0.0739	-0.157***	0.377***	0.499***	0.141***
	(0.0465)	(0.0293)	(0.0631)	(0.0772)	(0.0437)
urban or rural? (rural = 1)	-1.22***	-1.27***	-1.191***	-1.019***	-1.345***
	(0.0299)	(0.0161)	(0.0282)	(0.0391)	(0.0222)
Constant	-0.37***	0.35***	0.633***	0.357***	0.242***
	(0.0624)	(0.0331)	(0.0503)	(0.0866)	(0.0410)
Observations	8285	8450	7844	3610	9720
R-squared	0.4749	0.6427	0.3683	0.4462	0.5962

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

However, we do find a positive and significant (at 5%) coefficient on the *missing generation* variable for Tanzania 2004. Again, this may be capturing the self-selection effect in the assignment of orphans within kinship networks.

Next we present the results from Malawi and Zambia. Both countries experienced an HIV outbreak more recently and the HIV prevalence rates in both countries have grown rapid to roughly comparable high levels (14.1 for Malawi and 16.9 for Zambia, UNAIDS (2004) estimates).

Table 7: OLS: Relating Wealth Index Score to Household Structure (Malawi and Zambia)

	Malawi 1992	Malawi 2000	Malawi 2004	Zambia 1996	Zambia 2002
	Wealth Index Factor Score ($Wealth_i$)				
single-parent household (widow or widower)	0.094***	0.0023	-0.0036	0.0103	-0.0027
	(0.0294)	(0.0224)	(0.0329)	(0.0277)	(0.0282)
child headed household	0.0231	-0.0954	-0.0560	0.322***	0.0442
	(0.2393)	(0.0794)	(0.1382)	(0.1229)	(0.1486)
Missing parents	0.0392	0.0519**	0.0166	-0.0094	-0.0171
	(0.0349)	(0.0264)	(0.0295)	(0.0292)	(0.0271)
Missing generation	-0.0157	0.0741	0.1209*	0.1341**	0.0730
	(0.0835)	(0.0489)	(0.0706)	(0.0629)	(0.0502)
number of people in household	0.0214	-0.0047	0.0327	-0.0754	0.0137
	(0.3519)	(0.0864)	(0.4342)	(0.1227)	(0.2606)
age of the household head	0.0012**	0.0005	0.007***	0.006***	0.0008
	(0.0006)	(0.0005)	(0.0007)	(0.0006)	(0.0006)
sex of the head (Female = 1)	-0.0352	0.073***	0.111***	0.084***	0.0033
	(0.0250)	(0.0189)	(0.0287)	(0.0222)	(0.0217)
school years for household head	0.071***	0.070***	0.115***	0.086***	0.084***
	(0.0040)	(0.0024)	(0.0039)	(0.0027)	(0.0030)
children 5-15 in household	0.0000	0.0000	0.0000	0.0884	0.0000
	(0.3519)	(0.0864)	(0.4341)	(0.1228)	(0.2605)
proportion of 5-14 yr olds in School	0.297***	0.0616	0.146***	0.464***	0.665***
	(0.0507)	(0.0383)	(0.0523)	(0.0526)	(0.0521)
urban or rural? (rural = 1)	-1.01***	-1.49***	-1.26***	-1.28***	-1.28***
	(0.0328)	(0.0288)	(0.0401)	(0.0180)	(0.0203)
Constant	0.305***	0.899***	0.0532	-0.0169	0.219***
	(0.0518)	(0.0414)	(0.0545)	(0.0398)	(0.0439)
Observations	5294	14150	13588	7259	7079
R-squared	0.4051	0.4398	0.4448	0.6440	0.6326

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The regression output shows that for Malawi, in 1992, single parent households may have actually been wealthier, *ceteris paribus*. The coefficient on households with a single parent is positive and significant at 1%. However this positive effect disappears in 2000 and eventually becomes negative, though not statistically significant, in 2004.

Similarly, we find a positive effect on the child-headed household variable, but the coefficient becomes smaller and its statistical significance disappears by 2002. These findings may be explained by the late incidence of the HIV epidemic in both countries where, before its full outbreak, widowhood and orphanhood may not have necessarily been accompanied by the disproportionately large welfare losses that come with AIDS morbidity and mortality. We also observe the self-selection effect as indicated by the positive and statistically significant coefficients on the *missing-parents* variable for Malawi in 2000, which disappears in 2004, and on the missing generation variable in 1996 for Zambia, which also disappears in 2002.

Table 8: OLS: Relating Wealth Index Score to Household Structure (Ghana)

