

Orphanhood and Schooling in South Africa: Trends in the vulnerability of orphans between 1993 and 2005

Cally Ardington*

South African Labour Development Research Unit

University of Cape Town

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Abstract

Using eleven nationally representative surveys conducted between 1993 and 2005 this paper assesses the extent to which the vulnerability of orphans to poorer educational outcomes has changed over time as the AIDS crisis deepens in South Africa. This paper seeks to establish whether the fear that extended families are no longer effective safety nets may be overstated or whether traditional coping strategies are indeed breaking down. Patterns of care giving for orphans do appear to be shifting over time but these changes are taking place within the extended family safety net. Orphans are still absorbed into extended families but single orphans are increasingly less likely to live with the surviving parent and there is an increasing reliance on grandparents as caregivers. At every point in time cross-sectional evidence suggests that that orphans are at risk for poorer educational outcomes with maternal deaths generally having stronger negative effects than paternal deaths. Paternal deaths are strongly associated with poorer socio-economic status and much of the deficit experienced by children who have lost a father is explained by the relative poverty of their current household. In contrast maternal deaths appear to be directly associated with poorer schooling outcomes rather than channeled through socio-economic status. The results in this paper suggest that parental involvement and relatedness to the household are two of the multiple pathways through which parental death affects a child's schooling. Despite a significant increase in the number of orphans over the last decade this paper finds no evidence of a systematic deterioration in traditional coping strategies at least with respect to orphan's educational outcomes.

*Email: cally.ardington@uct.ac.za

1. Introduction

The rapid growth in the number of orphans in sub-Saharan Africa due to the HIV/AIDS pandemic has received much attention in the literature, with UNAIDS (2004) estimating that fifty million children under the age of 15 will have lost at least one parent by 2010. At the same time as the traditional African extended family is 'naturally' evolving or transforming in response to social, spatial, and economic pressures, it is being called upon to play an ever increasing role of providing for the safety and wellbeing, both economic and psychological, of its newly orphaned members. Orphanhood is preceded by the weakening of these same extended families resulting from increasing numbers of sick adults, who subsequently die. This reduces the caregivers and breadwinners in these families. There is no respite from the losses suffered as a consequence of HIV/AIDS deaths as there is in the case of natural disasters. As the epidemic proceeds the losses stack up incrementally so that the stresses are experienced not only by the extended family but also by the community and eventually the state.

There is increasing concern among a number of researchers and international agencies that extended family networks are already overwhelmed by the magnitude of the orphan crisis and that these traditional coping mechanisms may not be adequate in the face of the ever growing number of orphans (see Box 1). The consequence has been a growing body of research on the prevalence of orphanhood and the living arrangements, health and education outcomes of orphans. Recent empirical evidence suggests that children who have suffered parental loss are at risk for poorer educational outcomes challenging the traditional wisdom that 'there is no such thing as an orphan in Africa'. While this statement may be true in the sense that the vast majority of African orphans are absorbed into their extended family networks, orphans are not indistinguishable from non-orphaned children in that they are vulnerable to poorer outcomes. In spite of the concerns around the capacity of extended family networks to cope with the ever increasing number of orphans, surprisingly little is known about whether the vulnerabilities of orphans are changing as the AIDS crisis deepens. The extent to which traditional support mechanisms are coping is important from a policy perspective. International agencies and governments may either need to adopt measures to strengthen and support these family networks or investigate alternative coping strategies.

Poor educational outcomes in childhood are likely to have a lasting effect into adulthood. The importance of education to development is reflected in the South African constitution's recognition of education as a basic right. This paper joins the available literature in showing orphans to be especially vulnerable to poor schooling outcomes. The key contribution of this paper is to assess the extent to which the vulnerability of orphans to poorer educational outcomes has changed over time as the AIDS crisis deepens in South Africa. This paper seeks to establish whether the fear that extended families are no longer effective safety nets may be overstated or whether traditional coping strategies are indeed breaking down.

South Africa is an interesting case study for a number of reasons. South Africa has a large and rapidly growing orphan population. Adult mortality prior to the AIDS epidemic

was much lower in South African than elsewhere in the region. This combined with high and rapidly rising HIV prevalence means that South Africa is expected to experience among the highest growth in the rate of orphanhood in sub-Saharan Africa. Monash and Boerma (2004) suggest that coping strategies that rely on the extended family may be less resilient than elsewhere in sub-Saharan Africa due to high levels of work related migration and associated high rates of child fostering.

Box 1. The extended family and traditional coping strategies in an era of AIDS

"It has traditionally been said that there is no such thing as an orphan in Africa. Children who lost their parents were incorporated into a relative's family. But with increased numbers of orphans, reduced numbers of caregivers, and weakened families, the extended family is no longer the safety net that it once was, although it remains the predominant source of care for orphans in Africa (Foster 2002:1907)."

"The growth in the number of orphans is taxing the coping strategies of families and societies at large. In many cases, the extended family is finding it extremely difficult to cope economically and psychologically with the numbers it is required to absorb (Kelly 2000: 57)."

"The dramatic rise in orphanhood is overwhelming the ability of families, communities, civil societies and governments to ensure orphans' safety and well-being (Guarcello *et al.* 2004:2)."

"The responsibility of caring for orphaned children is a major factor in pushing many extended families beyond their ability to cope. With the number of children that require protection and support soaring – and ever-larger numbers of adults falling sick with HIV/AIDS – many extended family networks have simply been overwhelmed (UNICEF 2003:6)"

"The impact of AIDS deaths on households is unlike other disasters such as drought and famine because of the incremental nature of the epidemics. AIDS wears down extended families' resources over a period of several years, at the same time as the number of orphan (sic) is increasing. The extended family is not a social sponge with an infinite capacity to soak up orphans (Foster 2000:55)."

"The extended family system will continue to be the central social welfare mechanism in most parts of sub-Saharan Africa. Already overstressed and often already overwhelmed, these networks will face ever-greater burdens as the number of orphans spiral over the coming decade. These intense pressures come at a time when the very nature of the extended family is rapidly evolving (UNICEF 2003:21)."

Although South Africa has almost universal enrolment in primary school, the schooling system is still characterized by racial inequities and high rates of grade repetition with many African students never completing secondary school. Unlike many other high prevalence countries, South Africa has not seen any substantial increases in enrolment

over the last fifteen years. Completion of secondary school and tertiary education are strongly associated with the probability of employment and there are strong convexities in the returns to education for those in employment (see Anderson *et al.* 2001, Keswell and Poswell 2003).

