

Orphanhood and the Living Arrangements of Children in Sub-Saharan Africa

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Abstract

Increasing adult mortality due to HIV/AIDS in Sub-Saharan Africa raises considerable concerns about the welfare of surviving children. Studies have found substantial variability across countries in the negative impacts of orphanhood on child health and education. One hypothesis for this variability is the resilience of the extended family network in some countries to care for orphans—networks under increasing pressure by the sheer number of orphans in many settings. Using household survey data from 21 countries in Africa, this study examines trends in orphanhood and living arrangements, and the links between the two. The findings confirm that orphanhood is increasing, although

not all countries are experiencing rapid rises. In many countries, there has been a shift toward grandparents taking on increased childcare responsibility—especially where orphan rates are growing rapidly. This suggests some merit to the claim that the extended network is narrowing, focusing on grandparents who are older and may be less able to financially support orphans than working-age adults. However there are also changes in childcare patterns in countries with stable orphan rates or low HIV prevalence. This suggests future work on living arrangements should not exclude low HIV/AIDS prevalence countries, and explanations for changes should include a broader set of factors.

This paper—a product of the Poverty Team and Human Development and Public Services Team, Development Research Group—is part of a larger effort in the department to study the well-being of children. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at beegle@worldbank.org.

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I. Introduction

By the most recent estimates, more than 12 million children under 18 in Sub-Saharan Africa are currently orphaned by AIDS (UNAIDS 2008). This overwhelming figure, resulting from a steady increase over the past 10 years, has led to substantial concern for the welfare of orphans and vulnerable children. While there are obvious psychological and social impacts of losing one or both parents at a young age, much policy attention has been paid to the consequences in terms of investments in the health and education of orphans—on the grounds that low levels of investments will lead to increasing household poverty, and contribute to slower overall economic growth and development.¹

Despite these concerns, the empirical evidence of these impacts is mixed (see discussion in Beegle and De Weerd 2008). Analysis of the association between school participation and orphan status suggests substantial heterogeneity across countries—including countries in Sub-Saharan Africa (Ainsworth and Filmer 2006). At the same time, longitudinal case-studies reveal worse health and education outcomes for orphans, mainly maternal orphans, in Tanzania (Ainsworth and Semali 2000; Beegle, De Weerd and Dercon 2007), South Africa (Case and Ardington 2006; Ardington 2008) and Kenya (Evans and Miguel 2007). While there are several potential explanations for this variability in the estimate of impact—including, for example, the national HIV prevalence rate or the characteristics of the health and education systems—one possible mechanism lies in different, and changing, patterns of living arrangements for orphans. While the vast majority of children live with one or both parents, single orphans are less likely to reside with a parent than non-orphans, and double orphans by definition can not reside with a parent.

Living with a caregiver who is not a parent may lead to worse outcomes for several reasons. First, altruism may be dictated by the extent of biological connectedness such that more closely related caregivers provide higher quality care to children than more distantly or non-related caregivers (Hamilton 1964). Case, Paxson, and Abelidinger (2004) analyze this in their study of educational achievement of orphans and non-orphaned children in Africa. They find that

¹ For an example of direct measurement of the psychological distress associated with HIV/AIDS orphanhood, see the evidence from northern Uganda and a review of other studies in Atwine, Cantor-Graae, and Bajunirwe (2005).

orphans in households headed by more distant relatives had lower educational outcomes relative to children of the household head. Second, classic economic models emphasize the role of potential old-age support as a rationale for investments in child human capital (Becker 1991). If a biological relationship increases the likelihood of old-age support from children to parents, then one would expect to find higher levels of investments from parents to their biological children. Third, if grandparents become the caregivers of orphans, they will be older than parents or aunts/uncles and may be less able to raise income to support their dependent grandchildren. And last, households that foster children may have more children overall, exacerbating the demands on limited resources.²

There are, however, counter-balancing forces that might mitigate negative impacts of not living with either parent. Child fostering of non-orphans has been a common practice in many African countries suggesting that, at least in some settings, it is viewed as a beneficial practice, as found in Côte d'Ivoire by Ainsworth (1996) and in Burkina Faso by Akresh (2004). Serra (2009) develops a theoretical framework in which sending and receiving families weigh the costs and benefits associated with child work and schooling and shows conditions under which all actors—including children—benefit from the practice of fostering. Of course, parental support does not exist solely when children co-reside with the parent. Hill, Hosegood and Newell (2008) show that children living in households headed by grandparents or siblings in South Africa are often financially supported by their non-resident mother or father who are enabled to work after shifting day-to-day caregiving responsibilities to these family members. Single orphans who are cared for by foster families may benefit from remittances sent by the surviving parent. In the context of HIV/AIDS, fostering households may not have incurred the direct and indirect costs of AIDS and might therefore be more able to devote resources to a fostered orphan. Urassa et al. (1997) in Tanzania, and Zimmerman (2003) in South Africa, similarly note that fostering is not clearly associated with worse outcomes for children, since motives for fostering can include improving the living standards of children. If fostering is opportunistic—and fostering families are wealthier as predicted by the model in Serra (2009)—then foster families may provide access

² The number of children may not be higher if there is a decline in fertility in response to fostering demands.

to better services or education opportunities, even if they invest less in fostered children relative to biological children.³

There are a handful of studies which examine the living arrangements of children, and a subset of studies explore how these arrangements have evolved over time in Sub-Saharan Africa. Although it is clear that HIV-related adult mortality has fundamentally altered basic demographic patterns with respect to the mortality rates and life expectancy in some countries, it is less clear how these changes translate into impact on caregiving patterns. Moreover, patterns may change even in low prevalence countries. The existing evidence suggests considerable resilience among extended families in absorbing orphaned children. Significant increases in the number of child-headed households or children living outside of the household environment (e.g. street children) have not been observed (Heuveline 2004; Monasch and Boerma 2004). The most commonly cited consequences of rising adult mortality on childhood living arrangements is an increasing propensity for children to not reside with any parent, but with other relatives.⁴ Bicego, Rutstein and Johnston (2003) document an increase in orphan caregiving by grandparents in Niger, Tanzania and Zimbabwe from the early/mid-1990s to the late 1990s, but a decrease in Ghana and Kenya over the same period. Monasch and Boerma (2004) observe a shift in caregiving from other relatives (this excludes siblings and is presumably mostly aunts and uncles) to grandparents in Tanzania, Namibia and Zimbabwe, but an opposite trend in Kenya and Uganda. Ardington (2008) documents how extended families remained a source of support to orphans in South Africa between 1993 and 2005—a time of rapid increase in the number of orphans—and shows that grandparents played an increasing role as caregivers over this period. Zimmer and Dayton (2005) explore the patterns of older adults residing with children and grandchildren across several countries in Africa.

The increasing number of orphans raises the question of whether extended family networks are capable of caring for increased orphan burdens (as questioned by Foster, 2000, and Nyambedha, Wandibba and Aagaard-Hansen, 2003, and investigated—and contested in the case

³ Orphanhood patterns can also have implications or spill-over effects for living arrangements of non-orphans. Evans (2005) studies the extent to which other household members are impacted by orphans with whom they reside. He uses 42 DHS data sets from Sub-Saharan Africa and finds little evidence that this negative impact exists.

⁴ Another pathway by which being orphaned impacts living arrangements is through earlier marriage (and, therefore, residing outside the extended family network). Beegle and Krutikova (2007) find evidence that orphanhood increases the propensity of girls to enter into early marriage in Tanzania. Since the focus here is on orphans under 15, very few have married.

of South Africa—by Ardington 2008). Indeed, the 2008 UNICEF “State of the World’s Children” cautions that

Children can no longer rely on the support of the traditional extended family system, which provided care and support for the aged, orphans and any vulnerable and disadvantaged family member. This coping mechanism has been overstretched by poverty and by the sheer numbers of children to be cared for, given the fact that AIDS affects the most productive family members in the prime of their productive and reproductive lives. As a result, children have sometimes gone into homes that are already overstretched and where they are really not welcome (Essay by Elizabeth N. Mataka, United Nations Special Envoy of the Secretary-General for HIV/AIDS in Africa in UNICEF 2007, p42).

At the same time, little is known about the systematic shifts that are taking place in caregiving patterns and particularly, to whom the burden of care is falling over time—and it is this gap that this paper seeks to address. Using Demographic and Health Survey (DHS) data from 21 Sub-Saharan Africa countries, this study systematically documents differences in the distribution of living arrangements across countries and time. The extent to which orphan rates are associated with these trends is investigated, as is whether there is a tendency for orphaned children in countries with high and increasing orphan rates to live with more distant relatives—evidence that would support the claim that rising orphan rates are placing pressure on the extended family. The broad patterns in living arrangements for orphans and non-orphans and changes in caregiving patterns are explored; however, an investigation of the consequences of those changes is not the focus and is left to future work.

The remainder of the paper is structured as follows. Section II describes the data and the methods used to define orphans and household structure; Section III discusses trends in orphan rates—and develops a country typology of these trends; Section IV then discusses the changes in household living arrangements associated with those trends. Finally a concluding section summarizes and discusses the implications of these findings.

II. Data and methodology

This study draws on data from the DHS conducted in Sub-Saharan African countries with at least two rounds of data.^{5,6} The sample consists of 21 countries observed at two points in time, resulting in a total of 42 country-year datasets. This set of countries encompasses 52 percent of the population of Sub-Saharan Africa (World Bank 2007).

The earliest data are from 1991 in Cameroon while the most recent data used are from 2006 in Niger and Uganda. All surveys were conducted using a standardized questionnaire and aim to be nationally representative of the non-institutionalized civilian population.⁷ The countries range from low-HIV prevalence countries—nine out of 21 countries have HIV prevalence below 3 percent—to countries with very high prevalence levels—Malawi (14 percent), Namibia (20 percent), Zambia (17 percent) and Zimbabwe (20 percent).⁸ The sample sizes range from just above 10,000 children under 15 in Cote d'Ivoire in 1994 to almost 33,000 in Mali 2001—the median across all surveys is about 18,000 children under 15. It is important to note that for each country, the earliest and latest survey years available are used and that the number of years between the two surveys varies across countries—from a minimum of five years in three of the countries (Benin, Ethiopia and Rwanda) to 14 years in Niger. The median gap between the earliest and latest years is 10 years. Survey years and sample sizes, as well as HIV prevalence estimates, are reported in the Annex Table. For some countries, more than two surveys are available, although these interim rounds are not used.

An orphan is defined as a child under the age of 15 for whom one or both parents are reported to be deceased. The age-threshold is based on the structure of the DHS questionnaire in most of the countries. Single orphans are those who have only one surviving parent. A maternal

⁵ See UNICEF (2006) for a discussion of the validity of household survey sample frames for capturing a “true picture of all orphaned and vulnerable children living in a community.” The report concludes that national-level indicators on children orphaned and made vulnerable by HIV and AIDS can be obtained through household-only surveys—data do not need to be collected from children living in institutions or outside of households (e.g. as street children).

⁶ Several countries, including the Republic of Congo, Gabon, South Africa, and the CAR, were excluded because only a single survey was available at the time of data analysis. Several datasets, including Burkina Faso 1998/99, Cote d'Ivoire 1998/99 and Senegal 1997 had to be excluded due to missing information on parental survival status.

⁷ In all the analyses undertaken, survey sampling weights as provided in the DHS data are used in order to maintain this representation.

⁸ The HIV prevalence estimates cited are drawn from the UNAIDS (2006). These estimates are based on country surveillance systems and, where available, population-based surveys with HIV testing. Comparisons between surveillance system and population-based estimates suggest that the former tend to overstate prevalence.

orphan is defined as a child whose mother is reported deceased but whose father is reported to be alive, and a paternal orphan is a child whose father is reported deceased but whose mother is reported to be alive. Double orphans are those with both parents reported deceased.⁹ The small percentage of children for whom the survival status of one or both parents is missing is excluded from the analysis (see Annex Table). In 12 out of 42 country and year data sets, more than 2 percent (but less than 4 percent) report unknown status of either parent or other parents.