	Ghana 1993	Ghana 1998	Ghana 2003
	Wealth Index Factor Score ($Wealth_i$)		
single-parent household (widow or widower)	-0.1311***	-0.0929***	-0.0475*
	(0.0244)	(0.0247)	(0.0270)
child headed household	0.1194	-0.1267*	-0.3961***
	(0.1223)	(0.0733)	(0.1447)
Missing parents	0.1265**	0.0633	-0.1177***
	(0.0583)	(0.0477)	(0.0453)
Missing generation	0.0676	-0.1392	0.1713
	(0.1424)	(0.1794)	(0.1275)
number of people in household	0.0081	-0.0192	0.0010
	(0.1050)	(0.2341)	(0.0132)
age of the household head	0.0024***	0.0038***	0.0030***
	(0.0006)	(0.0006)	(0.0006)
sex of the household head (Female = 1)	-0.0122	0.0596***	0.0884***
	(0.0210)	(0.0205)	(0.0237)
number of school years for household head	0.0613***	0.0595***	0.0657***
	(0.0023)	(0.0019)	(0.0021)
number of children 5-15 in household	0.0000	0.0000	0.0000
	(0.1049)	(0.2342)	(0.0122)
proportion of 5-14 yr olds in School	-0.0081	0.1634***	-0.0838
	(0.0457)	(0.0436)	(0.0523)
urban or rural? (rural = 1)	-1.1375***	-1.1064***	-1.0789***
	(0.0205)	(0.0183)	(0.0182)
Constant	0.3149***	0.2713***	0.1255***
	(0.0430)	(0.0436)	(0.0447)
Observations	5815	5959	6208
R-squared	0.4973	0.5208	0.5131

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8 summarizes the regression output from Ghana. Despite having a relatively low AIDS prevalence rate, a low orphan prevalence rate and a smaller proportion of households with a single adult head, a child as household head, missing parents or missing a generation, we get robust coefficients on almost all the variables of interest from Ghana. We find that single parent households are negatively associated with household welfare. The coefficient is significant at 1% in 1993 and 1998 and at 10% in 2003. The size of the coefficient on single parent households however becomes smaller over time. Child headed households are also negatively associated with the wealth index score, with the coefficient growing in magnitude and significance between 1998 and 2003. Households with missing parents start off positively associated with welfare in 1993 and eventually become negatively correlated to income in 2003. This change could be a result of the growing stresses on kinship networks as a result of the slow but steady growth in HIV prevalence and adult mortality in the same period in Ghana.

From all the regressions, we find that most of out control variables do have an impact on household wealth. The coefficients are stable and robust across countries and have the right signs, indicating that they influence household income in predictable ways. For example, we find that most households located in rural areas are poorer than their urban counterparts. This finding is robust and the coefficient roughly similar and consistent across countries and time as a results of the similarity of the differences between rural households and urban household in the 7 countries. Similarly, we find that the number of years spent in school by the household head always has a positive impact of household welfare and that families with older household heads tend to have accumulated more assets.

In summary, the regressions above show that child-headed households are almost consistently negatively associated with household welfare. Households with a missing generation and households missing a parent are sometimes positively correlated with household wealth to capture the “self-selection” effect. The self-selection effect

contends that in order to minimize the negative welfare impact of caring for orphaned or abandoned children on the entire extended families, wealthier households may be over-represented in the class of households with a missing generation and households missing parents. Over time, however, this effect is weakened as the HIV epidemic exerts increasing pressure on the extended family networks, ultimately leading to a negative association between households missing a generation or missing parents and the wealth of the household. We also find that our control variables impact household wealth in predictable ways.

From the regression results above, however, the relationship between household wealth and single-parent hood is ambiguous. To disentangle the links further, we alter the regression specification to include interaction terms that isolate single-female headed households from single-male headed households. The rationale in this approach is that the death of a male spouse may lead to greater welfare losses than the death of a female spouse where the majority of breadwinners are male. The modified regression model is as follows:

$$Wealth_i = \beta_0 + \mathrm{B}^{'} Structure_i + \mathrm{A}_i^{'}\mathrm{X}_i + \lambda \cdot Sex_i \times Single\ Parent_i + \varepsilon_0 \qquad (2)$$

Such that the effect of single parent hood on household wealth is given by the relation:

$$Single\ Parent_i = \beta_1 + \lambda \times Sex_i$$

Table 9 summarizes the coefficients on the single parent variable and the interaction term for all the countries. The regression output shows that single male headed households were negatively correlated with wealth in Ghana (1993, 1998, 2003) and Tanzania (2004) with statistically significant coefficients. However in Kenya and Uganda, the correlation between wealth and single parent households headed by males is positive and significant.

Table 9: Wealth impact of Single-Parent-hood: Interacting with Household Head Gender

Y = Wealth index factor score

Country	Year	single-parent household (widow or widower))		single-parent household) X Female dummy (widow) -	
		β_1	Std. Error	λ	Std. Error.
Ghana	1993	-0.2196***	(0.041)	0.1398***	(0.045)
Ghana	1998	-0.1764***	(0.0396)	0.0331)	(0.0435)
Ghana	2003	-0.0840*	(0.0439)	0.0068	(0.0493)
Kenya	1998	0.0908*	(0.0518)	-0.2010***	(0.0499)
Kenya	2003	0.0830***	(0.032)	-0.1681***	(0.0319)
Malawi	1992	0.1503**	(0.0636)	-0.0964	(0.0606)
Malawi	2000	0.0976**	(0.0406)	-0.2540***	(0.0428)
Malawi	2004	0.0076	(0.0558)	-0.0866	(0.0611)
Tanzania	1996	0.069	(0.046)	-0.1404***	(0.0533)
Tanzania	1999	0.0311	(0.0585)	-0.1559**	(0.0791)
Tanzania	2004	-0.0958**	(0.0483)	-0.0283	(0.0487)
Uganda	1995	0.0698***	(0.0264)	-0.1129***	(0.031)
Uganda	2000	0.0097	(0.0319)	-0.0919**	(0.0358)
Zambia	1996	0.0976)	(0.0605	-0.0741	(0.0573)
Zambia	2002	-0.0299	(0.0535)	0.0978*	(0.0538)
Zimbabwe	1994	0.0092	(0.0337)	-0.1102***	(0.0339)
Zimbabwe	1999	0.0194	(0.0331)	-0.1008***	(0.0339)

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Female headed households are generally less wealth, as shown by the negative λ coefficients above, most of which are significant at 1%.