This paper examines the extent to which South African children who have experienced parental loss are vulnerable to poorer educational outcomes and the extent to which this vulnerability has changed over time as the HIV/AIDS crisis has deepened. Using eleven nationally representative surveys conducted between 1993 and 2005 I investigate the impact of parental death on schooling outcomes. At every point in time, cross-sectional evidence suggests that orphans are still absorbed into extended families. However, children who have lost one parent are increasingly less likely to live with the surviving parent and there is an increasing reliance on grandparents as caregivers. Orphans throughout the period of the study, are at risk of poorer educational outcomes with maternal deaths having stronger negative effects than paternal deaths. Results for maternal deaths are not affected by controlling for socio-economic status suggesting that maternal death is directly associated with poorer schooling outcomes rather than channeled through socio-economic status. In contrast much of the schooling deficit for paternal orphans is explained by their relative poverty. Looking for evidence of changes over time I find no evidence of a systematic deterioration in traditional coping strategies at least with respect to educational outcomes. The evidence of this paper suggests that, stressed as they may be and despite a significant increase in the number of orphans to be absorbed, extended family networks have still managed to provide similar levels of support in recent years as a decade ago.

The paper is organized as follows. The following section reviews recent literature on schooling and orphan status in Africa. Section 3 describes the data and definitions used in this study and presents rates of orphanhood. Sections 4 and 5 present the empirical results and discussion. The final section concludes.

2. Recent Literature on Schooling and Orphan Status in Africa

Theoretical mechanisms

The literature on orphanhood and schooling suggests a range of mechanisms through which parental death may influence a child's schooling outcomes (see Case *et al.* 2004, Gertler *et al.* 2004, Guarcello *et al.* 2004, Ainsworth *et al.* 2005, Bozzoli 2006, Beegle *et al.* 2005, Yamano and Jayne 2005, Case and Ardington 2006, Evans and Miguel 2007). There are multiple pathways that could lead to depressed investments in orphans' education and/or orphans having lower returns to education relative to non-orphaned children.

The financial resources of the household may be reduced through the loss of earnings of the deceased parent and high medical and funeral costs. In an environment where households are credit constrained this could result in lower investments in education. At the same time the opportunity cost of children's time may be raised by an increased

demand for them to care for critically ill parents and to substitute for the labour of the ill or deceased parent.

Foster parents or guardians may not have the same altruistic ties to orphaned children as to their own biological children leading to intra-household discrimination. Additionally if these caretakers are less likely to realize financial gains from investments made in orphans, then incentives to invest in orphans will be weaker.

Loss of parental involvement may affect schooling in a number of ways. Parents may simply be the gatekeepers to a child's education, in the sense that no other adult is as motivated to ensure that children get to school and that household resources are channeled to children's education. If schooling is more productive when parental involvement is high then orphanhood may reduce the returns to education. Parental death may also affect nutrition and health and therefore on the ability to learn.

Orphans cognitive and emotional development may be affected by the psychosocial impact of losing a parent. Scarring may result in the child being less school-ready than they were prior to the death of a parent. AIDS orphans potentially face additional psychological trauma through stigmatization.

The AIDS epidemic may also affect schooling through channels other than parental death. Yamano and Jayne (2005) and Forston (2007) find that school attendance for all children is negatively correlated with lagged HIV prevalence rates. This suggests that decreased life expectancy due to AIDS may alter parents' and caregivers' expectations about lifetime returns for themselves and their children from investments in children's education.

Empirical issues

In empirical work it is generally not possible to identify the specific pathways through which parental death affects schooling outcomes. Indeed, without longitudinal data, it is difficult to distinguish whether orphanhood has a causal effect on schooling or whether observed associations merely represent a spurious correlation. For example, orphans may come from households that were systematically poorer prior to a parents' death leading to correlations between the death of a parent, household poverty and schooling (Case and Ardington 2006). In cross-sectional studies the household characteristics observed after a parents' death may have been affected by the death and are therefore potentially endogenous. For example if the socio-economic distribution of HIV infection is such that AIDS deaths are concentrated in households of higher socio-economic status and socio-economic variation is partially unobserved then estimates of the impact of orphanhood will be biased towards zero (Evans and Miguel 2007). Household fixed effect estimation strategies may avoid this omitted variable bias but are still limited to comparing orphans to other children with whom they currently live. Beegle *et al.* (2007: 1267) argue that "it is not clear that a household fixed effects approach is appropriate if orphans are strategically placed in better-off households within the extended family and the orphans

in a household fixed effects framework are compared to a non-random sample of non-orphan co-residents."

Bicego *et al.* (2003) point out that even in longitudinal studies the true impact of parental death may be partially hidden as AIDS-related orphan incidence occurs after a period of erosion in the family situation. In this case, educational attainment may have begun to deteriorate before the child became an orphan. Therefore, the group of children who are not orphans also includes children whose education is affected by the AIDS epidemic.

Longitudinal data can go some way to establishing whether the impact of parental death is causal by observing children and their households both before and after the death. One still cannot however identify the specific pathways and thus the focus of the empirical work is to estimate the cumulative or reduced form effects on children's schooling via all pathways (Gertler *et al.* 2004).

The risk of orphanhood and school attendance both increase with age so estimates of orphan deficits will be attenuated in analyses that do not control adequately for age. A much cited paper by Ainsworth and Filmer (2002) found relatively small impacts of parental death and marked diversity between countries but their conclusions were based on the comparison between the fraction of orphans and non-orphans enrolled in school and did not adjust for age. The review of empirical evidence that follows excludes analyses that do not take into account the correlation between age, school outcomes and orphanhood (e.g. Ainsworth and Filmer 2002, Bennel 2005).

Recent empirical evidence

Several multi-country studies have used large cross-sectional nationally representative datasets to examine the impact of orphanhood on educational outcomes in sub-Saharan Africa. In general these studies find that orphans in sub-Saharan Africa are at risk for worse schooling outcomes even after controlling for their relative poverty.

Bicego *et al.* (2003) use Demographic and Health Survey (DHS) data collected in 1998 and 1999 from three East African and two West African countries with widely divergent HIV prevalence to estimate the odds of a child being at the correct grade for their age¹. Pooling the data within each region they find that both primary and secondary school age orphans in East Africa are less likely to be enrolled than non-orphaned children. Double orphans are at a particular disadvantage and for younger children the loss of a mother is more detrimental than the loss of a father. These results are robust to the inclusion of individual and household level controls. In the West African sample only primary school age orphans are at a significant disadvantage.