Living arrangements are categorized based on two main variables collected about a child. First is whether or not a child's mother and/or father are residents of the same household as the child. Second is the child's relationship to the head of the household.¹⁰ Where a parent co-resides with a child, but that parent is not the head of the household, the co-residence status is given precedence in categorization of living arrangement of the child. Relationship to household head is an imperfect measure of the true quantity of interest, namely the relationship between caregiver and child, which is expected to be more closely associated with child development. Due to data limitations, however, the primary caregiver of children can not be directly identified. Based on parent co-residence and the relationship to head of the household, the set of mutually exclusive categories for child living arrangements are: living with mother only, living with father only, living with both parents, household head is grandparent, household head is an "other relative", and "unrelated to household head". In the more recent DHS questionnaires (e.g. Zimbabwe 2005 and Cote d'Ivoire 2005), a separate category for niece/nephew (by blood or by marriage) was added as a specified relationship to the household head. Based on data from those countries, fully two-thirds of "other relatives" are aunts and uncles of the children. This is consistent with evidence from other surveys.¹¹

Since the data do not include information on both "receiving" and "sending" households for children who are fostered, only characteristics of the current residence of children ("receiving" households) are available to understand the process of child fostering—for orphans

⁹ These survey data provide so-called "direct" estimates of the number of orphans in these countries, whereas an alternative would be to use estimates from mathematical models produced by UNAIDS and others. There are in some cases large gaps between these sets of statistics. Robertson et al. (2008) discuss the underlying factors that might explain this gap, one of which is an underestimate of maternal orphans due to foster mothers reporting themselves as biological mothers.

¹⁰ There are extremely few children under 15 who were themselves reported to be head of their household, or spouse of the household head. They are not included in this analysis of living arrangements.

¹¹ Evidence from elsewhere suggest that aunts and uncles may be an even larger share of this group. In the 2004/05 Integrated Household Survey from Malawi, 75% of "other relative" caregivers for children under 15 were aunts or uncles. Others note that the traditional safety net for orphans in Africa has been aunts and uncles (Foster 2000).

as well as non-orphans. Therefore, the scope of the household characteristics examined is limited. Specifically, measures of household assets or the education of the head are not used to understand the placement of children because data for the extended family of the child (the set of opportunities for residency) or the household or origin of fostered children are not available.

Because patterns across countries and time are compared, there is concern that differences in the age-distribution might distort comparisons. Changes in the age-distribution could occur over time within a country as well as between countries, differences due to differences in fertility and infant/child mortality patterns.¹² Since orphanhood is more prevalent among older children, one might mistakenly infer an increase in orphanhood to a situation where the average age of children in one population is older than in another. Figure 1 illustrates the case of Namibia. The left panel shows how the age-distribution of children below 15 years in 2000 was skewed to older ages as compared to 1992. The right panel of Figure 1 shows how the prevalence of orphanhood increased with age in both years—with a higher overall prevalence, especially at older ages—in 2000. Simply comparing the prevalence rates among children under 15 years could be misleading since it confounds both changes. In order to overcome this potential problem, the rates presented are standardized by age and gender. For example, for prevalence rates, the probability of a given orphan status is estimated as a function of age, age squared and a dummy variable for gender in each country-dataset. Then, orphan status is predicted setting age and gender variables to correspond to those of a 7-year-old male. Neither 7 years of age nor male were chosen for any specific reason; these parameters do not affect the main results. In Namibia the unadjusted orphanhood prevalence increased from 7.0 to 10.9 percent between 1992 and 2000, or a 56 percent increase; the adjusted increase is from 7.9 to 11.6, or a 47 percent increase. Similarly, for living arrangements, in estimating the probability of a particular arrangement (for example, living with surviving parent) for a given orphan status, age and gender are included as controls. The probability of that arrangement is predicted setting the age and gender variables to correspond to those of a 7-year old male. As a result, the data reported should not be interpreted as simple means from the survey data, but rather age and gender adjusted means. In general, the estimates throughout the study are not very different with

¹² Sample weights will not address this concern since they adjust the sample to make it representative of the true population at the time of the survey; the concern then is that the true age-distribution may have changed.

this adjustment but differences are larger for longer time periods and in comparing different countries.¹³

III. Trends in the rates of orphanhood

This section provides a brief discussion of the trends in orphan rates across time and countries. This updates and extends the statistics reported in Bicego, Rutstein and Johnson (2003) and in Monasch and Boerma (2004), and adjusts for changes in age and gender composition (by standardizing to a 7-year-old male child, as described above). From the results, a typology of countries is proposed based on initial levels and changes in orphan rates. This allows us to subsequently investigate how changes in living arrangements might differ across countries depending on these conditions.

Overall orphan rates and the prevalence of HIV

Table 1 presents the percentage of children ages 0-14 who were single or double orphans in the earliest and latest years for which data are available. Orphan rates from the most recent round of survey data range from a low of about 5 percent of all children under age 15 in Mali having lost one or both parents to as many as 20 percent in Zimbabwe. In nine of the 21 countries, 10 percent or more children are single or double orphans. To be sure, these national averages mask within-country variation. For example, while the overall orphan rate in Kenya is 12 percent, in the rural Kenyan community studied by Nyambedha, Wandibba and Aagaard-Hansen (2003), one out of three children (below 18 years) is a single or double orphan.

As reflected in levels and changes in orphan rates, there are four main types of countries.¹⁴ In the first group of countries (Group A in Table 1), the orphan rate was relatively low in the earliest period (defined here as less than 10 percent) and did not change much between

¹³ For example, the largest discrepancy in the change in the orphan rate between the raw and adjusted methods is in Kenya. The raw rate increased from 6.9 to 11 percent between the earliest and latest rounds (4.1 percentage points), while the adjusted rates increased from 7.4 to 12.3 percent (4.9 percentage points); for a difference of 0.8 percentage points. Excluding Rwanda (which, as discussed in the paper is a special case due to ethnic conflict in that country) the largest gap across countries in the change in the raw orphan rate is between Madagascar where there was a 2.4 percentage point decline in the orphan rate and Zimbabwe where there was a 12.5 percentage point increase; after adjusting, these countries still lie at the extremes but the rates are a decline of 2.9 percentage points and an increase of 13.1 percentage points respectively.

¹⁴ Due to the big differences in patterns across these four groups of counties averages across all countries in this study are not presented.

the earliest and latest years. Many of these countries experienced *decreasing* orphan rates—for example Benin, Burkina Faso, Chad, Ghana, Guinea, Mali, Niger—although these declines are small (not greater than 1 percentage point). Eleven of the 21 countries are classified into this category. The country average orphan rate was 7.1 percent in the earliest year and 7.2 percent in the latest year, showing virtually no change.

In the second group (Group B), there are countries in which the orphan rate was relatively high in the earliest year, and in which there was a relatively small change in that rate between the earliest and latest years. In all of these countries—Ethiopia, Madagascar, Mozambique and Uganda—there was, in fact, a decline in the percent of orphaned children. For these four countries, the orphan rate averaged 11.9 in the earliest year and 10.4 in the latest year, for an average decline of 1.6 percentage points.

In a third group of counties (Group C) a relatively low orphan rate in the earliest year was followed by a large increase between the earliest and latest years. Kenya, Malawi, Namibia, Zambia and Zimbabwe all match this profile: with increases in the orphan rate ranging from 3.7 to 13.1 percentage points. The 7.8 and 13.1 percentage point increases in Zambia and Zimbabwe were especially stark; amounting to increases of 95 and 150 percent respectively over the 9 years in each case. In these five countries out of the 21 countries, the average orphan rate across countries in the earliest year was 8.2 percent and 15.2 in the latest year, for an average increase of 6.9 percentage points.

Finally, Rwanda is treated as a special case; the orphan rate in that country declined by 9 percentage points (from 28 percent to 19 percent) between 2000 and 2005. The very high levels of orphanhood are undoubtedly related to the Rwandan genocide of 1994. The large decrease in the orphan rate can likely be attributed to the transition of the genocide cohort out of childhood and the birth of a new cohort of children subsequent to the genocide. Orphan prevalence in Rwanda is expected to continue to decrease as the youngest and remaining children in the genocide cohort transition into adulthood. While Rwanda is in the tables and figures, specific attention to it is not noted in the discussion although it does stand out in several of these.

This paper is motivated primarily on the basis that the HIV/AIDS epidemic is the underlying cause of high and increasing orphan rates. However, it is hard to estimate the share of orphans whose parents have died of HIV/AIDS; vital registration systems are weak in these settings, and information on the specific cause of death of parents is not collected in the DHS or

other comparable household surveys. The last column of Table 1 reports the HIV prevalence rate in each country, estimated for 2005 in UNAIDS (2006) which can be compared to levels and changes in orphan rates.¹⁵ HIV prevalence rates closely follow the typology, but not always. Rates are low in the countries with a low and unchanging orphan rate (Group A), somewhat higher in those with a high and unchanging orphan rate (Group B), and highest in the countries where the orphan rate has surged (Group C). In this latter group, the prevalence of HIV ranges from 6.0 percent in Kenya to 20.1 percent in Zimbabwe—with an average of 15.4 percent across the five countries. This congruence between changes in orphan rates and HIV prevalence among adults signals that the changes in orphan rates are indeed strongly related to HIV/AIDS in these countries. There are exceptions to the overall patterns: Rwanda, as discussed above, but also Mozambique where the orphan rate has remained relatively stable despite a very high estimated HIV rate for 2005 (16 percent); or Senegal where 8 percent of all children are single or double orphans despite having the lowest HIV prevalence among these 21 countries.

There are several reasons why HIV prevalence (measured in 2005) might not map closely to orphanhood levels and trends in every country. These include the lag between HIV prevalence and AIDS, as well as fertility patterns. More recently, introduction of ARV treatment will be expected to lower this correlation. Côte d'Ivoire, Kenya, and Tanzania, all with national HIV prevalence estimates between 6 and 7 percent, provide an illustration of the contrast. In Kenya, the orphan rate increased by 5 percentage points, whereas in Tanzania it increased by just below 2 percentage points, and in Côte d'Ivoire by less than 1 percentage point.¹⁶ Clearly HIV prevalence and trends in orphan rates are strongly related—but other factors still contribute in determining the level and change in the share of children who are orphans.

Orphan rates disaggregated by maternal, paternal, and double orphans

The top left panel of Figure 2 illustrates changes in orphan rates by plotting the percentage of children who are orphans in the latest survey against the percent in the earliest

¹⁵ While it would be desirable to have prevalence rates corresponding to the same years as the surveys in this study, these are typically not available. Rates based on sentinel surveys, which are the only types of surveys available for the earliest years, have proven to produce misleading estimates. The data are restricted to the more robust estimates for 2005 which are primarily—but not exclusively—based on representative sample surveys. This means that this HIV indicator is a very crude proxy for recent adult mortality patterns, and its strength as such depends on stable incidence rate (the flow of persons with respect to contracting HIV).

¹⁶ As mentioned above, the relationship between change in HIV prevalence and change in orphan rates cannot be explored because of a lack of comparable estimates of national HIV prevalence for the early 1990s.

survey. Points above (below) the 45 degree line indicate increases (decreases) in orphan rates. Solid points indicate statistical significance at the 5 percent level in the change in the orphan rate; while hollow points (usually close to the 45 degree line) indicate that the difference is not statistically significantly different from zero.¹⁷ As expected, the five countries where rates increased between the earliest and latest surveys (Group C in Table 1) stand out as large deviations from the 45 degree line.

The remaining panels of Figure 2, as well as Table 2, report the changes in paternal, maternal and double orphan rates. Paternal orphan rates are the highest of the three in all countries, a finding consistent with other studies (see, for example, Ainsworth and Filmer, 2006). In general, the paternal orphan rates are about double the maternal rates. This is typically attributed to a combination of higher mortality rates among men and the age gap between partners. Importantly, in the group of countries that experienced large increases in orphan rates (Group C), the change was generally driven by an increase in the percentage of paternal orphans. In these countries the increase in the maternal orphan rate averaged 0.6 percentage points, while the increase in the paternal orphan rate averaged 3.9 percentage points.