3.3.1: LONGITUDINAL ANALYSIS

The cross-sectional regression analysis for each country-year above produces stable output for how various indicators of household structure types correlate to household wealth. However, it fails to account for time specific conditions that may be unrelated to the HIV epidemic and might be the real drivers behind the observed levels and changes in the relationship between household structure and household wealth. We address this problem by estimating a panel data regression model with fixed effects for each country specified by:

$$Wealth_{it} = \beta_0 + \mathrm{B}' Structure_{it} + \mathrm{A}' \mathrm{X}_{it} + \varphi_t + \varepsilon_0 \qquad (3)$$

where every component of the model is the same as it was for the cross-sectional model for each time period t and φ_t is our time effect. We find that running this cross-sectional regression has very little impact on the findings above. We present two sets of these results, from Uganda and Ghana as illustrative examples. More result tables are in the appendix.

Table 10: Longitudinal study the relationship between household structure and wealth (Uganda 1995, 2000)

	Wealth Index Factor Score	
	(1)	(2)
single parent (widow or widower)	0.0001	0.0429*
	(0.0149)	(0.0231)
child headed household	-0.1081**	-0.1231**
	(0.0541)	(0.0536)
Missing parents	0.0343**	0.0337**
	(0.0163)	(0.0163)
Missing generation	0.1184***	0.1176***
	(0.0379)	(0.0377)
year==2000	-0.0804***	-0.0807***
	(0.0232)	(0.0232)
single-parent household) X Female		-0.1081***
		(0.0281)
Constant	0.3396***	0.3210***
	(0.0547)	(0.0565)
Observations	15063	15063
R-squared	0.5215	0.5222

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

For clarity, the results presented do not include the control terms. Full result tables are in the appendix

Column (1) of the results table (10) shows that child-headed households are strongly and negatively correlated with household welfare in Uganda. Interacting the household head gender variable with the single parent household dummy variable (column (2)) reveals – as was shown in the cross-sectional study – that the class of households headed by widows is associated with less wealth. Male-headed households on the other hand are positively correlated to wealth, implying that such households are more likely to be wealthy.

Table 11 below presents the results of running the regression specified by equation 3 above.

Table 11: Longitudinal study the relationship between household structure and wealth (Ghana, 1993, 1998, 2003)

	Wealth Index Factor Score	
	(1)	(2)
single parent (widow or widower)	-0.0917***	-0.2462***
	(0.0158)	(0.0312)
child headed household	-0.0791	0.1195
	(0.0630)	(0.1192)
Missing parents	-0.0015	0.1222*
	(0.0307)	(0.0644)
Missing generation	0.0927	0.0677
	(0.0978)	(0.1760)
year==1998	-0.0060	-0.0545
	(0.0319)	(0.0371)
year==2003	-0.0869**	-0.1275***
	(0.0340)	(0.0366)
(year==1998)*single parent		0.1217***
		(0.0323)
(year==2003)*single parent		0.1364***
		(0.0321)
(year==1998)*child headed		-0.2392*
		(0.1384)
(year==2003)*child headed		-0.5220***
		(0.1820)
(year==1998)*missing parents		-0.0612
		(0.0811)
(year==2003)*missing parents		-0.2480***
		(0.0776)
(year==1998)*missing generation		-0.2082
		(0.2490)
(year==2003)*missing generation		0.1064
		(0.2151)
Constant	0.2634***	0.2828***
	(0.0438)	(0.0466)
Observations	17982	17982
R-squared	0.5079	0.5104

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

For clarity, the results presented do not include the control terms. Full result tables are in the appendix

Column (1) in Table 11 also confirms earlier results that single parent households, and especially widow headed households are associated with less income. The coefficient on the indicator variable for a single widow/widower headed household is negative and significant at 1%. Interacting the household structure variables with the years allows us to test the joint effect of the year on which the survey was administered and the household structure variables. The results of this regression, reproduced in column (2) generally confirms that child headed households are associated with less wealth and that over time, households with missing parents and missing a generation progressively get poorer.

4. Discussion

4.1 Findings

In this paper we sought to disentangle the links between household structure and household welfare. Through cross-sectional regression analysis, we found that households headed by children and single parents, particularly women, are poorer even after we control for all household specific characteristics. Such household specific characteristics include the education and age of the household head, the size of the household and its location (rural or urban). We also found that whereas households with missing parents and missing a generation may initially be relatively well off compared to the average household, over time the mortality impact of HIV may take its toll and cause them to be less wealthy on average as well. A longitudinal regression model with fixed time effects confirmed the accuracy of the cross-sectional analysis.

The implication of this is that the coefficients on the 4 household structure classes studied above estimate the negative welfare impact associated with an AIDS related death. This may be losing a spouse, in the case of single parent households, or losing both parents in the case of child headed households. The coefficients on the “missing

generation" and "missing parent" variables estimate the negative welfare impact imposed on kinship networks that may absorb orphaned or abandoned children.