Monash and Boerma (2004) analyse school attendance of ten to fourteen year olds in 31 sub-Saharan countries using DHSs and Multiple Indicator Cluster Surveys (MICS). They present point estimates aggregated at the sub-regional level of the ratio of the proportion

¹ They use data from DHSs conducted in the early 1990s to examine trends in the relative poverty and living arrangements of orphans but do not compare educational outcomes over time.

of orphans who are attending school with the proportion of non-orphans who are attending school. The ratio is below 1 in 30 of the 31 countries with orphans being approximately 13% less likely on average to attend school than non-orphans. Double orphans were found to be at a particular disadvantage.

Guarcello *et al.* (2004) use MICS data from ten sub-Saharan countries to analyse the links between orphanhood, child labour and school drop-out. They find that orphans are significantly less likely to attend school in nine of the ten countries with double orphans at a particular disadvantage. The relationship between orphanhood and children's exposure to work is less clear with orphans being significantly more likely to work in five of the ten countries.

Using data from nineteen DHSs in ten African countries between 1992 and 2000 Case *et al.* (2004) find that orphans are less likely to be enrolled than non-orphans and that paternal orphans live in relatively poorer households. Effects are largest for double orphans and there is no evidence that female orphans suffer any additional disadvantage. They extend previous work on orphanhood and schooling in Africa by assessing the empirical evidence for different hypotheses for orphans' poorer educational outcomes. They employ household fixed effect models to test for within-household discrimination and find that orphans are less likely to be enrolled than non-orphans with whom they live providing evidence against the hypothesis that the orphan disadvantage is accounted for solely by their poverty. Further they find no evidence that within-household discrimination against orphans is exacerbated by poverty suggesting that increased resources do not protect orphans from poorer outcomes. Living arrangements, in particular the degree of relatedness to the household head, are found to have a large impact on schooling outcomes. The lower enrolment of orphans is largely explained by the greater tendency of orphans to live with distant relatives or unrelated caregivers.

More recent work by Ainsworth and Filmer (2006) estimates enrolment differentials using a multivariate model that includes controls for age and wealth. They examine data from 102 surveys in 51 countries in Africa, the Caribbean, Latin America and Asia. They find considerable diversity in the impact of orphanhood with statistically significant deficits in less than half of the 102 surveys and argue that generalizations across countries are difficult and that "the orphan enrolment gap is typically dwarfed by the gap between children from richer and poorer households (Ainsworth and Filmer 2006:1099)." The focus of the paper is very much on pulling together their cross-continental findings. However, an in-depth inspection of their rich array of empirical evidence by region yields more a nuanced interpretation. If one restricts the analysis to African countries and the high prevalence countries (HPC) of Eastern and Southern Africa in particular the results appear much more consistent. In 30 out of the 36 surveys from 15 countries in Eastern and Southern Africa orphans were significantly less likely to be enrolled². There were

² In the remaining six surveys there were no significant orphan deficits. Point estimates for maternal and double orphans were negative but not statistically significant for the 1992 Namibian DHS, the 1996 Tanzanian DHS and the 1998 South African DHS. There was a significant positive effect of paternal orphanhood in the 2000 Namibian DHS and of double orphanhood in the 1993 Kenyan DHS. The Kenyan 2000 MICS survey has an enrolment rate for non-orphans of 74.5% compared to rates of 91.3% and 91.5%

also significant negative effects in 23 out of the 34 surveys from Western and Central Africa. The gaps in enrolment between the richest and poorest children in these countries are indeed large but orphan enrolment differentials that control for wealth indicate that orphans are at greater risk for poor schooling outcomes than other poor children. Similarly to Case *et al.* (2004) they find that paternal orphans are poorer while there is no systematic relationship between poverty and maternal death. They also investigate whether deficits associated with being an orphan differ by socio-economic status but find no clear patterns in the data.

Ainsworth and Filmer (2006) go some way towards an analysis of trends in orphan educational deficits by calculating enrolment differentials for multiple years for many of the countries included in their study. However, the focus of the paper is very much on a comparison across countries rather than over time, with these results only presented in the appendix and no detailed commentary about changes over time. Examining their results for Eastern and Southern African countries for which there are multiple surveys (see discussion in the appendix) no clear time trends in the vulnerabilities of orphans emerge. The diversity across countries and the uncertainty about the multiple pathways through which orphanhood may affect schooling endorses a focus on changes over time within one country where there are sufficient observations to analyse trends.

In addition to these cross-country analyses a number of recent studies have used longitudinal data to examine the impact of parental death on education. These studies allow researchers to go some way towards evaluating competing explanations for the deficits we see in orphans and to establish whether parental death has a causal effect on schooling outcomes.

Ainsworth *et al.* (2005) analysed a Northwestern Tanzanian panel of 1,213 children (1991-1994) and found that attendance was delayed for maternal orphans and children in poor households with a recent adult death. They found no evidence of children dropping out of primary school but children spent less time in school in the months preceding an adult death and seemed to recover following the death. The panel nature of the data set was not fully exploited in this study. Although the authors controlled for base line characteristics they did not employ individual fixed effects models so the results are susceptible to omitted variable bias.

Yamano and Jayne (2005) use a three year nationwide panel dataset of 1,422 rural households collected in 1997, 2000 and 2002. They find significant negative impacts of working-age adult death on enrolment but only amongst poor children. School attendance is affected prior to the death in poor households and more so for girls suggesting that female children are sharing the burden of caring for sick adults. In contrast school attendance for boys drops sharply after a death in relatively poor households.

in the 1998 and 2003 DHSs. The authors give no information about differences in sampling but based on these enrolment figures the 2000 MICS survey does not appear to be nationally representative.

Evans and Miguel (2007) use a five-year school-based panel dataset of over 20,000 children in the Busia district in Kenya. The study covers 84% of primary schools in the region. They find a substantial decrease in primary school participation following a parent death and a smaller drop before the death. While girls are at no particular disadvantage, impacts of maternal deaths are more than twice as large as those for paternal deaths. They find no evidence of an orphan recovery after the death. Children with lower pre-parental death academic test scores experience greater reductions in school participation after parental death than do children with higher baseline test scores “suggesting that households decide to focus their increasingly scarce resources after a parent death on more promising students (Evans and Miguel 2007:52).” Their analysis suggests that estimates based on cross-sectional data are biased towards zero as estimated impacts are larger in specifications with individual fixed effects.