Double orphans are a very small fraction of orphans overall (on the order of 10 percent—last column of Table 2). However, in the countries with large increases in the orphan rate the share of children who are double orphans is notably higher, around 17 percent. Of particular concern is that this fraction increased at a substantially faster pace in these countries: in the countries where the orphan rate did not change much the fraction of double orphans increased by only about 2 percentage points. In the countries where the orphan rate increased rapidly the fraction of double orphans increased by almost 11 percentage points on average—reaching over 20 percent in Malawi and Zimbabwe. It is not necessarily self-evident that increasing orphan rates in general will translate into higher double-orphan rates among all orphans, although this would be expected if HIV/AIDS is the main driver of mortality. The trend in double orphanhood in this group of countries suggests a specific dimension in need of more emphasis when studying orphanhood in the region, as opposed to not differentiating between single and double orphans.

¹⁷ Statistical differences are based on simple t-tests of country-level means.

IV. Living arrangements

Levels and changes in the living arrangement of non-orphans

Before addressing the living arrangements of orphans, the living arrangements of non-orphans are discussed. To some extent, this serves as a benchmark for “customary” living arrangements in a country and how these might be changing over time—including ways that relate to changes in the orphan rate.¹⁸ Table 3 shows the percentage of non-orphans who reside with one or both of their parents. The remaining children live with grandparents, other relatives, or non-relatives. The vast majority—on the order of 85 to 90 percent—of non-orphans live with one or both parents.¹⁹ The majority—on the order of 60 to 70 percent—of these children live with both their parents. There is considerably more heterogeneity across countries in the percentage of non-orphans who live with their mother only, or their father only—although in most countries about 10 to 20 percent live with only their mother and around 5 percent live with their father only.

For non-orphans in countries where the orphan rate rose substantially (Group C), two distinct features of living arrangement trends are noted. Non-orphans in these countries are more likely to live with their mother only, and less likely to live with either parent, than non-orphans in other countries. Part of this arises because of the anomaly of Namibia where almost 30 percent of non-orphans live with their mother only and only 65 percent of non-orphans live with either one or both their parents. Nevertheless, when Namibia is excluded from the average for Group C countries, non-orphans still tend to have a higher likelihood of living either with their mother only, or away from both their parents, than in other countries.

Figure 3 shows these changes graphically in the first row of figures. The lower row shows the changes in the three remaining categories of living arrangements: living with grandparents, other relatives, and non-relatives. In general, the living arrangements of non-orphans have remained fairly stable: changes are typically limited to no more than 5 percentage

¹⁸ Nyambedha, Wandibba and Aagaard-Hansen (2003) note that customary living arrangements for orphans may define some caregivers for orphans as “...culturally inappropriate...”, such as matrilineal kin and strangers in the case of their study in western Kenya. Whether children are cared for by matrilineal or patrilineal kin cannot be studied here, since the status of non-parent caregivers is not collected in detail.

¹⁹ There is little evidence to support Monasch and Boerma (2004) who emphasize that fostering is higher in southern Africa than eastern Africa. They specifically note Botswana, Namibia, and South Africa for southern Africa and Burundi for eastern Africa, for which there are no DHS data. In the set of countries in this study, Mozambique, Malawi and Madagascar do not have higher rates compared to Tanzania and Uganda.

point differences between the earliest and latest years. Some countries, however, stand out. In several countries—particularly those in West Africa that had low and unchanging orphan rates (Group A)—there was a substantial decline in non-orphans living with both parents and a corresponding increase in living with only their mother (Cameroon, Niger, Senegal). These large changes, in countries where HIV rates are low and the orphan rate has remained stable, are reminders that despite the large role that HIV/AIDS plays in children’s living arrangements, there are potentially important changes that are likely unassociated with HIV/AIDS.

As noted above, Namibia stands out among the other groups of countries. In that country, there was an especially large decline in living with both parents (-9 percentage points) accompanied by a large increase in living with mother only (6 percentage points), as well as an increase in living with grandparents.

Levels and changes in the living arrangements of orphans

Table 4 reports the levels and changes in the percentage of single orphans living with their surviving parent or a grandparent. The omitted category is other relatives (aunts/uncles) and non-relatives. Among single orphans, it is natural to expect that the remaining parent would be responsible for the burden of child care. Indeed, the results show that surviving parents play a substantially more prominent role in the care for paternal orphans than do other members of the extended-family network. However, maternal orphans are much less likely to reside with their father than paternal orphans with their mothers. This is especially true in countries with rapidly increasing orphan rates (Group C). In the countries with stable orphan rates (Groups A and B) 70 percent of paternal orphans were living with their mother, compared to 50 to 60 percent of maternal orphans living with their father. In countries with rapidly growing orphan rates, again 70 percent of paternal orphans were residing with their mother, however less than 40 percent of maternal orphans were residing with their father. Mozambique stands out as an exception to this general pattern; even though the orphan rate was stable in that country, paternal orphans are twice as likely to live with their mothers as maternal orphans with their fathers.

After parents, grandparents are the most important caregivers for single orphans, especially in the countries that have experienced large increases in the orphan rate (Group C). In these countries 25 percent of paternal orphans live with a grandparent (a share that exceeds 30 percent in Namibia and Zimbabwe), and 41 percent of maternal orphans live with a grandparent

(the share exceeds 40 percent in Malawi and Zimbabwe, and is over 60 percent in Namibia). In some of these countries—Malawi, Namibia, and Zimbabwe—grandparents play a more important role than surviving fathers. For example, grandparents in Namibia take care of 62 percent of maternal orphans in contrast to fathers who only assume care for 16 percent of maternal orphans. The role of grandparents is more limited in the countries with stable orphan rates: about 15 percent of paternal orphans, and around 20 percent of maternal orphans, live with a grandparent.

As noted, in Group C countries, grandparents are substantially more likely to be caregivers than are other relatives or non-relatives. Across these countries, paternal orphans who are fostered are almost three times more likely to live with a grandparent than with someone else (75 percent versus 25 percent)—maternal orphans who are fostered are two times more likely to live with a grandparent than with someone else (40 versus 20 percent). In countries with stable orphan rates (Groups A and B) fostered children are roughly evenly split between grandparents and other relatives. In general, very few of these children live in a household whose head is not a relative.²⁰

Turning to the issue of trends in the living arrangements of single orphans, Figure 4 shows that the role of grandparents is becoming more pronounced with time. For paternal orphans, this is especially true in the countries where the orphan rate increased rapidly (Group C). The cross-country average was a 7 percentage point increase in the proportion of paternal orphans living with a grandparent. For maternal orphans this shift is occurring in most countries—but is especially acute in countries where orphan rates are increasing rapidly (Group C). On average, these countries had an 11 percentage point increase in the share of maternal orphans living with a grandparent. As shown in Figure 4, there has been little change in the share living with other relatives or non-relatives. Exceptions include Côte d’Ivoire and Niger where a noticeable reduction in living with other relatives was accompanied by an increase in the probability of paternal orphans living with their mother. In Namibia, Zambia and Zimbabwe, all countries with rapidly growing orphan rates, there was a decrease in the probability of living with an “other relative” accompanied by an increase in the probability of living with a grandparent.

²⁰ As noted in the previous section, when no parent lives in the household, the household head is assigned the status of caregiver for the child. It is possible that the household head is a non-relative but some other relative does live in the household and care for the child. This information is not included in the content of the questionnaire.

Lastly, the living arrangements of double orphans are discussed. The level and change in the probability of living with a grandparent are reported in the last two columns of Table 4, and the changes in the probabilities of living with a grandparent, another relative or a non-relative are illustrated in Figure 5. Grandparents assume the bulk of the burden of care for double orphans in the countries with rapidly growing orphan rates (Group C). In these countries the average rate of double orphans living with their grandparent is 66 percent—a share that reaches as high as 81 percent in Zimbabwe. In the other countries grandparents account for around 40 to 50 percent of the care of double orphans—although the share varies substantially (from 17 percent in Benin to 66 percent in Mali). At the same time, however, there appears to be a systematic shift in almost all countries away from double orphans living with other relatives and towards living with grandparents. The percent living with a grandparent rose by an average of between 11 and 16 percentage points in the countries with relatively stable orphan rates (Groups A and B), and by 12 percentage points in the countries with rapidly growing orphan rates (Group C). In almost all these countries this increase of the role of grandparents is accompanied by a decrease in the role of other relatives (as opposed to non-relatives who constitute a very small share of care-givers).

HIV rates and living arrangements

So far, the discussion on patterns in living arrangements has not made reference to the role of HIV. As mentioned in the discussion of Table 1, HIV prevalence varies somewhat consistently with the country typology identified based on the levels and changes in orphan rates. But there are noted exceptions to this pattern, and so the relationship between HIV prevalence and living arrangements is explored more directly. In particular, in countries where the prevalence rate is high, one might expect that orphaned children are less likely to live with their surviving parent because that parent may be sick or financially unable to care for their children due to the costs associated with the death of the other parent.

Figure 6a focuses on changes in the probability that single orphans reside with their surviving parent. There does indeed appear to be a negative relationship between HIV prevalence and the probability of a paternal orphan living with their mother. It is in the countries with the highest prevalence (Malawi, Mozambique, Namibia and Zimbabwe) that the likelihood of living with a surviving parent falls appreciably. But this association does not hold for all countries: Zambia with a prevalence rate of 17 percent saw no change in the probability of a paternal

orphan living with their mother; and Kenya and Tanzania with mid-range prevalence rates saw reductions on the order of 4 or 5 percentage points. There also appears to be a weakly negative association between HIV prevalence and changes in the likelihood that maternal orphans live with their father. Here, however, the exceptions are more dramatic: in the three countries with the highest prevalence (Namibia, Zambia, Zimbabwe) there was virtually no change in the probability that maternal orphans live with their father. Consistent with the discussion above, there are many countries in which there is a fall in the share of maternal orphans living with their father, some of which have fairly low prevalence levels.

In Figure 6b the relationship between HIV prevalence and changes in probability of living with grandparents is presented. The associations are starkest for single orphans (top two panels), precisely where one would expect that grandparents are assuming greater caregiving roles because of sick surviving parents. Among paternal orphans it is clearly the countries with high HIV prevalence where the role of grandparents increased substantially. Among maternal orphans these hard-hit countries also exhibit large increases in the role of grandparents—but there are large increases in countries with lower prevalence levels as well (such as Cameroon, Ghana and Guinea for example) and small increases in at least one high prevalence country (Zimbabwe). Recall that in many countries there was only a small change in the role of parents; increased caregiving by grandparents is observed even when parental caregiving has not shifted—reflecting a shift in caregiving from other relatives to grandparents. This is especially pronounced for Zambia among paternal orphans, and for Namibia and Zambia among maternal orphans. As discuss above, there is a common trend towards caregiving by grandparents even among double orphans (which does not seem to be systematically related to HIV prevalence) and among non-orphans (which appears to be weakly correlated with HIV prevalence).

Household characteristics: Caregiver age

Two characteristics of the households in which children live are further examined: caregiver age and the number of children. Table 5 reports the mean age of caregivers by a child's orphan status, overall and by caregiver category (that is, living with a parent, grandparent, other relative, or non-relative) for the most recent round of survey data. For non-orphans the average ages of the mothers and fathers with whom they live is distinguished. Reflecting the age gap in couples, fathers are typically on the order of 10 years older than mothers—for non-orphans as

well as for fathers caring for maternal orphans compared to mothers caring for paternal orphans. Fathers and mothers caring for single orphans are older than the average age of parents caring for non-orphans, consistent with orphanhood being driven by HIV/AIDS-related adult mortality concentrated in mid-life.

For children who do not reside with a parent, the age of the household head is examined. When children live without parents and in households headed by their grandparents, the average age of grandparents does not differ across paternal, maternal and double orphans: it hovers around 63-65 years of age. The age of grandparent caregivers raises concerns about the physical and financial ability of older persons to care for a child who is 7 years old on average, especially when no prime-age adults are present.²¹

Although the precise relationship of other relatives to children cannot be confirmed, the average age in this category consistently hovers at 40 years for non-orphans and orphans—consistent with the notion that other relations are typically aunts or uncles. In most countries, the average age of non-related caregivers is also consistent across countries, between 44 and 47 years of age. It may be that unrelated caregivers are members of the extended family that are not related to the children by blood, for example husbands and wives of aunts and uncles.