In the descriptive analysis, we gave evidence to suggest that one of the main effects of the HIV epidemic is to increase the prevalence of orphans and to increase the proportion of households with a single parent, headed by children, missing a generation or with missing parents. We argued that while it is hard to ascertain the proportion of adult mortalities due to AIDS, in high HIV prevalence countries in sub-Saharan Africa the most important determinants of demographic changes and changes in household structure are very closely associated with the HIV epidemic.

Thus, it may be possible to indirectly estimate the welfare impact of AIDS mortalities on households using the relationships between household structure and household welfare. The coefficients we estimated here, limited by the smaller number of counts of each household type, are a rough measure of this. A more efficient estimation of the coefficients relating the different household structure types to household wealth using larger more comprehensive datasets, such as from censuses, may yield a more usable measure of the welfare impact of AIDS on households. Additionally, directly tracing changes in the proportions of household structure classes against corresponding changes in average income for different groups (such as by district) could yield an estimate of the overall welfare impact of the HIV epidemic since its outbreak. Such an estimate could also be used predict changes in the average income of households given the output from models elsewhere that predict expected values of orphanhood from current trends in HIV infection rates and adult mortality.

4.2 Conclusion

This paper shows first attempts at using changing household structure to better understand the impact of the HIV/AIDS epidemic on the welfare conditions of households. Relying on the evidence gleaned from survey data about household structure and characteristics allows us to derive a new approach of assessing both the ways in which families have been affected, and how much they have been affected. The scope of our analysis here is limited by the fact that any household based assessment of the welfare impact of AIDS immediately excludes any affected people that are not associated with any household at all. These may include street children and children in various institutions such as orphanages. Thus, our impact measures will always be an underestimate of the true impact of AIDS related death. However, by focusing our household structure, our approach makes it possible to also track down the welfare of some of the worst affected that dissolve and get absorbed within kinship networks. Given the extensive and devastating effects of the epidemic, this approach could help resolve some questions about the most efficient use of international development efforts and aid money. If we could efficiently estimate the welfare cost of any structural change to the household after a AIDS related death, it may be possible to make limited resources go as far as possible to alleviate suffering. Such an estimate could also be useful too planners as they prepare policy for households, villages and larger units.

5. Bibliography

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6. Supplementary Result Tables

6.1 Descriptive Analysis

Country	Year	Obs	Average household characteristics: All Households				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	5815	3.80	42	5.50	0.1822	3.0330
Ghana	1998	5959	3.64	44	6.45	0.1801	3.1251
Ghana	2003	6208	4.07	45	6.26	0.1803	3.1655
Kenya	1998	8286	4.38	44	6.21	0.2319	3.1596
Kenya	2003	8450	4.45	43	6.58	0.2635	3.2236
Malawi	1992	5294	4.58	44	3.65	0.1724	2.9056
Malawi	2000	14124	4.50	42	4.35	0.2199	2.9926
Malawi	2004	13588	4.45	42	4.85	0.2337	2.8974
Tanzania	1996	7844	5.05	45	4.59	0.1247	3.0401
Tanzania	1999	3610	5.21	45	4.41	0.1325	3.0629
Tanzania	2005	9720	5.04	44	4.98	0.1802	3.0593
Uganda	1995	7349	4.88	42	4.41	0.1733	2.9817
Uganda	2000	7715	4.95	42	5.02	0.2502	2.9064
Zambia	1996	7260	5.54	43	6.06	0.1704	2.9238
Zambia	2002	7079	5.35	43	6.33	0.1871	2.8656
Zimbabwe	1994	5850	4.91	43	5.97	0.2346	3.2110
Zimbabwe	1999	6311	4.30	43	6.94	0.2318	3.2128

Country	Year	Obs	Average characteristics: Many Adults in Household				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	3292	5.19	45	5.34	0.2214	3.0368
Ghana	1998	3658	4.95	46	6.50	0.2239	3.0494
Ghana	2003	4344	5.18	47	6.18	0.2133	3.0629
Kenya	1998	6121	5.19	45	6.30	0.2579	3.0882
Kenya	2003	6382	5.20	44	6.63	0.2895	3.1168
Malawi	1992	4394	5.09	44	3.97	0.1848	2.9836
Malawi	2000	11461	4.98	42	4.67	0.2278	3.0322
Malawi	2004	10832	4.95	42	5.17	0.2383	3.0164
Tanzania	1996	6652	5.59	45	4.67	0.1309	3.0286
Tanzania	1999	3079	5.79	45	4.54	0.1411	3.0572
Tanzania	2005	8325	5.59	44	5.09	0.1877	3.0598
Uganda	1995	5570	5.57	41	4.67	0.1814	2.9688
Uganda	2000	5881	5.68	41	5.30	0.2662	2.9248
Zambia	1996	6406	5.97	43	6.26	0.1776	2.9367
Zambia	2002	6198	5.79	42	6.57	0.1960	2.9240
Zimbabwe	1994	4507	5.68	45	5.91	0.2552	3.1821
Zimbabwe	1999	4754	5.07	44	6.88	0.2534	3.1700