Using data from a large longitudinal study in northern KwaZulu-Natal in South Africa Case and Ardington (2006) find significant differences in the impact of mothers' and fathers' deaths. The study uses data collected on school-aged children between 2001 and 2004 with a sample of 17,000 children observed in two time periods. Maternal orphans are less likely to be enrolled in school, have completed significantly fewer years of schooling and less money is spent on their education than children whose mothers are alive. Using household fixed effects they find that maternal orphans are at an educational disadvantage relative to other children within the same household. They use the timing of mothers' deaths and employ individual fixed effects to argue that these deaths have a causal effect on children's education. They find that the correlation between fathers' deaths and children's schooling outcomes appear to be driven entirely by their common link to household socio-economic status. They compare their results to the 2001 South African census and find the estimated effects to be very similar suggesting that their findings are generalisable beyond just the field site.

Timaeus and Boler (2007) follow a cohort of 1,088 nine to sixteen year olds over six years using the second and third wave of the KwaZulu-Natal Income Dynamics Study in South Africa. They find no evidence that maternal orphanhood or living apart from one's mother adversely affects children's schooling attainment. Fathers' deaths and absence however result in slower progress through school. Less than a third of the negative impact of paternal death and absence is explained by the relative poverty of the household. The interpretation of the results is somewhat complicated in that deceased mothers are compared to co-resident mothers who went to primary school whereas deceased fathers are compared to co-resident fathers with any level of education. They provide no information about the educational status of mothers who died. Attrition is a concern with only 68% of nine to sixteen year olds in the 1998 wave re-contacted in 2004. There was already considerable attrition in the panel between 1993 and 1998.

Beegle *et al.* (2006) and Bozzoli (2006) examine outcomes for young adults and provide some insight into the long term effects of orphanhood and the impact of deficits in schooling on outcomes in early adulthood. Using data from two waves of a Tanzanian panel conducted in 1991-1994 and again in 2004 Beegle *et al.* (2006) find that maternal orphans permanently lose on average close to one year of schooling and that maternal

orphanhood is associated with height deficiencies for those aged 11 to 18 in 2004 indicating that orphanhood at an early age has detrimental and lasting effects on health and nutrition. Bozzoli (2006) uses panel data from the same field site in northern KwaZulu-Natal as Case and Ardington (2006). He finds that among young adults aged 18 to 25, orphans leave school earlier, are less likely to finish high school and are more likely to be inactive (not enrolled, unemployed and not seeking work). He finds that orphans in poorer households are more likely to stay inactive and orphans with more education prior to the parental death have better labour market outcomes.

Longitudinal studies are not without their disadvantages. They are usually localised and so the generalisability of findings is not clear; attrition can pose serious problems particularly as children experiencing parental death may be more likely to be lost to follow up; and sample sizes are often small with resultant imprecise estimates of rare events such as parental death³.

While longitudinal studies give us some insight into the causal impact of parental death on schooling outcomes they do not shed any light on how the vulnerabilities of orphans are changing as the AIDS crisis deepens⁴.

This paper adds to the literature on orphans and schooling in Africa by explicitly examining changes in the vulnerability of orphans to poor educational outcomes over time within a particular country. The focus of the new empirical work in this paper is on South Africa. South Africa is a particularly interesting case study for a number of reasons. Most importantly, rates of orphanhood have risen sharply and will continue to do so for the next decade and the schooling system is characterized by high enrolment and high rates of grade repetition. There is very little nationally representative research on orphanhood in South Africa⁵ in spite of the availability of over a decade of large nationally representative datasets. This paper examines the impact of orphanhood on both enrolment and attainment. Much of the research to date has focused on enrolment rather than educational attainment. Ainsworth and Filmer (2006:1107) claim that "the countries most affected by the AIDS epidemic have among the lowest enrolment rates in the world." Figure 1 uses their results and plots enrolment rates for non-orphaned children aged 7 to 14 against estimated HIV prevalence around 2000 for the 33 African countries included in their study. For Africa at least their claim is not borne out in the data. There does not appear to be a negative association between HIV prevalence and enrolment. Indeed some of the countries with the highest HIV prevalence have the highest enrolment rates. In the literature the contrast between enrolment of orphans and non-orphans is greatest in countries where enrolment is already low (UNICEF 2003). For countries with

³ For example, Timaeus and Boler (2007) and Ainsworth et al. (2005) follow only 1,088 and 1,213 children respectively.

⁴ Ainsworth and Filmer (2006) and Bennel (2005) begin this analysis but only provide a very cursory analysis of changes in orphan schooling deficits over time.

⁵ Monash and Boerma (2004) include the 1998 South African DHS in their analysis but only present results aggregated at a regional level, Ainsworth and Filmer (2006) include the 1998 DHS and the 1995 and 1998 OHSs but do not analyse changes, Case and Ardington (2006) estimate enrolment and attainment deficits using the 2001 Census.

high enrolment any educational deficits that orphans may experience are more likely to be apparent when looking at educational attainment.

In what follows this paper first looks at trends in orphanhood as this is the key context for the empirical work. Section 4 proceeds to examine the living arrangements, economic well-being and schooling outcomes (educational attainment and enrolment) of orphans and non-orphaned children. The final section investigates alternative explanations for orphan schooling deficits by examining whether effects are homogenous among orphans.

3. Data, definitions and rates of orphanhood

Data and definitions

The analysis in this paper is based on all publicly available nationally representative South African datasets that include questions on parents' vital status. I use the 1993 Project for Statistics on Living Standards (PSLSD), the 1995-1998 October Household Surveys (OHS), the 1996 and 2001 Censuses, and the 2002-2005 General Household Surveys (GHS). In addition to data on parents' vital status all of these surveys collected data on years of completed education, current enrolment status, household living arrangements and a range of variables capturing the household's living conditions.

The samples for all surveys other than the censuses were multi-stage stratified random samples of non-institutionalized households in the case of the PSLSD, OHSs and DHSs and households and hostels in the case of the GHSs. Hostels are not identified in the GHS data but the analyses in this paper focus on children of schooling going age so are unlikely to include many hostel dwellers. The sample sizes vary from 9,000 to 30,000 households. The census data used in this paper are 10% samples of the censuses with weights to adjust for the undercount⁶. The sample sizes are large with 846,478 and 905,748 households in 1996 and 2001 respectively.