One exception to this pattern is countries with a rapidly growing orphan population (Group C). In these countries when maternal orphans live with a non-relative, this person is younger, on average, than in the countries with stable orphan rates (Groups A and B). The average age of non-relative caregivers for maternal orphans is 36 in these countries with rapidly growing orphan rates, while it exceeds 40 in the countries with stable orphan rates.

Household characteristics: Number of children in the household

In addition to the potential diminished earning capacity of older caregivers, one might be concerned that fostering of orphans may increase the number of children living in receiving households. Table 6 shows the average number of children under 15 in the household (including the index child) by orphan status and living arrangement. Orphans typically live in households with the same number, or fewer, children as non-orphans. For example, in countries with low

²¹ The household head may not be the only person who is caring for the child. If the household has other adults (such as adult children of the grandparent) this interpretation could be misleading. Among children not living with a parent and with a grandparent as household head, 44 percent live in a household with no (other) adult between the ages of 20-49.

and stable orphan rates (Group A) the average number of children is 4.9 for non-orphans, but is 4.7, 4.6 and 4.2 for paternal, maternal and double orphans respectively. In countries with rapidly growing orphan rates (Group C) the average number of children remains at 3.7 and 3.8 for non-orphans and orphans, respectively.

When children live with their grandparents, there are typically fewer children in the household than when children live with a parent. For example in the countries with high and stable rates (Group B) the average number of children is 3.3 for non-orphans and orphans living with a grandparent. Some countries have a different pattern, most notably Namibia where maternal orphans living with a grandparent typically live in households with one child more than maternal orphans living with their father (4.2 versus 3.2 children).

Conversely, when orphans live with an “other relative” and especially if they live with a non-relative, the households often have more children as compared to living with a grandparent or a surviving parent. The difference can be quite large: for example maternal orphans in Niger who live with a non-relative live in a household with an average of 6.7 children, while those who live with a grandparent live in a household with an average of 4.4 children. Or double orphans living with a non-relative in Namibia live in households with an average of 5.6 children, while those who live with a grandparent live in a household with 3.9 children on average. These differences are consistent with orphans residing with caregiving relatives or non-relatives who have their own children as well as the fostered children. To some extent, the disadvantage that might exist for orphans cared for by grandparents as opposed to younger relatives might be offset by the smaller number of children in the household.

V. Conclusions

The well-being and development of a child are closely tied to the household in which she or he resides. While most children in Africa live with one or both parents, this traditional arrangement can be impacted when one parent is deceased; by definition this is true for children with both parents deceased. Several multi-country studies which examine human capital outcomes for orphans compared to non-orphans have shown a large degree of heterogeneity across countries. A handful of longitudinal analyses from mid-to-high prevalence countries (Kenya, South Africa and Tanzania, among others) have shown that the negative impact of

orphanhood can be large, especially for orphans who have lost their mother. One hypothesis for the resilience in education and health outcomes in some situations on the one hand, and their decline in others, is the role of extended family networks. Traditional support systems to orphans may be undermined by the pressure of large increases in the number of orphans. If orphaned children are increasingly living in households that are less willing or able to invest in their human capital, then these shifts could have major implications for long-run poverty and human development in countries hard-hit by the HIV/AIDS pandemic.

Data from these 21 Sub-Saharan African countries show that orphanhood is common in many countries, although not all countries are experiencing rapid increases in rates of orphanhood. In many of the countries studied the orphan rate has remained stable—and even declined in some countries. This set of countries includes a group of countries where orphan rates have remained stable at a relatively low rate (this group consists primarily of the West African countries in the sample). It also includes a group of countries where the orphan rate is relatively high, but stable (Ethiopia, Madagascar, Mozambique and Uganda). In the sample, there is an orphanhood surge in 5 countries: Kenya, Malawi, Namibia, Zambia and Zimbabwe. These are all countries with a high prevalence of HIV. While there is a strong indication that HIV prevalence maps to orphanhood trends, this pattern is not always observed. For example, despite its high HIV rate, Mozambique has not experienced this surge in orphanhood.

The trends in living arrangements are less clear cut than suggested by the common hypothesis that increasing orphan rates are corroding the ability of families to care for orphans, at least in terms of co-residence. The main finding that emerges from the analysis is that, in many countries, there has been a shift towards grandparents taking on increased childcare responsibility. This suggests that care by surviving parents, other relatives, and non-relatives has been substituted with care by grandparents. While the trend is apparent among all orphan types, it is larger for single and double orphans. This trend is also especially evident in countries where the orphan rate has been increasing rapidly. Still, some large changes in living arrangements even in countries with low orphanhood rates are found, such as the substantial decline in non-orphans living with both parents in Cameroon, Niger, and Senegal.

The average age of caregivers among orphans is higher than among non-orphans. Grandparents who are caregivers are on average in their mid-60s, which raises concerns about the ability of this group to physically and financially care for young fostered children. Orphans

living with their grandparents do not also reside with a larger number of other children, whereas orphans living with other relatives do tend to live in households with more children. If grandparents continue to be more likely to care for children, though, these dependency rates are likely to increase.

The trauma of losing one's parent will, without doubt, have substantial social impacts on the many orphans resulting from the HIV/AIDS pandemic in Sub-Saharan Africa, as well as the societies and economies in which they live. If the social structures that have hitherto supported orphans strain under the pressure of increases in the number of orphans then the magnitude of these impacts are bound to increase. The evidence from these 21 countries suggests that in those countries with highest HIV rates, orphan rates have been increasing rapidly and it is grandparents who have been increasingly taking on responsibility for the care of orphaned children. At the same time some important changes in living arrangements even in countries with low prevalence levels are found, where orphan rates are not increasing. Based on these findings, not only should these changes and patterns be carefully tracked with subsequent rounds of data, but these changes need to be studied more carefully to understand underlying causes and implications. Moreover, the focus on changes in living arrangements should not focus narrowly on high HIV prevalence countries or on the population of orphans in these countries.

References

- Ainsworth, Martha. 1996. "Economic Aspects of Child Fostering in Côte d'Ivoire." In T. Paul Schultz (Ed.), *Research in Population Economics* 8. Greenwich, CT: JAI Press.
- Ainsworth, Martha, and Deon Filmer. 2006. "Inequalities in Children's Schooling: AIDS, Orphanhood, Poverty, and Gender." *World Development* 34(6): 1099-1128.
- Ainsworth, Martha and Innocent Semali. 2000. "The Impact of Adult Deaths on Children's Health in Northwestern Tanzania." World Bank Policy Research Working Paper No. 2266. The World Bank. Washington, DC.
- Akresh, Richard. 2004. "Adjusting Household Structure: School Enrollment Impacts of Child Fostering in Burkina Faso." IZA Discussion Paper No. 1379; Yale University Economic Growth Center Discussion Paper No. 897
- Ardington, Cally. 2008. "Orphanhood and Schooling in South Africa: Trends in the vulnerability of orphans between 1993 and 2005." Southern Africa Labour and Development Research Unit Working Paper Number 16. Cape Town: SALDRU, University of Cape Town.
- Atwine, Benjamin Elizabeth Cantor-Graae and Francis Bajunirwe. 2005. "Psychological Distress Among AIDS Orphans in Rural Uganda." *Social Science & Medicine* 61(3):555-564.
- Becker, Gary. 1991. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- Beegle, Kathleen, Joachim De Weerd, Stefan Dercon. 2007. "The Long-run Impact of Orphanhood." World Bank Policy Research Working Paper 4353. The World Bank. Washington, DC.
- Beegle, Kathleen and Sofya Krutikova. 2007. "Adult Mortality and Children's Transition into Marriage." *Demographic Research* 19(42): 1551-1574.
- Beegle, Kathleen and Joachim De Weerd. 2008. "Methodological Issues in the Study of the Socioeconomic Consequences of HIV/AIDS." *AIDS* 22 supplement 1: S89-S94.
- Bicego, George, Shea Rutstein and Kiersten Johnson. 2003. "Dimensions of the Emerging Orphan Crisis in Sub-Saharan Africa." *Social Science and Medicine* 56(6):1235-1247.
- Case, Anne and Cally Ardington. 2006. "The Impact of Parental Death on School Outcomes: Longitudinal Evidence from South Africa." *Demography* 43(3): 402-420.
- Case, Anne, Christina Paxson and Joseph Ableidinger. 2004. "Orphans in Africa: Parental Death, Poverty and School Enrollment." *Demography* 41(3): 483-508.
- Evans, David and Edward Miguel. 2007. "Orphans and Schooling in Africa: A Longitudinal Analysis." *Demography* 44(1): 35-57.

- Evans, David. 2005. "The Spillover Impacts of Africa's Orphan Crisis." Mimeo.
- Foster, G. 2000. "The Capacity of the Extended Family Safety Net for Orphans in Africa." *Psychology, Health & Medicine* 5(1): 55-62.
- Hamilton, W.D. 1964. "The Genetical Evolution of Social Behavior." *Journal of Theoretical Biology* 7(1): 1-16.
- Heuveline, Patrick. 2004. "Impact of the HIV Epidemic on Population and Household Structure: the Dynamics and Evidence to Date." *AIDS* 18 Supplement 2: S45-S53.
- Hill, Caterina, Victoria Hosegood and Marie-Louise Newell. 2008. "Children's Care and Living Arrangements in a High HIV Prevalence Area in Rural South Africa." *Vulnerable Children and Youth Studies* 3(1): 65-77.
- Monasch, Roeland, and J. Ties Boerma. 2004. "Orphanhood and childcare patterns in Sub-Saharan Africa: an analysis of national surveys from 40 countries." *AIDS* 18 Supplement 2: S55-S65.
- Nyambedha, Erick Otieno, Simiyu Wandibba, Jens Aagaard-Hansen. 2003. "Changing Patterns of Orphan Care Due to the HIV Epidemic in Western Kenya." *Social Science and Medicine* 51: 301-311.
- Robertson, L., S. Gregson, C. Madanhire, N. Walker, P. Mushati, G. Garnett, and C. Nyamukapa. 2008. "Discrepancies between UN Models and DHS Survey Estimates of Maternal Orphan Prevalence: Insights from Analyses of Survey Data from Zimbabwe." *STI* 84(Suppl 1): i57-i62.
- Serra, Renata. 2009. "Child Fostering in Africa: When Labor and Schooling Motives May Coexist." *Journal of Development Economics* 88(1): 157-170.
- UNAIDS. 2006. Report on the Global AIDS Epidemic. UNAIDS, New York.
- UNAIDS. 2008. Report on the Global AIDS Epidemic. UNAIDS, New York.
- UNICEF. 2006. "Collecting Data for National Indicators on Children Orphaned and Made Vulnerable by AIDS: A Methodological Report." UNICEF, Division of Policy and Planning, New York.
- UNICEF. 2007. *State of the World's Children 2008*. New York: UNICEF.
- Urassa Mark, J. Ties Boerma, Japheth Z.L. Ng'weshemi, Raphael Isingo, Dick Schapink, and Yusufu Kumogola. 1997 "Orphanhood, Child Fostering and the AIDS Epidemic in Tanzania." *Health Transition Review Supplement* 2 7:141-153

World Bank. 2007. *World Development Indicators*. Washington, D.C.: World Bank.

Zimmer, Zachary and Julia Dayton. 2005. "Older Adults in Sub-Saharan Africa living with children and grandchildren." *Population Studies* 59(3): 295-312.

Zimmerman, Frederick J. 2003. "Cinderella Goes to School: The Effects of Child Fostering on School Enrollment in South Africa." *The Journal of Human Resources* 38(3):557-290.