Country	Year	Obs	Average characteristics: Single Parent Household				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	2515	1.99	38	5.70	0.1313	3.0258
Ghana	1998	2294	1.75	40	6.36	0.1172	3.2334
Ghana	2003	1854	1.76	41	6.42	0.1116	3.3792
Kenya	1998	2151	2.16	42	5.96	0.1601	3.3545
Kenya	2003	2051	2.11	40	6.41	0.1829	3.5489
Malawi	1992	884	2.33	45	2.21	0.1175	2.5534
Malawi	2000	2652	2.40	43	2.98	0.1836	2.8203
Malawi	2004	2713	2.48	43	3.58	0.2173	2.4265
Tanzania	1996	1188	2.01	43	4.15	0.0899	3.1031
Tanzania	1999	526	2.01	43	3.71	0.0852	3.0877
Tanzania	2005	1390	2.14	43	4.41	0.1407	3.0511
Uganda	1995	1769	2.48	42	3.51	0.1438	3.0308
Uganda	2000	1824	2.43	42	4.04	0.1944	2.8388
Zambia	1996	849	2.12	44	4.50	0.1128	2.8173
Zambia	2002	868	2.20	44	4.56	0.1252	2.4462
Zimbabwe	1994	1331	2.38	38	6.18	0.1672	3.3016
Zimbabwe	1999	1553	2.07	39	7.13	0.1674	3.3394

Country	Year	Obs	Average characteristics:Child headed household				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	30	1.20	16	5.30	0.1833	3.1000
Ghana	1998	35	1.40	16	5.94	0.2776	2.7450
Ghana	2003	14	1.98	16	6.50	0.3240	2.4358
Kenya	1998	29	2.06	16	7.02	0.5840	2.9658
Kenya	2003	28	2.04	16	6.20	0.4119	3.4979
Malawi	1992	12	2.23	16	3.41	0.1052	2.8244
Malawi	2000	68	2.26	16	4.59	0.5617	3.1933
Malawi	2004	66	2.39	16	4.47	0.4857	1.8625
Tanzania	1996	15	2.63	16	4.17	0.1859	2.7167
Tanzania	1999	10	1.18	16	6.20	0.1450	4.1474
Tanzania	2005	16	1.82	17	5.04	0.2432	3.4457
Uganda	1995	49	1.99	16	4.13	0.2443	3.0589
Uganda	2000	47	1.90	16	5.41	0.2587	2.9437
Zambia	1996	18	3.18	16	3.31	0.2670	3.0411
Zambia	2002	11	2.13	17	4.38	0.3927	2.6697
Zimbabwe	1994	36	3.13	16	7.07	0.5554	3.0191
Zimbabwe	1999	46	3.05	16	7.71	0.5357	2.9720

Country	Year	Obs	Average characteristics: Missing Parent(s) household				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	257	5.99	50	4.85	0.3195	3.0700
Ghana	1998	288	5.60	50	6.36	0.3302	3.0066
Ghana	2003	389	6.24	50	6.11	0.3020	3.0131
Kenya	1998	444	6.03	49	4.87	0.3271	3.0415
Kenya	2003	514	6.42	51	5.14	0.4042	2.8629
Malawi	1992	467	6.00	49	3.47	0.2285	2.9547
Malawi	2000	1606	5.86	50	4.08	0.3472	3.0511
Malawi	2004	2113	5.60	49	4.47	0.3453	2.9660
Tanzania	1996	698	6.75	51	3.66	0.1855	3.0269
Tanzania	1999	447	6.90	50	4.01	0.1887	3.0778
Tanzania	2005	1222	6.58	49	4.84	0.2724	3.1950
Uganda	1995	864	6.64	50	4.14	0.2889	3.1964
Uganda	2000	1030	6.80	48	5.01	0.3899	3.1936
Zambia	1996	1022	7.37	47	6.22	0.2397	3.0674
Zambia	2002	1284	6.88	48	6.18	0.2531	2.9550
Zimbabwe	1994	375	7.51	54	4.25	0.3599	2.8485
Zimbabwe	1999	655	6.69	53	4.88	0.3741	2.6976

Country	Year	Obs	Average characteristics: Missing generation household				
			Household size	Head age	Head years of schooling	Proportion of children 5-14 in school	Wealth index (1-5 where 5=richest)
Ghana	1993	59	5.78	48	4.90	0.3989	3.1864
Ghana	1998	28	5.58	53	7.85	0.3585	2.8921
Ghana	2003	39	5.91	51	5.32	0.3515	3.0898
Kenya	1998	98	5.90	48	5.44	0.3496	3.2046
Kenya	2003	172	6.58	53	4.99	0.4693	2.8617
Malawi	1992	55	6.34	60	2.80	0.2136	2.9096
Malawi	2000	380	6.18	52	4.16	0.4115	3.1991
Malawi	2004	627	6.02	51	4.74	0.4059	3.1474
Tanzania	1996	68	6.69	55	3.46	0.2438	3.2416
Tanzania	1999	55	6.37	59	5.44	0.2403	3.1337
Tanzania	2005	177	6.70	49	5.75	0.3232	3.7307
Uganda	1995	224	6.95	52	3.85	0.3526	3.3697
Uganda	2000	288	6.97	52	5.64	0.4556	3.4812
Zambia	1996	182	7.70	47	6.72	0.2778	3.3237
Zambia	2002	333	7.21	50	6.40	0.3126	3.1706
Zimbabwe	1994	54	8.66	54	3.69	0.3868	2.8029
Zimbabwe	1999	133	6.29	55	4.63	0.3750	2.6766

6.2 Regression Analysis

6.2.1: LONGITUDINAL MODEL[3]