The surveys are all conducted at the household level and ask a knowledgeable adult to list all individuals who usually live in this household (see appendix for different definitions of household membership and residency). Co-resident parents were identified in the household roster in all surveys other than the 1996 Census and the 1997 and 1998 OHSs. There are no data on cause or timing of parental death in any of the surveys so it is impossible to distinguish AIDS orphans from other orphans.

All results are weighted to be nationally representative and standard errors and statistical tests take the survey design (stratification and clustering) into account. Barnes *et al.* (2007) provide a detailed account of the different sample frames and weighting procedures used in each of these questionnaires. The appendix provides a detailed discussion on the comparability of particular variables of interest across surveys.

A maternal orphan is defined as a child whose mother is deceased and whose father is known to be alive, a paternal orphan as a child whose father is deceased and whose

⁶ Institutions are included in the 10% samples but were excluded from the analyses in this paper.

mother is known to be alive and a double orphan as a child whose mother and father are both deceased. Single orphans refer collectively to maternal and paternal orphans. Orphans refer to children who have lost at least one parent and non-orphans have two surviving parents. Following Case *et al.* (2004) I also define a "virtual" double orphan as a child who has lost one parent and does not live with the surviving parent. A foster child has two living parents but does not co-reside with either of them.

In the analyses that follow I focus on African⁷ children of school going age. The paper focuses on African children for three reasons. Firstly, HIV prevalence amongst non-Africans is low⁸. Secondly while there is growing within race inequality, Africans differ substantially from the other racial groups on a range of socioeconomic indicators that are likely to affect schooling outcomes. Finally response rates for Africans in South African surveys are typically much higher than for other racial groups. All results shown below were replicated for the whole of South Africa with no resulting differences in any of the substantive findings.

Rates of orphanhood

Figure 2 shows for each survey the percentage of African children under the age of 18 whose mother is deceased or whose father is deceased. Figure 3 indicates the percentage of maternal, paternal and double orphans. The bars represent 95% confidence intervals around the point estimates. The increase in parental death over the twelve years from 1993 to 2005 is clear - the percentage of children whose mother is deceased has risen from 2.4% to 6.9% and the percentage whose father is deceased has risen from 8.7% to 16.6%. It is evident from the graphs that the greatest increase has been in the percentage of double orphans and has occurred since 1998. The percentage of children who are maternal, paternal and double orphans has risen by 94%, 64% and 348% respectively. The percentage of children who have lost at least one parent who are double orphans has increased from 7.9% in 1993 to 18.5% in 2005.

Figure 4 shows rates of orphanhood by age for African children under the age of 18 in 1993, 1996, 2001 and 2005. The risk of orphanhood clearly increases with age. The most recent estimates from 2005 indicate that by the age of seventeen over a quarter (29.4%) of children have lost their father, 12.9% have lost their mother and 7.4% are double orphans. The increase in orphanhood over time, particularly the percentage of double orphans, is clear.

There are no data on the cause or timing of parental death so one cannot distinguish AIDS orphans from other orphans. It is not clear how much of the increase in orphanhood can be attributed to HIV/AIDS although the disproportionate increase in the number of double orphans "is largely attributable to the dependency between paternal and maternal

⁷ Africans represent over 80% of the South African population.

⁸ The Nelson Mandela HSRC Study of HIV/AIDS in 2005 found for those aged 15 to 49 the percentage HIV positive was 19.9% of Africans, 0.5% of whites, 3.2% of coloureds and 1.0% of Indian/Asians. (Shisana *et al.* 2005:40)

mortality that is introduced by AIDS (Johnson and Dorrington 2001:i).” Ainsworth and Filmer (2006) point out that due to the long average lag between HIV infection and AIDS mortality, countries with recent rapid increases in HIV prevalence will still have relatively low AIDS mortality and the immediate impact on rates of orphanhood will be modest. Anderson and Phillips (2006:7) show that between 1995 and 1998 the percentage of women at public antenatal clinics who were HIV positive increased from 10% to 23% with no increasing trend in orphan rates during this period. Using the Actuarial Society of South Africa 2000 Orphans Model, Johnson and Dorrington (2001) project that the number of orphans is likely to peak around 2015 with roughly two million maternal orphans under the age of 15 and three million under the age of 18. Although we have seen the percentage of children who have lost mothers and fathers triple and double respectively we can expect further rapid increases in the prevalence of orphanhood over the next decade.

4. Orphan status, living arrangement, poverty and schooling outcomes

Orphan status and living arrangements

Child headed households will be under-represented in the data as interviewers are typically instructed to interview a knowledgeable adult about the household. Children living on the streets and in institutionalized settings are also excluded by design. The percentage of children living in institutions is negligible. Using the 2001 Census Anderson and Phillips (2006:18) estimate that 1.3% of children aged 0 to 14 live in an institution and that orphans are no more likely to live in an institution than non-orphaned children. Table 1 presents information on the living arrangements of African children aged 8 to 17 in non-institutionalised households for each of the surveys. Non-orphaned children are substantially more likely to be living with their mothers than their fathers and child fostering is common. In the most recent survey (2005) 74% of non-orphans lived with their mother, 42% with their father and nearly a quarter (23%) with neither parent. Only 38% of non-orphans lived with both parents. These child-parent co-residency patterns for non-orphans seem to be fairly stable over the period 1993 to 2005.

Children who have lost one parent are less likely than non-orphans to live with the surviving parent and this appears to be increasingly true over time. The percentage of maternal orphans who are "virtual" double orphans increased from 65% in 1993 to 73% in 2005. Paternal orphans are at much lower risk of being "virtual" double orphans but the percentage living with their mother has decreased from 78% in 1993 to 67% in 2005. The difference between children who have lost a mother and those who have lost a father is highlighted by the following categorisation. Fifty-seven percent of children whose mother had died were double orphans, 31% are "virtual" double orphans and 12% live with their father. In contrast among children whose father had died, 23% are double orphans, 25% are "virtual" double orphans and 52% are living with their mother.

The surveys all record the relationship between the child and the household head and most identify co-resident parents. Primary care givers and relationships to other members of the household are not identified. The relationship to the household head is used as a

proxy for the relatedness of the child to the household. Children are classified as living in a household headed by a parent, grandparent, other relative or non-relative. A negligible percentage of children (0.7% of non-orphans and 1.4% of double orphans) classified themselves as the household head. In a number of cases double orphans are identified as the son or daughter of the household head or maternal and paternal orphans are identified as the children of female and male heads respectively. In some of the surveys adoptive and foster children are included in the same category as biological children. Double orphans, maternal orphans in female headed households and paternal orphans in male headed households were reclassified as foster/adoptive children if they had been identified as sons or daughters of the household head.