Table 1. Levels and changes in orphan rates

	Early year	Recent year	Change	HIV Prevalence 2005
A) Low orphan rate in earliest year– small change from earliest to latest year				
Benin 1996-2001	6.5	6.2	-0.3	1.8
Burkina Faso 1992-2003	8.4	7.6	-0.9	2.0
Cameroon 1991-2004	7.3	9.5	2.1	5.4
Chad 1996-2004	8.1	7.5	-0.5	3.5
Cote d’Ivoire 1994-2005	6.1	7.0	0.8	7.1
Ghana 1993-2003	7.3	6.6	-0.7	2.3
Guinea 1999-2005	8.1	7.6	-0.6	1.5
Mali 1995-2001	5.8	5.4	-0.4	1.7
Niger 1992-2006	7.1	6.0	-1.1	1.1
Senegal 1992-2005	6.4	7.6	1.2	0.9
Tanzania 1991-2004	7.3	8.9	1.6	6.5
<i>Average</i>	7.1	7.2	0.1	3.0
B) High orphan rate in earliest year– small change from earliest to latest year				
Ethiopia 2000-2005	10.7	9.4	-1.3	2.0
Madagascar 1992-2003	11.1	8.2	-3.0	0.5
Mozambique 1997-2003	11.6	9.8	-1.8	16.1
Uganda 1995-2006	14.3	14.1	-0.3	6.7
<i>Average</i>	11.9	10.4	-1.6	6.3
C) Low orphan rate in earliest year– large increase from earliest to latest year				
Kenya 1993-2003	7.4	12.3	4.8	6.0
Malawi 1992-2004	8.9	14.0	5.1	14.1
Namibia 1992-2000	7.9	11.6	3.7	19.6
Zambia 1992-2001	8.2	16.0	7.8	17.0
Zimbabwe 1994-2005	8.7	21.8	13.1	20.1
<i>Average</i>	8.2	15.2	6.9	15.4
D) High orphan rate in earliest year– large decline from earliest to latest year				
Rwanda 2000-2005	28.0	18.8	-9.2	3.1

Note: Table shows the level and change in the percentage of children 0-14 who are defined as being a paternal, maternal, or two parent orphan. Estimates are adjusted for the age and gender composition over time and standardized to a 7-year-old male child. “Average” refers to unweighted averages across countries.

Table 2. Rates of orphanhood

			Any Orphans		Paternal Orphans		Maternal Orphans		Double Orphans		Double as % of all Orphans	
	Early Year	Recent Year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year
A) Low orphan rate in earliest year– small change from earliest to latest year												
Benin	1996	2001	6.2	-0.3	4.2	0.3	1.5	-0.7	0.4	0.1	6.5	2.5
Burkina Faso	1992	2003	7.6	-0.9	4.6	-0.2	2.3	-0.4	0.7	-0.2	9.1	-2.0
Cameroon	1991	2004	9.5	2.1	6.3	1.4	2.4	0.4	0.7	0.3	6.9	1.4
Chad	1996	2004	7.5	-0.5	4.5	-0.6	2.3	-0.1	0.7	0.1	9.2	2.4
Cote d'Ivoire	1994	2005	7.0	0.8	4.6	0.5	1.7	0.0	0.7	0.3	9.5	3.4
Ghana	1993	2003	6.6	-0.7	4.4	0.0	1.8	-0.2	0.4	-0.5	6.0	-5.6
Guinea	1999	2005	7.6	-0.6	4.6	-0.5	1.9	-0.3	1.0	0.2	13.1	3.2
Mali	1995	2001	5.4	-0.4	3.2	-0.3	1.6	-0.2	0.6	0.1	10.8	3.2
Niger	1992	2006	6.0	-1.1	3.2	-0.6	2.3	-0.7	0.5	0.1	7.6	2.8
Senegal	1992	2005	7.6	1.2	5.2	0.8	1.7	0.0	0.7	0.3	8.7	3.6
Tanzania	1991	2004	8.9	1.6	5.5	0.7	2.6	0.4	0.7	0.4	7.8	3.2
<i>Average</i>			7.2	0.1	4.6	0.1	2.0	-0.2	0.6	0.1	8.7	1.6
B) High orphan rate in earliest year– small change from earliest to latest year												
Ethiopia	2000	2005	9.4	-1.3	5.8	-0.8	2.7	-0.7	0.8	0.1	8.9	2.1
Madagascar	1992	2003	8.2	-3.0	4.9	-1.3	2.7	-1.5	0.5	-0.1	6.0	0.6
Mozambique	1997	2003	9.8	-1.8	6.3	-0.5	2.4	-1.6	1.0	0.2	10.0	3.6
Uganda	1995	2006	14.1	-0.3	8.3	-0.4	3.3	-0.4	2.4	0.5	17.1	3.9
<i>Average</i>			10.4	-1.6	6.3	-0.7	2.8	-1.0	1.2	0.2	10.5	2.5
C) Low orphan rate in earliest year– large increase from earliest to latest year												
Kenya	1993	2003	12.3	4.8	7.8	2.3	2.0	0.4	2.4	2.1	19.7	15.9
Malawi	1992	2004	14.0	5.1	8.3	3.5	2.8	-0.5	2.8	1.8	19.8	8.8
Namibia	1992	2000	11.6	3.7	7.8	2.3	2.7	0.8	1.0	0.6	8.7	3.6
Zambia	1992	2001	16.0	7.8	9.6	4.3	3.5	0.9	2.6	2.1	16.3	10.0
Zimbabwe	1994	2005	21.8	13.1	13.6	7.0	3.1	1.2	4.7	4.1	21.6	14.8
<i>Average</i>			15.2	6.9	9.4	3.9	2.8	0.6	2.7	2.2	17.2	10.6
D) High orphan rate in earliest year– large decline from earliest to latest year												
Rwanda	2000	2005	18.8	-9.2	13.2	-6.2	3.2	-1.0	2.5	-1.3	13.5	-0.4

Notes: Estimates are adjusted for the age and gender composition over time and standardized to a 7-year-old male child. Only first and last survey for each country included in this table. "Recent Year %" corresponds to the percentage of children in the most recent survey. "Change from early year" corresponds to the change in the percentage of orphans between the early and most recent survey. "Average" refers to unweighted averages across countries.

Table 3. Living Arrangement among non-orphans

	Living with mother only				Living with father only		Living with both parents		Living with one or both parents	
	Early Year	Recent Year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year
A) Low orphan rate in earliest year– small change from earliest to latest year										
Benin	1996	2001	9.7	1.3	9.1	-0.1	70.7	-1.0	89.6	0.6
Burkina Faso	1992	2003	4.9	1.0	5.0	1.2	83.8	-0.5	93.7	1.6
Cameroon	1991	2004	12.8	3.6	9.2	2.5	63.0	-7.0	84.6	-0.8
Chad	1996	2004	9.4	-0.6	4.3	-1.4	78.1	2.3	91.5	0.7
Cote d'Ivoire	1994	2005	17.6	1.8	9.2	-0.5	64.9	2.1	91.6	3.6
Ghana	1993	2003	21.2	-3.7	5.7	-1.4	59.3	3.5	86.3	-1.6
Guinea	1999	2005	8.1	-0.1	7.4	1.0	72.6	-0.1	87.6	0.7
Mali	1995	2001	5.9	1.8	4.1	1.6	82.6	-3.3	92.6	0.1
Niger	1992	2006	13.8	8.1	5.2	1.1	72.4	-7.6	91.7	2.5
Senegal	1992	2005	19.2	3.3	4.1	0.9	63.6	-5.3	86.5	-1.3
Tanzania	1991	2004	15.1	2.4	5.3	-0.8	66.9	-2.1	87.3	-0.1
Average			12.5	1.7	6.2	0.4	70.7	-1.7	89.3	0.6
B) High orphan rate in earliest year– small change from earliest to latest year										
Ethiopia	2000	2005	6.4	-2.9	3.4	-0.4	83.3	6.0	92.8	2.6
Madagascar	1992	2003	12.4	-0.8	4.5	-1.3	71.6	0.4	88.2	-1.7
Mozambique	1997	2003	18.0	2.0	4.6	-0.3	66.6	-2.0	89.3	-0.1
Uganda	1995	2006	15.5	2.5	6.4	-0.8	63.0	-2.5	84.7	-0.3
Average			13.1	0.2	4.7	-0.7	71.1	0.5	88.8	0.1
C) Low orphan rate in earliest year– large increase from earliest to latest year										
Kenya	1993	2003	21.7	-2.9	2.9	1.2	67.2	2.2	91.7	0.2
Malawi	1992	2004	15.8	-3.2	2.6	0.8	66.9	0.7	85.0	-2.5
Namibia	1992	2000	28.9	5.8	5.8	-0.1	30.8	-8.9	65.1	-3.0
Zambia	1992	2001	12.0	0.2	4.5	-0.4	72.9	1.6	89.4	1.6
Zimbabwe	1994	2005	23.8	-1.3	4.3	0.4	54.7	1.5	82.4	0.5
Average			20.4	-0.3	4.0	0.4	58.5	-0.6	82.7	-0.6
D) High orphan rate in earliest year– large decline from earliest to latest year										
Rwanda	2000	2005	14.5	-1.0	2.0	-0.9	75.0	1.5	91.4	-0.2

Notes: Estimates are adjusted for the age and gender composition over time through standardization to a 7-year-old male child. Only first and last country-surveys are considered. "Recent Yr %" corresponds to the percentage of children in the most recent survey. Change from early year corresponds to the change in percentage points since the early survey. "Average" refers to unweighted averages across countries.

Table 4. Living Arrangement by orphan type

	Paternal orphans						Maternal orphans				Double orphans	
	Living with Mother		Living with Grandparent		Living with Father		Living with Grandparent		Living with Grandparent			
	Early Year	Recent Year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year	Recent Year %	Change from early year
A) Low orphan rate in earliest year– small change from earliest to latest year												
Benin	1996	2001	65.3	5.8	11.5	-2.2	67.5	-3.2	10.4	-2.5	16.8	8.6
Burkina Faso	1992	2003	71.2	-0.5	8.2	-0.2	75.6	-1.0	7.1	-2.7	27.5	-11.1
Cameroon	1991	2004	70.5	4.2	11.3	2.2	51.1	-19.3	27.0	14.9	52.8	28.7
Chad	1996	2004	64.1	3.3	11.5	-1.9	52.0	-8.5	21.6	4.7	49.7	25.3
Cote d'Ivoire	1994	2005	78.5	12.4	9.2	-0.8	64.0	1.2	18.8	2.5	65.7	34.3
Ghana	1993	2003	71.9	-0.4	16.8	1.3	56.3	-15.6	24.8	10.1	28.8	-12.9
Guinea	1999	2005	70.3	3.0	12.2	1.6	70.3	-3.4	17.8	8.4	33.5	5.7
Mali	1995	2001	73.3	1.2	8.3	0.5	79.4	-2.9	7.9	-2.4	65.9	39.7
Niger	1992	2006	59.9	11.4	18.3	4.0	72.2	2.6	13.7	4.0	29.3	6.5
Senegal	1992	2005	73.8	0.5	6.0	0.3	60.8	0.1	14.0	-1.0	25.8	12.6
Tanzania	1991	2004	70.8	-3.0	15.2	0.9	49.1	-9.1	31.9	8.8	36.7	-14.9
Average			70.0	3.4	11.7	0.5	63.5	-5.4	17.7	4.1	39.3	11.1
B) High orphan rate in earliest year– small change from earliest to latest year												
Ethiopia	2000	2005	83.2	2.4	9.0	0.3	69.7	1.7	14.3	-2.6	51.0	26.1
Madagascar	1992	2003	72.8	0.3	14.4	0.8	63.9	-7.1	18.2	4.4	62.3	31.0
Mozambique	1997	2003	75.6	-6.6	14.5	6.0	39.2	-21.5	32.9	15.8	43.3	7.1
Uganda	1995	2006	59.2	2.1	23.9	-2.0	43.5	-14.9	34.3	8.2	49.2	1.1
Average			72.7	-0.5	15.5	1.3	54.1	-10.4	24.9	6.5	51.4	16.3
C) Low orphan rate in earliest year– large increase from earliest to latest year												
Kenya	1993	2003	84.0	-3.3	12.8	2.7	67.5	-8.3	17.8	5.5	63.1	7.2
Malawi	1992	2004	70.8	-5.1	23.3	6.8	30.6	-17.9	40.4	12.0	62.2	-5.7
Namibia	1992	2000	53.1	-3.2	33.9	10.3	16.1	-1.7	61.6	19.1	64.2	21.0
Zambia	1992	2001	68.3	0.6	21.8	6.0	44.4	-1.6	35.6	14.7	61.3	15.5
Zimbabwe	1994	2005	62.6	-3.1	32.6	11.1	38.4	1.2	48.6	3.3	81.0	19.9
Average			67.8	-2.8	24.9	7.4	39.4	-5.7	40.8	10.9	66.4	11.6
D) High orphan rate in earliest year– large decline from earliest to latest year												
Rwanda	2000	2005	85.5	-0.5	9.9	-0.2	54.8	-9.2	24.8	5.9	51.5	-3.2

Notes: Estimates are adjusted for the age and gender composition over time through standardization to a 7-year-old male child. Only first and last country-surveys are considered. "Recent Yr %" corresponds to the percentage of children in the most recent survey. Change from early year corresponds to the change in percentage points since the early survey. "Average" refers to unweighted averages across countries.