Ghana

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	-0.0917***	-0.1576***	-0.2462***
	(0.0158)	(0.0247)	(0.0312)
Child headed	-0.0791	-0.0849	0.1195
	(0.0630)	(0.0625)	(0.1192)
Missing parents	-0.0015	-0.0059	0.1222*
	(0.0307)	(0.0308)	(0.0644)
missing generation	0.0927	0.0945	0.0677
	(0.0978)	(0.0978)	(0.1760)
number of people in household	-0.0033	-0.0034	-0.0032
	(0.0176)	(0.0181)	(0.0175)
age of the household head	0.0032***	0.0033***	0.0033***
	(0.0004)	(0.0005)	(0.0005)
sex of the household head	0.0432***	0.0643***	0.0645***
	(0.0150)	(0.0220)	(0.0219)
school years for household head	0.0621***	0.0625***	0.0626***
	(0.0024)	(0.0024)	(0.0024)
number of children 5-15 in household	0.0000	0.0000	0.0000
	(0.0173)	(0.0178)	(0.0171)
proportion of 5-14 yr olds in school	0.0261	0.0261	0.0263
	(0.0300)	(0.0300)	(0.0298)
urban or rural?	-1.1078***	-1.1068***	-1.1062***
	(0.0318)	(0.0318)	(0.0317)
year==1998	-0.0060	-0.0071	-0.0545
	(0.0319)	(0.0318)	(0.0371)
year==2003	-0.0869**	-0.0884***	-0.1275***
	(0.0340)	(0.0339)	(0.0366)
young single parent		0.0963***	0.0994***
		(0.0254)	(0.0254)
sex of single parent		0.0527*	0.0549**
		(0.0278)	(0.0277)
sex of young parent		-0.1070***	-0.1046***
		(0.0262)	(0.0262)
(year==1998)*single parent			0.1217***
			(0.0323)
(year==2003)*single parent			0.1364***
			(0.0321)
(year==1998)*child headed			-0.2392*
			(0.1384)
(year==2003)*child headed			-0.5220***
			(0.1820)
(year==1998)*missing parents			-0.0612
			(0.0811)
(year==2003)*missing parents			-0.2480***
			(0.0776)

[3] For all tables: Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

(year==1998)*missing generation			-0.2082
			(0.2490)
(year==2003)*missing generation			0.1064
			(0.2151)
Constant	0.2634***	0.2554***	0.2828***
	(0.0438)	(0.0455)	(0.0466)
Observations	17982	17982	17982
R-squared	0.5079	0.5086	0.5104

Kenya

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	-0.0204	0.0883**	0.0330
	(0.0170)	(0.0370)	(0.0416)
Child headed	-0.0177	-0.0297	-0.1613
	(0.0868)	(0.0894)	(0.1160)
Missing parents	0.0123	0.0076	0.0723
	(0.0288)	(0.0290)	(0.0470)
missing generation	0.0014	-0.0006	0.1106
	(0.0463)	(0.0462)	(0.1000)
number of people in household	0.1145	0.1212	0.1095
	(0.1113)	(0.1107)	(0.1087)
age of the household head	0.0091***	0.0088***	0.0088***
	(0.0009)	(0.0009)	(0.0009)
sex of the household head	0.1036***	0.1641***	0.1650***
	(0.0168)	(0.0197)	(0.0195)
school years for household head	0.0857***	0.0861***	0.0861***
	(0.0046)	(0.0046)	(0.0046)
children 5-15 in household	-0.1324	-0.1367	-0.1249
	(0.1112)	(0.1106)	(0.1086)
proportion of 5-14 yr olds in school	-0.1214***	-0.1200***	-0.1168***
	(0.0314)	(0.0315)	(0.0315)
urban or rural?	-1.2410***	-1.2345***	-1.2354***
	(0.0594)	(0.0595)	(0.0594)
year==2003	-0.2238***	-0.2251***	-0.2474***
	(0.0354)	(0.0354)	(0.0377)
young single parent		-0.0298	-0.0361
		(0.0357)	(0.0360)
sex of single parent		-0.1799***	-0.1789***
		(0.0335)	(0.0339)
sex of young parent		-0.0078	-0.0092
		(0.0276)	(0.0274)
(year==2003)*single parents			0.1200***
			(0.0281)
(year==2003)*child headed			0.3158**
			(0.1558)
(year==2003)*missing parents			-0.1275**
			(0.0590)
(year==2003)*missing generation			-0.1315
			(0.1097)
Constant	0.1571**	0.1350**	0.1451**
	(0.0623)	(0.0624)	(0.0633)
Observations	16735	16735	16735
R-squared	0.5384	0.5398	0.5410