Relationship to the household head is only a crude proxy for the degree of relatedness of the child to the household. For example if an orphan lives in a household headed by a non-relative one does not know whether or how they are related to any other household members. Three generation households are very common in South Africa and around 27% of African children aged 8 to 17 live in a household headed by a grandparent. In about half of these households at least one parent is present. It is not clear that these children are different with respect to relatedness to the household than children where a present parent is considered the household head. I therefore created a second measure where children were classified as living with a parent, not co-residing with a parent in a household headed by a grandparent, not co-residing with a parent in a household headed by another relative or not co-residing with a parent in a household headed by a non-relative.

The majority of non-orphans (63%) live in a household headed by a parent. Twenty seven percent live in households headed by a grandparent, 8% live in a household headed by another relative and 1% in a household headed by a non related person. This pattern in the relationship to the household head for non-orphans has not changed over the thirteen year period of this study. The living arrangements of orphans, however, do appear to have shifted over time. There has been a substantial increase in the percentage of maternal and paternal orphans living in households headed by a grandparent – the increasing numbers of "virtual" double orphans are mostly accommodated in these households. The percentage of single orphans living in a grandparent headed household has increased from 37% to 47% and 17% to 31% for maternal and paternal orphans respectively. Only around 1% of single orphans live in a household headed by a non-relative and for paternal orphans the mother is co-resident in many of these households.

Over half (52%) of the double orphans live in a household headed by a grandparent. Forty two percent live with other relatives and less than 2% live in households headed by a non-relative. Five percent are classified as the foster or adoptive child of the household head. As with single orphans the percentage living in a household headed by a grandparent has increased from 43% in 1993 to 52% in 2005.

The percentage of households with children aged 8 to 17 housing at least one orphan has increased from 16% in 1993 to 25% in 2005. Over the period under study around a quarter of orphans live in a household with children who have two surviving parents. The

percentage of non-orphans living with an orphan has increased from 5.9% in 1993 to 12.3% in 2005.

With respect to living arrangements, the extended family network appears to be accommodating the increasing number of orphans with no increase in the percentage of orphans living in households headed by a non related person. Within the family network there do appear to have been some shifts in the living arrangement of orphans with single parent orphans being less likely to co-reside with the surviving parent and all orphans more likely to live in a household headed by a grandparent. Bicego *et al.* (2003) also document an increasing reliance on grandparents in Tanzania, Namibia and Zimbabwe. The impact of living arrangements on the schooling of orphans and non-orphans will be investigated in section 5 below.

Orphan status and economic well-being

While the link between poverty and educational outcomes is well established in the literature (see Case and Deaton 1999, Lam *et al.* 2007), the relationship between orphanhood and economic well-being is less clear. Ainsworth and Filmer (2005:1107) find that orphans are not necessarily concentrated in poorer households "most likely because of the coping processes in which those with the most resources take in orphaned children, or because of the socio-economic distribution of HIV infection." Comparing the relative poverty of orphans in the early and late 1990s Bicego *et al.* (2003) find that orphans are consistently better off in Kenya and Tanzania and increasingly better off in Niger while the relative poverty of orphans in Zimbabwe and Ghana has risen. They suggest that increases in the relative poverty of households absorbing orphans in Zimbabwe "may signal a strain in the way communities deal with orphans as the impact of AIDS is felt more pervasively." Case *et al.* (2004), Ainsworth and Filmer (2006) and Case and Ardington (2006) found that paternal orphans came from poorer households while maternal orphans were not systematically better or worse off than non-orphans.

The relationship between parental death and household economic well-being is investigated in Table 2. Indicators that the child's mother/father is deceased are regressed on a range of measures of economic well-being (expenditure per capita, access to piped water, access to a hygienic toilet and electricity from the main supply). The regressions control for the child's age using a full set of dummies and include an indicator for gender. There is a strong relationship between paternal death and economic well-being. Children whose fathers are deceased are significantly more likely to live in households without access to electricity, piped water and hygienic toilets and with significantly lower per capita expenditure. Children whose mothers have died do not live in households that are systematically richer or poorer than other children's households. There does not appear to be any evidence of a systematic improvement or deterioration over time in the economic well-being of households in which orphans live relative to non-orphans' households.

Without longitudinal data one can only examine the well-being of the child's household after a parental death. For example there is no way of knowing whether the household was poor prior to a paternal death or whether the death contributed to the relative poverty

of the household. I am therefore unable to distinguish between a spurious correlation between paternal death and schooling outcomes and an indirect causal effect of paternal death on schooling outcomes operating through changes in household well-being. Case and Ardington (2006) use a large longitudinal dataset in northern KwaZulu-Natal to argue that father's deaths do not have a causal effect on schooling. They found that households where fathers died were poor prior to the death of the father.

If children are fostered into the better resourced households in an extended family network then one may over-estimate the impact of orphanhood when comparing them to children with whom they live. I find no evidence that households that take in orphans are systematically better off. Following Case *et al.* (2004) I refer to households with both orphans and non-orphans as "blended" households. "Blended" households are significantly larger (by about two members) and have lower living standards (as measured by per capita expenditure and access to electricity, piped water and hygienic toilets) than non-"blended" households. These "blended" households will enable us to compare outcomes for orphans to those of non-orphaned children with whom they live.

The next section turns to examine the vulnerabilities of orphans with respect to educational outcomes. In all that follows I will only ever be able to control for concurrent household characteristics.

Orphan status and schooling

The South African Schools Act of 1996 makes schooling compulsory from the age of seven till fifteen. While there is some evidence of delays in starting school, enrolment is almost universal in this age group. Despite this there are large and persistent racial and socio-economic gaps in educational attainment driven primarily by high rates of grade repetition amongst Africans (Anderson *et al.* 2001, Lam *et al.* 2007). Enrolment among Africans remains high into the late teens but students do begin to drop out before completing their secondary schooling. In 2005 for example 16% of 16 to 18 year olds who had not completed secondary school were not enrolled.

Case *et al.* (2004:497) restrict their analysis to enrolment as they argue that attainment does not reflect current investments by caregivers but rather "a history of enrolment over the child's life." Case and Ardington (2006:417) distinguish between "a child's educational "stock" (years of completed education) and educational "flow" (enrolment and current spending on children's schooling)." Given that the South African schooling system is characterised by high enrolment and high rates of grade repetition this paper looks at both enrolment and grades completed in the analyses that follow.