Table 5. Average age of caregiver by orphan type and living arrangement (last survey round)

	Non orphans					Paternal orphans					Maternal orphans					Double orphans				
	ALL	PA Mot.	GP Fat.	RL	NR	ALL	PA Mot.	GP	RL	NR	ALL	PA Fat.	GP	RL	NR	ALL	GP	RL	NR	
A) Low orphan rate in earliest year– small change from earliest to latest year																				
Benin	39	33	43	65	42	47	44	41	67	42	45	49	49	66	40	49	51	74	43	50
Burkina Faso	41	34	46	65	45	50	43	40	66	43	49	52	51	69	48	48	51	64	47	50
Cameroon	39	32	43	63	42	46	41	39	62	39	45	51	49	63	42	49	49	62	41	41
Chad	37	32	42	61	36	45	41	40	58	34	48	48	46	61	39	42	49	60	39	50
Cote d'Ivoire	38	32	43	62	42	46	42	39	66	41	39	50	46	66	42	60	59	68	45	58
Ghana	41	35	44	64	42	46	46	42	67	44	57	51	49	64	45	48	49	71	40	47
Guinea	42	34	48	66	47	50	43	39	63	47	54	53	52	66	48	53	51	63	46	50
Mali	40	33	46	64	43	46	42	40	67	42	47	49	49	66	42	49	53	64	41	50
Niger	40	33	45	63	45	45	45	41	66	40	55	50	48	65	42	42	53	65	48	41
Senegal	40	34	47	65	47	53	43	40	68	47	52	52	51	64	47	48	51	63	47	50
Tanzania	38	33	41	62	41	42	43	39	64	41	45	49	44	64	38	42	47	64	41	42
Average	40	33	44	64	43	47	43	40	65	42	49	50	49	65	43	48	51	65	43	48
B) High orphan rate in earliest year– small change from earliest to latest year																				
Ethiopia	39	34	42	64	39	45	42	40	65	38	52	50	49	65	41	43	48	66	34	50
Madagascar	38	33	39	59	36	45	43	41	62	36	47	49	46	63	36	46	56	65	42	39
Mozambique	37	33	40	60	39	41	41	38	60	39	39	48	47	62	39	37	47	61	39	46
Uganda	37	32	39	62	37	38	43	38	64	37	39	48	42	65	38	44	51	67	37	44
Average	38	33	40	61	38	42	42	39	63	38	44	49	46	64	39	42	50	65	38	45
C) Low orphan rate in earliest year– large increase from earliest to latest year																				
Kenya	37	33	41	62	37	38	40	37	61	40	37	47	46	60	40	36	51	65	37	41
Malawi	37	32	39	62	34	37	42	39	63	32	44	47	42	63	35	41	51	65	35	43
Namibia	43	35	43	66	43	49	49	38	67	49	53	59	49	71	42	43	55	67	39	53
Zambia	37	32	40	61	36	38	41	37	63	37	44	48	44	65	37	29	50	64	38	45
Zimbabwe	38	32	41	62	33	41	46	39	64	34	44	51	47	63	32	33	57	65	34	50
Average	39	33	41	63	37	41	44	38	64	39	45	51	46	64	37	36	53	65	37	47
D) High orphan rate in earliest year– large decline from earliest to latest year																				
Rwanda	39	35	40	64	38	42	43	41	65	37	42	49	46	69	34	43	46	67	33	44

Note: PA=Living with parent; GP=Living with grandparent; RL=Living with relative; NR=living with non relative. “Average” refers to unweighted averages across countries.

Table 6. Average number of children 0-14 in household by orphan type and living arrangement (last survey round)

	Non orphans					Paternal orphans					Maternal orphans					Double orphans			
	ALL	PA	GP	RL	NR	ALL	PA	GP	RL	NR	ALL	PA	GP	RL	NR	ALL	GP	RL	NR
A) Low orphan rate in earliest year– small change from earliest to latest year																			
Benin	4.9	5.0	3.9	4.6	4.7	4.1	3.9	3.4	4.6	5.5	4.6	4.9	2.8	4.6	4.7	4.0	3.4	4.3	3.8
Burkina Faso	5.6	5.6	4.2	5.1	6.2	5.5	5.4	5.1	6.1	3.8	5.2	5.2	4.8	5.6	6.5	4.5	3.7	4.8	4.1
Cameroon	4.8	4.8	4.3	4.1	5.1	4.8	4.9	4.1	5.0	4.4	4.5	4.8	4.4	4.1	4.5	4.2	4.0	4.4	3.9
Chad	4.7	4.8	3.5	4.4	3.9	4.1	3.7	4.4	5.5	3.5	4.3	4.5	3.3	5.1	4.0	3.6	3.0	3.6	4.6
Cote d'Ivoire	4.7	4.7	4.5	4.1	4.5	4.7	4.8	5.3	4.1	5.8	4.0	3.6	4.0	4.5	6.1	3.8	3.4	4.4	3.9
Ghana	3.6	3.6	3.2	3.5	3.6	3.3	3.1	3.2	3.7	4.8	3.3	3.1	2.7	3.8	4.9	3.0	1.8	3.5	2.4
Guinea	4.9	4.9	4.1	4.9	5.4	4.9	4.8	4.9	5.5	5.0	4.6	4.7	3.8	5.1	4.2	4.8	3.4	5.5	4.4
Mali	4.7	4.8	3.7	4.4	4.5	4.6	4.6	3.7	4.8	5.0	4.5	4.6	3.7	4.5	4.5	4.1	3.7	4.5	4.5
Niger	5.2	5.3	4.1	5.0	4.6	5.0	4.8	5.2	6.0	3.6	4.8	4.6	4.4	5.1	6.7	4.3	4.5	4.3	3.7
Senegal	7.0	7.0	5.5	6.4	13.1	6.7	6.2	5.3	6.5	16.2	6.6	6.6	5.4	6.2	8.8	6.3	4.7	6.4	8.0
Tanzania	4.2	4.2	3.8	4.0	3.6	4.0	4.1	3.8	3.8	4.4	4.0	4.6	3.2	3.9	3.8	3.5	2.7	3.8	3.7
Average	4.9	5.0	4.1	4.6	5.4	4.7	4.6	4.4	5.1	5.6	4.6	4.7	3.9	4.8	5.3	4.2	3.5	4.5	4.3
B) High orphan rate in earliest year– small change from earliest to latest year																			
Ethiopia	3.8	3.9	2.3	2.7	2.6	3.0	3.1	2.1	3.3	3.0	3.5	3.9	2.2	2.9	3.3	2.7	2.3	3.1	2.7
Madagascar	3.7	3.8	3.5	3.3	3.2	3.5	3.4	3.7	3.4	4.0	3.9	4.1	3.9	3.0	3.2	3.3	3.3	3.3	3.5
Mozambique	3.9	4.0	3.2	3.5	3.3	3.6	3.7	3.2	3.3	3.7	3.8	4.2	3.4	3.6	3.3	4.1	3.7	4.2	4.3
Uganda	4.4	4.4	4.1	4.0	3.9	4.2	4.1	4.1	4.6	4.2	4.3	4.6	3.8	4.5	3.8	4.1	3.7	4.5	4.9
Average	4.0	4.0	3.3	3.4	3.2	3.6	3.6	3.3	3.6	3.7	3.9	4.2	3.3	3.5	3.4	3.6	3.3	3.8	3.8
C) Low orphan rate in earliest year– large increase from earliest to latest year																			
Kenya	3.7	3.7	3.3	3.5	3.7	3.6	3.6	3.5	3.7	4.5	3.5	3.4	2.9	4.3	4.4	3.9	3.6	3.8	5.0
Malawi	3.5	3.5	3.3	3.3	3.2	3.3	3.4	3.2	3.2	2.9	3.2	3.2	3.1	3.4	3.6	3.6	3.5	3.6	3.6
Namibia	4.2	4.1	4.6	4.4	4.3	4.2	4.1	4.3	4.0	4.0	4.2	3.2	4.2	4.5	4.7	4.1	3.9	3.8	5.6
Zambia	4.0	4.1	3.7	3.7	3.8	4.0	4.0	4.0	4.1	4.5	4.0	3.9	3.9	4.0	3.8	3.9	3.6	4.1	4.5
Zimbabwe	3.4	3.4	3.6	3.2	3.7	3.5	3.3	3.9	3.3	2.8	3.6	3.6	3.8	3.3	3.4	3.5	3.6	3.0	3.7
Average	3.8	3.7	3.7	3.6	3.7	3.7	3.7	3.8	3.7	3.7	3.7	3.5	3.6	3.9	4.0	3.8	3.7	3.7	4.4
D) High orphan rate in earliest year– large decline from earliest to latest year																			
Rwanda	3.5	3.6	2.4	2.7	3.4	2.9	2.9	2.5	2.9	3.3	3.0	3.3	2.4	2.5	3.1	2.7	2.5	2.7	3.0

Note: PA=Living with parent; GP=Living with grandparent; RL=Living with relative; NR=living with non relative. “Average” refers to unweighted averages across countries.

Figure 1: Age-distribution of sample and orphanhood by age in Namibia: 1992 and 2000.