Malawi

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	0.0077	0.0612	0.1003**
	(0.0194)	(0.0406)	(0.0474)
Child headed	-0.0954	-0.1291*	0.0170
	(0.0734)	(0.0744)	(0.2377)
Missing parents	0.0350**	0.0374**	0.0603
	(0.0177)	(0.0178)	(0.0428)
missing generation	0.1131***	0.1102***	-0.0206
	(0.0419)	(0.0418)	(0.0888)
number of people in household	0.0000	0.0000	0.0000
	(0.0783)	(0.0778)	(0.0790)
age of the household head	0.0034***	0.0041***	0.0041***
	(0.0007)	(0.0009)	(0.0009)
sex of the household head	0.0802***	0.0927***	0.0936***
	(0.0232)	(0.0199)	(0.0199)
school years for household head	0.0908***	0.0907***	0.0906***
	(0.0065)	(0.0065)	(0.0065)
children 5-15 in household	0.0137	0.0136	0.0138
	(0.0783)	(0.0778)	(0.0790)
proportion of 5-14 yr olds in school	0.1166***	0.1136***	0.1163***
	(0.0293)	(0.0294)	(0.0296)
urban or rural?	-1.3281***	-1.3247***	-1.3262***
	(0.0933)	(0.0930)	(0.0930)
year==2000	0.0570*	0.0568*	0.0569*
	(0.0323)	(0.0321)	(0.0327)
year==2004	0.0889**	0.0892**	0.1077***
	(0.0364)	(0.0364)	(0.0361)
young single parent		0.0387	0.0419
		(0.0439)	(0.0437)
sex of single parent		-0.1528***	-0.1579***
		(0.0391)	(0.0386)
sex of young parent		0.0794***	0.0773**
		(0.0304)	(0.0302)
(year==2000)*single parents			0.0273
			(0.0358)
(year==2004)*single parents			-0.1119***
			(0.0361)
(year==2000)*child headed			-0.0844
			(0.2490)
(year==2004)*child headed			-0.2125
			(0.2660)
(year==2000)*missing parents			-0.0518
			(0.0515)
(year==2004)*missing parents			-0.0076
			(0.0499)
(year==2000)*missing generation			0.0681
			(0.1015)
(year==2004)*missing generation			0.1736
			(0.1097)
Constant	0.3949***	0.3592***	0.3500***
	(0.0766)	(0.0758)	(0.0762)
Observations	33032	33032	33032
R-squared	0.4330	0.4340	0.4349

Tanzania

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	-0.0189	-0.0131	-0.0245
	(0.0197)	(0.0348)	(0.0407)
Child headed	-0.0482	-0.0891	-0.1182
	(0.0887)	(0.0851)	(0.1490)
Missing parents	0.0125	0.0117	0.0555
	(0.0197)	(0.0197)	(0.0360)
missing generation	0.1449***	0.1457***	0.0313
	(0.0547)	(0.0547)	(0.0889)
number of people in household	-0.2750*	-0.2725*	-0.2742*
	(0.1413)	(0.1414)	(0.1413)
age of the household head	0.0010	0.0011*	0.0011*
	(0.0006)	(0.0007)	(0.0007)
sex of the household head	-0.0249	0.0151	0.0152
	(0.0175)	(0.0190)	(0.0190)
school years for household head	0.0434***	0.0434***	0.0435***
	(0.0046)	(0.0046)	(0.0046)
children 5-15 in household	0.2803**	0.2782**	0.2797**
	(0.1411)	(0.1412)	(0.1411)
proportion of 5-14 yr olds in school	0.3139***	0.3189***	0.3191***
	(0.0438)	(0.0438)	(0.0440)
urban or rural?	-1.2860***	-1.2806***	-1.2801***
	(0.0601)	(0.0603)	(0.0603)
year==1999	-0.2037***	-0.2034***	-0.1973***
	(0.0419)	(0.0419)	(0.0443)
year==2005	-0.0098	-0.0094	-0.0099
	(0.0397)	(0.0396)	(0.0413)
young single parent		0.0960***	0.0962***
		(0.0357)	(0.0358)
sex of single parent		-0.0975**	-0.0977**
		(0.0380)	(0.0383)
sex of young parent		-0.0477	-0.0484
		(0.0307)	(0.0308)
(year==1999)*single parents			0.0125
			(0.0456)
(year==2005)*single parents			0.0207
			(0.0450)
(year==1999)*child headed			0.0616
			(0.2156)
(year==2005)*child headed			0.0373
			(0.2107)
(year==1999)*missing parents			-0.0710
			(0.0500)
(year==2005)*missing parents			-0.0612
			(0.0460)
(year==1999)*missing generation			-0.0081
			(0.1564)
(year==2005)*missing generation			0.2057*
			(0.1150)
Constant	0.6442***	0.6264***	0.6246***
	(0.0776)	(0.0783)	(0.0781)
Observations	21174	21174	21174
R-squared	0.4682	0.4689	0.4691

Uganda

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	0.0001	0.0429*	0.0450*
	(0.0149)	(0.0231)	(0.0258)
Child headed	-0.1081**	-0.1231**	-0.1119
	(0.0541)	(0.0536)	(0.0723)
Missing parents	0.0343**	0.0337**	0.0086
	(0.0163)	(0.0163)	(0.0217)
missing generation	0.1184***	0.1176***	0.1527***
	(0.0379)	(0.0377)	(0.0558)
number of people in household	-0.0313	-0.0339	-0.0325
	(0.0223)	(0.0236)	(0.0233)
age of the household head	0.0026***	0.0028***	0.0028***
	(0.0003)	(0.0004)	(0.0004)
sex of the household head	0.0800***	0.1045***	0.1045***
	(0.0137)	(0.0168)	(0.0167)
school years for household head	0.0658***	0.0657***	0.0657***
	(0.0035)	(0.0035)	(0.0035)
children 5-15 in household	0.0390*	0.0421*	0.0408*
	(0.0224)	(0.0237)	(0.0234)
proportion of 5-14 yr olds in school	0.1642***	0.1623***	0.1615***
	(0.0265)	(0.0265)	(0.0265)
urban or rural?	-1.2222***	-1.2180***	-1.2183***
	(0.0503)	(0.0505)	(0.0505)
year==2000	-0.0804***	-0.0807***	-0.0830***
	(0.0232)	(0.0232)	(0.0231)
young single parent		0.0119	0.0123
		(0.0266)	(0.0267)
sex of single parent		-0.1081***	-0.1074***
		(0.0281)	(0.0280)
sex of young parent		0.0277	0.0274
		(0.0232)	(0.0232)
(year==2000)*single parents			-0.0050
			(0.0229)
(year==2000)*child headed			-0.0243
			(0.0985)
(year==2000)*missing parents			0.0461
			(0.0320)
(year==2000)*missing generation			-0.0639
			(0.0774)
Constant	0.3396***	0.3210***	0.3219***
	(0.0547)	(0.0565)	(0.0561)
Observations	15063	15063	15063
R-squared	0.5215	0.5222	0.5223