The regressions include separate indicators for maternal and paternal deaths as the literature suggests that there are different effects for the death of a mother relative to the death of a father. Empirical evidence suggests that, in general, the death of a mother has greater impacts on children's schooling than the death of a father. I do not distinguish between paternal, maternal and double orphans as is done in much of the literature. In order to assess whether the impact of losing both parents is merely equal to the additive

effect of losing a mother and a father an interaction term between the maternal and paternal death indicators was included in the regressions (Table A1 in the appendix). The interaction term is insignificant with and without household controls and in the fixed effect models suggesting that the simpler specification without the interaction term adequately captures the impact of parental death on schooling. This may be due to the fact that almost ninety percent of children whose mother has died are either double orphans or "virtual" double orphans. Parental death is rare, which often results in insufficient statistical precision to reliably estimate impacts especially when one includes interactions to examine whether effects are homogenous among all orphans. I therefore prefer the simpler specification for most of the analyses to follow.

Parent's vital status is missing for a number of cases. I experimented with a variety of approaches to missing data (see discussion and results in the appendix) and found that my results were robust with all specifications generating negative estimates of the impact of parental death. The regressions that follow include an indicator that the parent's vital status is missing and the orphan status indicators are set to zero.

Figure 5 shows coefficient estimates and 95% confidence intervals for regressions of years of completed education on indicators that the child's mother and father are deceased for African children aged 8 to 17. The sample is restricted to children aged 8 and older as there have been small changes in the age of admission in the period under study and in all surveys these children should have completed at least one year of education if they were making normal progress at school. The first column controls for the child's sex and age using a full set of age dummies. The second column includes the following household controls: age, sex and education level of the household head, indicators for each of nine provinces, an indicator that the area is urban, logarithm of per capita household expenditure, indicators that the household has a hygienic toilet facility, access to piped water and electricity, the logarithm of household size, the fraction of residents who are less than 14 years old and indicators that there is at least one female/male resident who is age eligible for the social pension (Tables A2 to A6 in the appendix present means for all variables used in the regressions by orphan status). The third column estimates household fixed effects. Coefficients for maternal and paternal death are presented in the first and second row respectively of Figure 5.

Starting with the first column I find that for all surveys other than the 1996 and 1998 OHS⁹ there is a significant negative effect of maternal death. The point estimates of the

⁹ The 1996 OHS was conducted in the same year as the Census and was limited to a smaller and less dispersed sample than other OHSs due to financial and time constraints (Barnes *et al.* 2007). The quality of the data has also been questioned "due to the difficulty of conducting the fieldwork for the 1996 OHS just after the fieldwork for the 1996 Census (Anderson and Phillips 2006)." The estimates from the 1996 OHS differ not only from those of the preceding and following OHSs but also from the Census conducted in the same year. From this point onwards results from the 1996 OHS are not shown. The 1998 OHS is also a smaller sample than previous years and is the only survey where the results are sensitive to the inclusion or exclusion of sampling weights. The 1998 Demographic and Health Survey (DHS) was excluded from the analysis because the survey did not include a race variable in the household roster and only asked questions of parents' vital status for children under fifteen years of age. Estimates for all South Africans aged 8 to 14

deficit range from 0.15 to 0.31 of a year less completed education than children of the same age and sex whose mothers are alive. The un-weighted average deficit is 0.20. There does not appear to be any clear trend in this deficit over time. Children whose father has died are also at a significant disadvantage with respect to educational attainment although the average magnitude of the deficit (0.15) is slightly lower than that for a maternal death. As with maternal deaths, there does not appear to be any clear evidence of systematic deterioration or improvement in the deficit that orphans face with respect to educational attainment.

The first column of Figure 5 documents that orphans are consistently at risk for lower educational attainment and that this orphan deficit is generally larger for maternal death than paternal death. The next two columns of Figure 5 investigate how much of this disadvantage is driven by poverty and whether orphans are at greater disadvantage than other poor children. The second column introduces controls for household characteristics with the result that the coefficients on paternal death are substantially reduced (the average coefficient drops from 0.145 to 0.079) while the results for maternal death are not affected. Around half of the disadvantage associated with paternal death is accounted for by the socio-economic conditions of the household. One cannot distinguish between an indirect causal effect of paternal death on schooling outcomes operating through economic status and a spurious correlation between paternal death, household poverty and schooling. Without longitudinal data one also cannot estimate whether a maternal death has a causal effect on the child's schooling but the results do suggest that maternal death is directly associated with poorer schooling outcomes rather than being channelled through socio-economic status.

Over a quarter of orphans and 12% of non-orphans live in "blended" households. This enables one to move beyond comparing orphans to children of similar socio-economic status to comparing orphans to non-orphans within the same household. Household fixed effect models allow us to examine whether there are intra-household differences and avoid empirical problems associated with the mis-measurement of household characteristics. The third column of Figure 5 presents estimates from household fixed effects models. The coefficient for maternal death remains unchanged suggesting that on average children whose mothers have died have completed 0.22 years less education than the children with whom they live whose mothers are alive. The coefficient is significant at the 5% level or better for all surveys other than the 1993 PSLSD. The coefficient on paternal death is further diminished (the average coefficient is 0.034) and is statistically significant in only 4 surveys.

The primary objective of this paper is to document the extent to which the vulnerability of orphans to poorer educational outcomes is changing over time. Table 3 presents estimates analogous to those in Figure 5 for two pooled samples and the 2001 Census. Pooling both improves statistical precision and allows for easier identification of any trends in the data. Looking back to Figures 2 and 3, rates of orphanhood and particularly

from the 1998 DHS show significant negative effects of a mother's death on educational attainment (coefficient = -0.275, standard error = 0.106).

double orphanhood were fairly flat in the 1980s and then rose substantially after 1998. Data were pooled to create a 1993 to 1998 sample and a 2002 to 2005 sample. Weights in each survey were scaled to sum to one so that within each pooled sample each survey receives equal weight. Expenditures were inflated to 2005 Rands and indicators for the year of the survey were included in all regressions. Each row in Table 3 presents selected coefficients and their standard errors from a single regression model. In the models with only individual level controls (panel A) the impact of maternal death seems to have decreased slightly although not significantly. As with the results for each survey individually, adding household controls (panel B) has very little effect on the maternal death coefficients. There is a slight decrease in the coefficient for the earlier sample and a slight increase for the two more recent samples when household controls are included. The magnitude of the gap in schooling attainment between children who have lost their mother and other children with whom they live whose mothers are alive (panel C) has increased slightly over the period under study. Changes for paternal death impacts in models without household controls are more marked than for maternal deaths. The deficit in grades completed increases from 0.104 in the first sample to 0.197 in the most recent sample. Estimates for paternal death without household controls are actually slightly larger than for maternal death in the most recent sample. The coefficients on paternal death are greatly reduced however when household controls are added. The household fixed effect estimates for father's deaths are further diminished. Compared to other children with whom they live children who have lost a father are on average only 0.07 years behind in school. In the regressions that control for household socio-economic status and the household fixed effects models the impact of paternal deaths, although small, does appear to increase between 1993 and 2005.