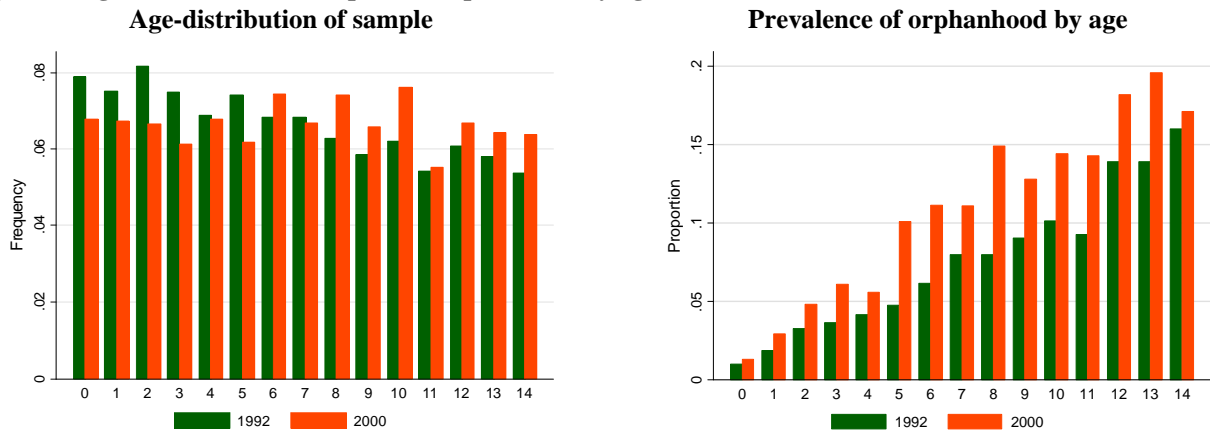
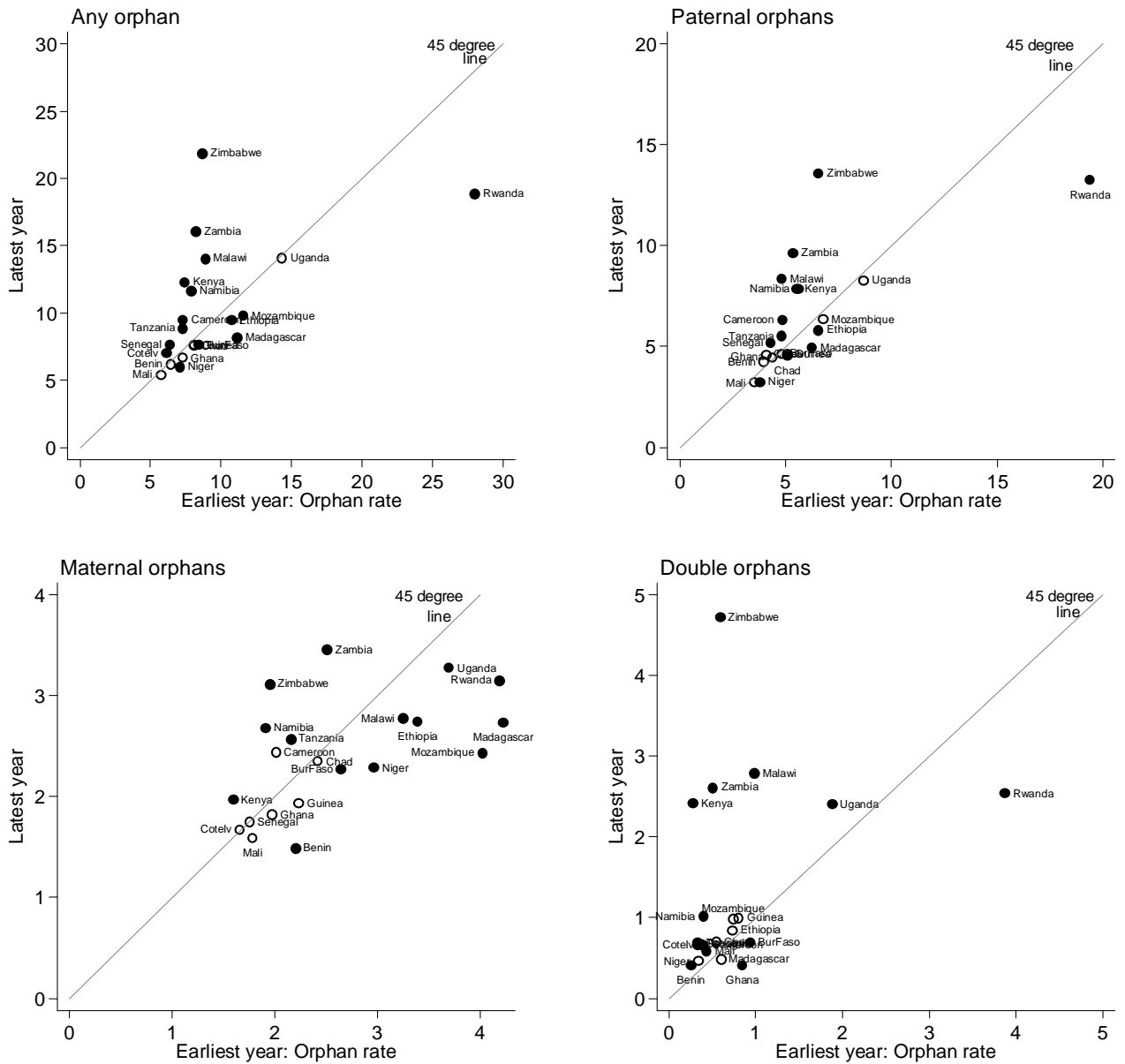


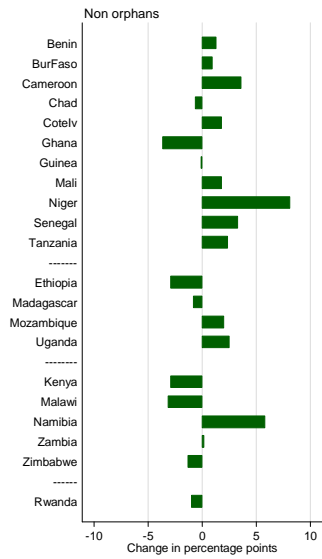
Figure 2. Trends in orphanhood among children 0 - 15 years (Percent of children who are orphans in the first and last survey rounds)



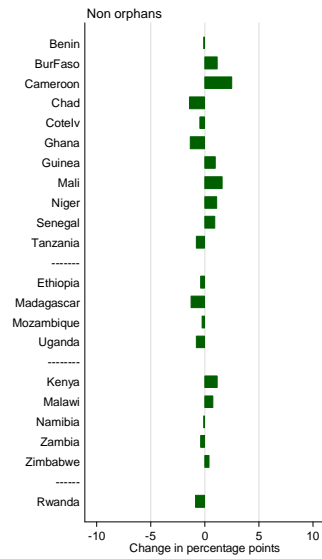
Notes: Prevalence estimates are adjusted for the age and gender composition of the survey through standardization to a 7-year-old male child. Only first and last country-surveys are included. Points that fall along the 45-degree line correspond to no change between first and last survey. Colored-in points refer to those countries in which change in the prevalence of orphanhood between first and last years is significant at the 5% level; hollow points correspond to countries in which change is not significant at the 5% level.

Figure 3. Changes in the living arrangements of non-orphans

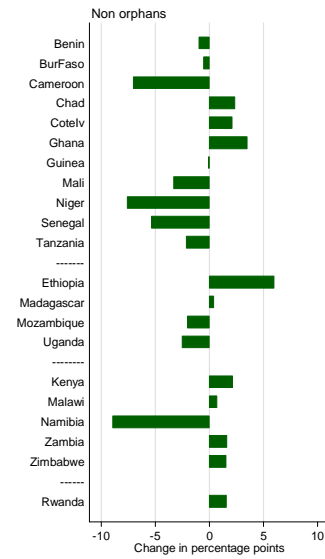
Living with mother only



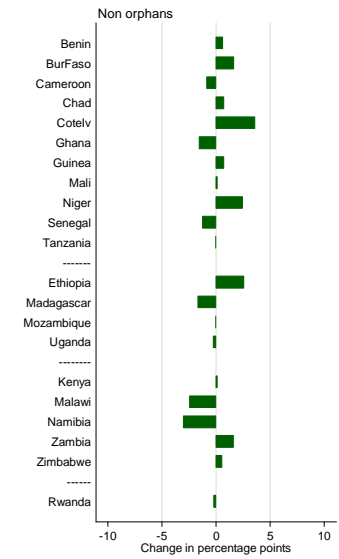
Living with father only



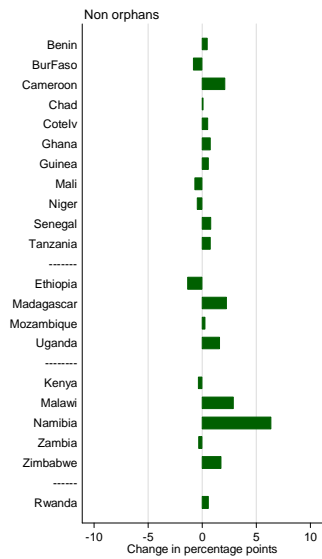
Living with both parents



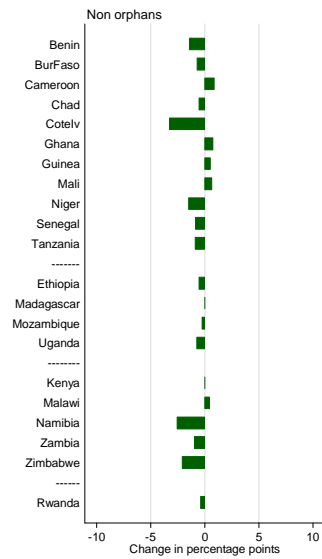
Living with either/both parents



Living with a grandparent



Living with relative



Living with non-relative

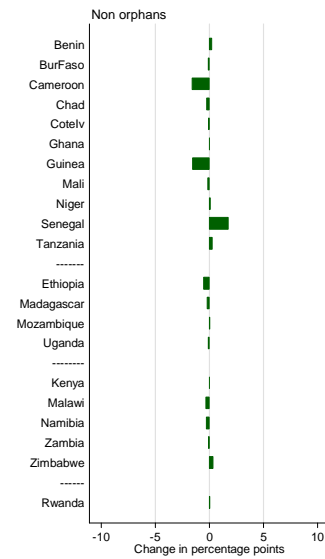
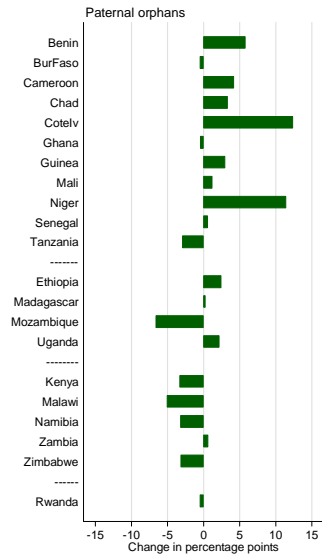


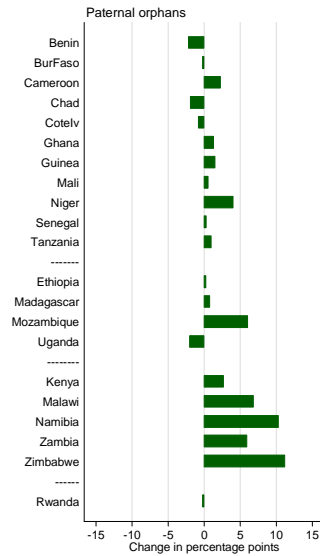
Figure 4. Changes in living arrangements of single-parent orphans