Zambia

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	0.0010	0.0286	0.0664
	(0.0217)	(0.0443)	(0.0475)
Child headed	0.1954**	0.2114**	0.2453**
	(0.0885)	(0.0888)	(0.1197)
Missing parents	-0.0162	-0.0169	-0.0039
	(0.0189)	(0.0189)	(0.0311)
missing generation	0.0915**	0.0908**	0.1315**
	(0.0428)	(0.0428)	(0.0661)
number of people in household	-0.0758	-0.0722	-0.0708
	(0.0794)	(0.0800)	(0.0798)
age of the household head	0.0034***	0.0030***	0.0030***
	(0.0006)	(0.0006)	(0.0006)
sex of the household head	0.0440**	0.0519**	0.0521**
	(0.0211)	(0.0233)	(0.0234)
school years for household head	0.0846***	0.0847***	0.0847***
	(0.0047)	(0.0047)	(0.0047)
children 5-15 in household	0.0891	0.0859	0.0845
	(0.0794)	(0.0800)	(0.0798)
proportion of 5-14 yr olds in school	0.5681***	0.5689***	0.5690***
	(0.0484)	(0.0484)	(0.0483)
urban or rural?	-1.2726***	-1.2728***	-1.2730***
	(0.0557)	(0.0558)	(0.0558)
year==2002	0.0030	0.0029	0.0179
	(0.0386)	(0.0385)	(0.0397)
young single parent		-0.0598	-0.0600
		(0.0406)	(0.0405)
sex of single parent		0.0101	0.0100
		(0.0443)	(0.0443)
sex of young parent		-0.0250	-0.0248
		(0.0309)	(0.0310)
(year==2002)*single parent			-0.0740*
			(0.0415)
(year==2002)*child headed			-0.0996
			(0.1899)
(year==2002)*missing parents			-0.0259
			(0.0388)
(year==2002)*missing generation			-0.0602
			(0.0866)
Constant	0.1063	0.1193	0.1117
	(0.0733)	(0.0742)	(0.0741)
Observations	14338	14338	14338
R-squared	0.6365	0.6366	0.6368

Zimbabwe

	(1)	(2)	(3)
	wealth Index Factor Score	wealth Index Factor Score	wealth Index Factor Score
single parent (widow or widower)	-0.0355**	0.0177	-0.0466
	(0.0150)	(0.0253)	(0.0310)
Child headed	0.0547	0.0499	0.0176
	(0.0518)	(0.0520)	(0.0589)
Missing parents	0.0171	0.0144	0.0689**
	(0.0194)	(0.0196)	(0.0279)
missing generation	-0.0215	-0.0200	0.0060
	(0.0413)	(0.0412)	(0.0612)
number of people in household	-0.0492	-0.0557	-0.0849
	(0.1303)	(0.1327)	(0.1322)
age of the household head	0.0053***	0.0054***	0.0054***
	(0.0006)	(0.0007)	(0.0007)
sex of the household head	0.0353**	0.0556***	0.0549***
	(0.0170)	(0.0191)	(0.0193)
school years for household head	0.0602***	0.0606***	0.0604***
	(0.0031)	(0.0031)	(0.0031)
children 5-15 in household	0.0360	0.0433	0.0720
	(0.1303)	(0.1328)	(0.1323)
proportion of 5-14 yr olds in school	0.0164	0.0200	0.0225
	(0.0307)	(0.0306)	(0.0310)
urban or rural?	-1.5856***	-1.5837***	-1.5832***
	(0.0428)	(0.0426)	(0.0428)
year==1999	-0.0633***	-0.0625***	-0.0851***
	(0.0169)	(0.0168)	(0.0203)
young single parent		-0.0112	-0.0107
		(0.0209)	(0.0210)
sex of single parent		-0.1022***	-0.1035***
		(0.0256)	(0.0258)
sex of young parent		0.0192	0.0212
		(0.0254)	(0.0253)
(year==1999)*single parent			0.1178***
			(0.0271)
(year==1999)*child headed			0.0526
			(0.0864)
(year==1999)*missing parents			-0.0862**
			(0.0363)
(year==1999)*missing generation			-0.0247
			(0.0730)
Constant	0.6046***	0.5839***	0.6005***
	(0.0593)	(0.0618)	(0.0633)
Observations	12163	12163	12163
R-squared	0.7365	0.7369	0.7377