Paternal orphans

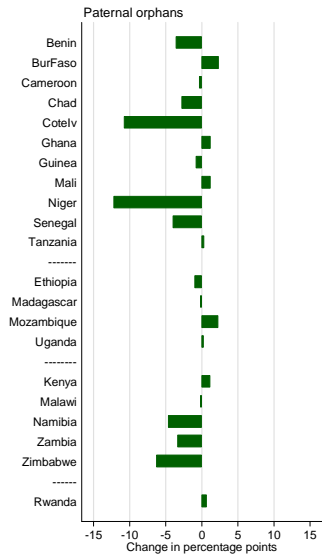
Living with surviving parent



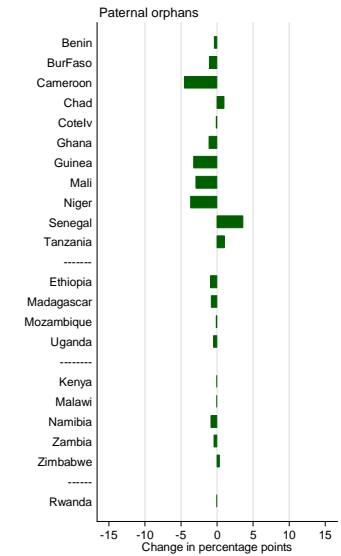
Living with grandparent



Living with relative

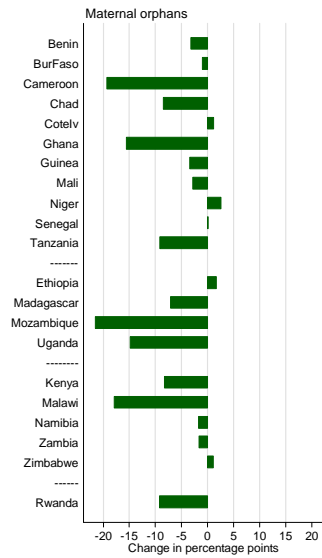


Living with non-relative

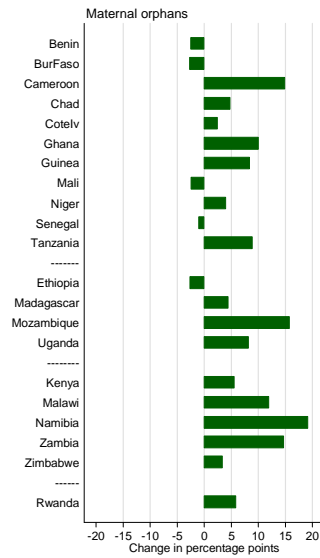


Maternal orphans

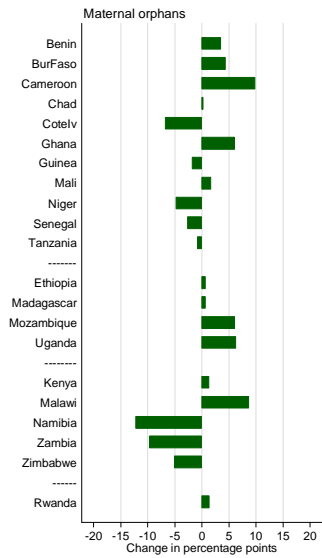
Living with surviving parent



Living with grandparent



Living with relative



Living with non-relative

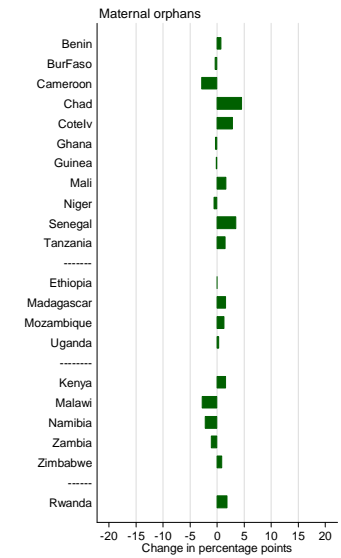
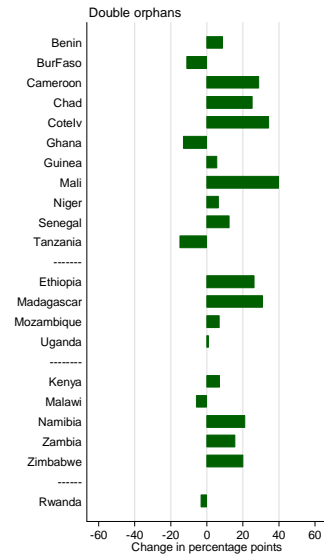
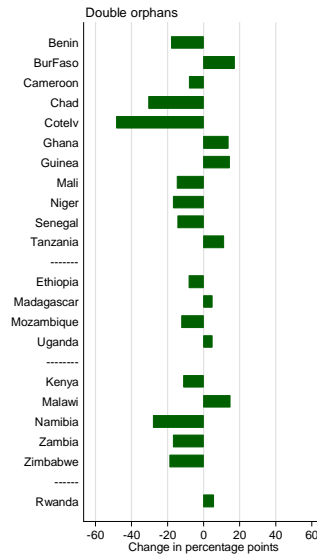


Figure 5. Changes in living arrangements of double orphans

Living with grandparent



Living with relative



Living with non-relative

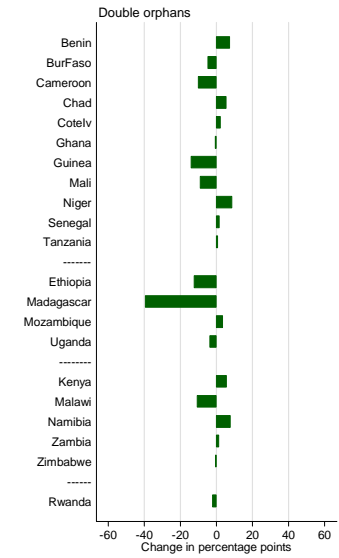


Figure 6a: Association between change in probability of living with surviving parent among orphans who have lost one parent and HIV prevalence

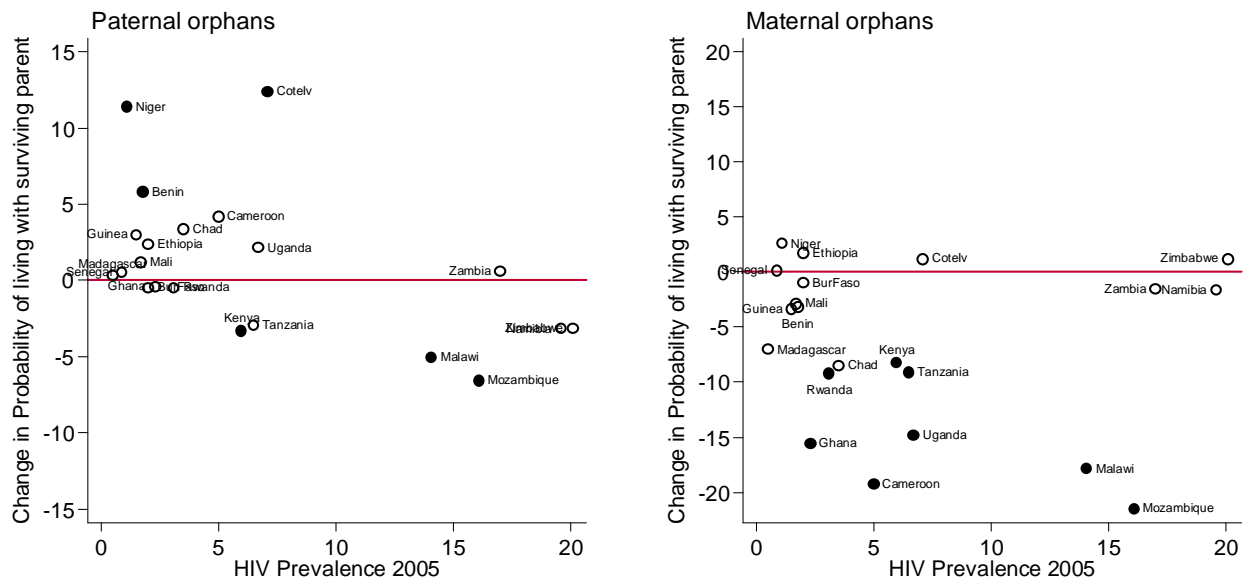
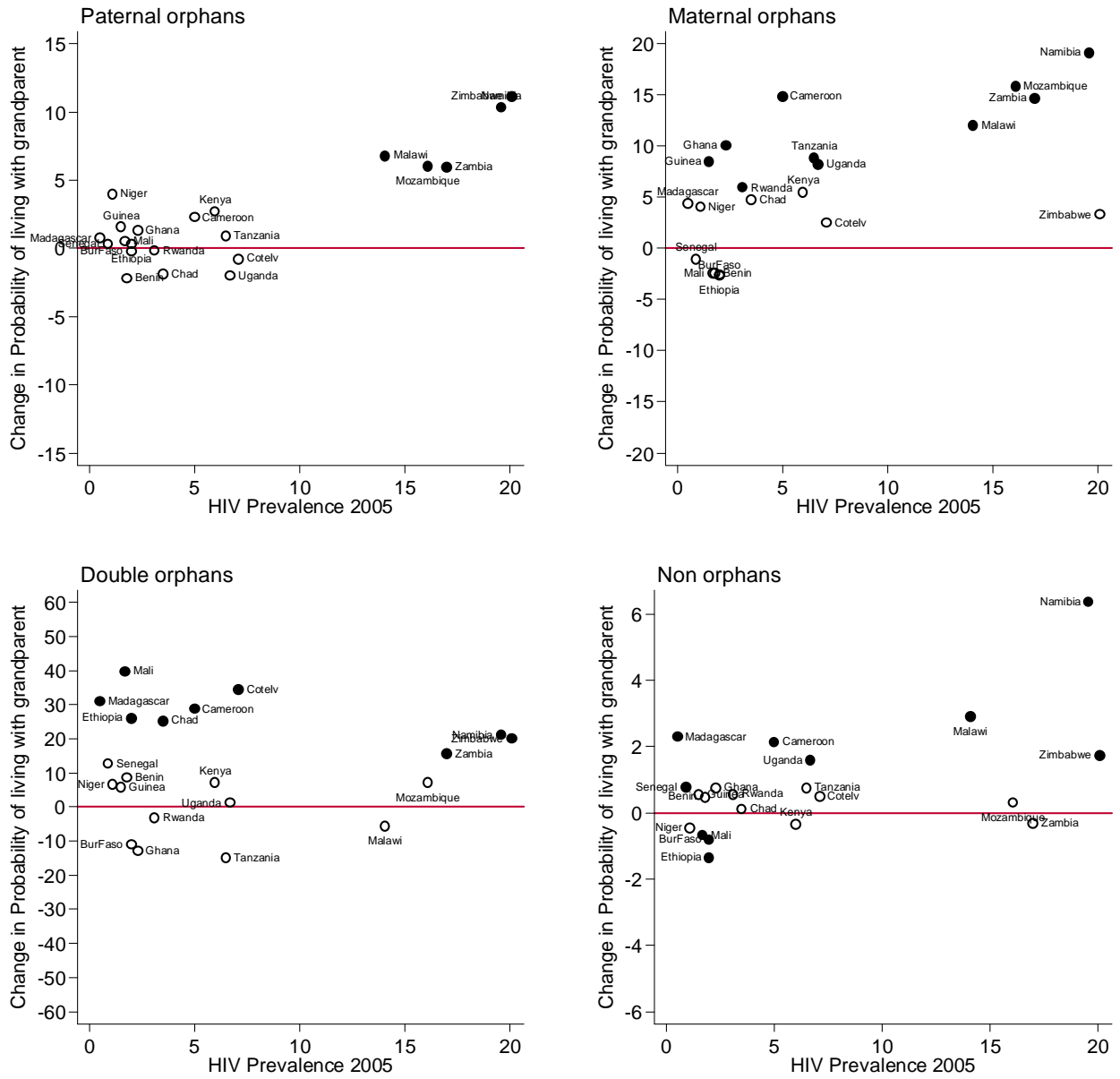


Figure 6b: Association between change in probability of living with grandparent among orphans and non orphans and HIV prevalence



Annex Table: DHS Data Sets and HIV Rates

	DHS data sets									HIV				
	Early Year	Obs. (Children <15)	Pct. missing orphan status	Recent Year	Obs. (Children <15)	Pct. missing orphan status	Interim Year*	Obs. (Children <15)	Pct. missing orphan status	Interim Year*	Obs. (Children <15)	Pct. missing orphan status	Prevalence in 2005	Confidence interval
Benin	1996	13,746	0.98	2001	14,640	0.61							1.8%	1.2-2.5%
Burkina Faso	1992/93	16,150	0.47	2003	28,666	0.86							2.0%	1.5-2.5%
Cameroon	1991	9,556	1.66	2004	22,772	2.20	1998	11,550	1.64				5.4%	4.9-5.9%
Chad	1996/97	18,228	1.03	2004	14,501	0.50							3.5%	1.7-6.0%
Cote d'Ivoire	1994	17,979	1.02	2005	10,413	0.50							7.1%	4.3-9.7%
Ethiopia	2000	29,432	0.72	2005	30,228	0.55							~2%	0.9-3.5%
Ghana	1993	10,526	1.15	2003	11,747	0.90	1998	9,859	0.74				2.3%	1.9-2.6%
Guinea	1999	16,473	2.22	2005	18,221	0.55							1.5%	1.2-1.8%
Kenya	1993	18,741	3.05	2003	16,291	2.97	1998	17,197	2.69				6%	5.2-7.0%
Madagascar	1992	14,116	3.71	2003/04	16,831	2.26	1997	15,786	1.66				0.5%	0.2-1.2%
Malawi	1992	11,649	0.83	2004	29,294	0.86	2000	29,478	0.54				14.1%	6.9-21.4%
Mali	1995/96	24,513	0.63	2001	32,648	1.05							1.7%	1.3-2.1%
Mozambique	1997	20,238	2.60	2003	29,153	0.86							16.1%	12.5-20.0%
Namibia	1992	11,375	2.87	2000	13,014	3.85							19.6%	8.6-31.7%
Niger	1992	16,363	0.65	2006	24,943	1.12	1998	17,971	0.71				1.1%	0.5-1.9%
Rwanda	2000	21,305	3.35	2005	21,956	1.49							3.1%	2.9-3.2%
Senegal	1992/93	15,057	1.91	2005	31,151	1.66							0.9%	0.4-1.5%
Tanzania	1992	21,511	2.85	2004	22,819	1.83	1996	18,403	1.40	1999	8,714	0.70	6.5%	5.8-7.2%
Uganda	1995	18,035	1.63	2006	23,660	0.97	2000/01	18,997	0.71				6.7%	5.7-7.6%
Zambia	1992	16,140	0.77	2001/02	18,174	1.16	1996	18,488	0.86				17.0%	15.9-18.1%
Zimbabwe	1994	13,876	1.92	2005	18,742	4.02	1999	12,335	1.93				20.1%	13.3-27.6%

Source for HIV estimates: UNAIDS (2006).

* Not all countries had any surveys in interim years. The interim years are not used in the analyses.