The pooled data are helpful in summarising impacts across surveys and in identifying any trends in the data. The estimates from each survey are also useful in that they give a sense of the consistency of findings. Looking back at Figure 5, conclusions about the impact of orphanhood on educational attainment could vary considerably depending on the survey selected, highlighting the advantage of having multiple observations over time to build a comprehensive picture of orphan vulnerabilities.

I examine whether the effects are homogenous with respect to the age of the orphans by splitting the sample into younger (8-12) and older (13-17) children. The deficit for younger children is smaller and less precisely measured at least in part because there are fewer orphans in this age group (results in Tables A7 and A8 in the appendix). However younger children have had less opportunity to fall behind and if educational attainment is expressed as grades completed relative to potential the effects of maternal death are very similar for both groups of children. Paternal deaths on the other hand appear to only negatively impact older students.

Estimates of the effect of parental death on enrolment are shown in Figure 6. The analysis is restricted to African children aged 7 to 15 – the age group for whom schooling is compulsory. There is very close to universal enrolment in this age group and as expected effects of parental death are small. The figure shows coefficient estimates and 95% confidence intervals for maternal and paternal deaths in the first and second row

respectively. As with the previous figure, the first column shows estimates from regressions with only individual controls. The second column includes household controls and the third column shows estimates from household fixed effects models. Estimates for maternal and paternal death in models with and without household controls are always negative but only significant in four and five surveys for maternal and paternal deaths respectively. Children whose mothers are deceased are on average 2 percentage points less likely to attend school while those who have lost fathers are 1 percentage point less likely to attend school. There are small but significant deficits in enrolment for paternal deaths in six of the household fixed effects regressions. Maternal death deficits are only significant for three surveys.

Figure 7 examines enrolment for children aged 16 to 18 who have not yet completed secondary school. Parental death puts late teens at risk for dropping out of school before completion of Grade 12. For models with household controls the maternal death coefficients are significantly negative in seven out of the ten surveys and the average deficit is 4.4 percentage points. Paternal death also has significant negative effects in eight of the ten survey years with an average deficit of 3.8 percentage points. The average estimated deficits do not change in the household fixed effects models but estimates are now significantly different from zero in only four of the surveys for both maternal and paternal death. In contrast to the results for attainment paternal death impacts on enrolment do not seem to be explained by household socio-economic status although the magnitude of impacts is small.

Table 4 presents coefficient estimates and standard errors for the pooled samples and the 2001 Census for the same regression models shown in Figures 5 and 6. For children aged 7 to 15 enrolment deficits for maternal deaths have halved between the first and last sample. This is consistently so across models without household controls, models with household controls and household fixed effect models. Enrolment deficits for paternal deaths appear to be fairly consistent over time although they are insignificantly different from zero in the most recent sample for the household fixed effects model. Results for children aged 16 to 18 who have not yet completed Grade 12 are shown in the third and fourth column of Table 4. The trends over time are similar to those observed for 7 to 15 year olds. The disadvantage in enrolment associated with maternal death appears to have declined considerably and in the household fixed effects model the estimate ranges from a deficit of 8.9 percentage point to an advantage of 3.3 percentage points (although this advantage is not statistically significant). The trend for paternal deaths is less clear although the household fixed effect estimates have declined from 5.4 percentage points in the earliest sample to 3.8 percentage points in the most recent sample.

The impact on orphanhood on other children in the household

The household fixed effects models shown in Figures 5 to 7 allow us to investigate intra-household differences and to side-step empirical problems around mis-measurement of household socioeconomic status. One is however restricted to comparing orphans to children with whom they currently live. This may result in an over or under estimation of the impact of parental death on schooling outcomes. To the extent that children are

fostered into the better off households within a family network orphan effects may be over estimated. Alternatively, if the education of all children in a household suffers when the household absorbs orphans the impact of parental death may be hidden. The percentage of non-orphaned children living in "blended" households has more than doubled between 1993 and 2005. To investigate the impact on children in households that absorb orphans I regressed educational attainment on interactions between orphan status indicators and indicators that the child lives in a "blended" household. Results are presented in Table 5 for each survey and the two pooled samples. There is no evidence that children whose mother is alive are at any particular disadvantage if they live in a household with children whose mother is deceased. The evidence on the impact of living with children whose father is deceased is more mixed. In five of the surveys they are significantly behind children with living fathers in non-"blended" households. This result is consistent with Case and Ardington's (2006) findings that paternal death was a marker for lower socioeconomic status. There does not appear to be any systematic change in the impact of living with orphans over time. I tested for significant differences between orphans in blended and non-blended households and between orphans and non-orphans in "blended" households. There is no consistent evidence that outcomes for orphans differ if they live in "blended" or non-"blended" households.

5. Discussion

While it is clear that parental death, particularly maternal death, is associated with poorer schooling outcomes, it is not clear what mechanisms drive this relationship. It is not possible to distinguish empirically between potential mechanisms and without longitudinal data one is unable to establish whether a causal interpretation is appropriate. One can however go some way towards evaluating alternative explanations for these orphan deficits by examining whether effects are homogenous among orphans. I begin by investigating the role of household resources.

Resource constraints

Results in the previous section showed that children whose mother had died had lower educational attainment than children of similar socio-economic status and than other children within the same household. Following Case *et al.* (2004) I test whether the effect of parental death operates through resource constraints by including wealth interactions in the fixed effects specifications shown in Figure 5. If investments in orphans were depressed due to resource constraints one would expect the interaction term between wealth and parental death to be significant and positive thereby offsetting the negative impact of parental death. Table 6 presents coefficients from interactions between parental death and the logarithm of expenditure per capita. There is no evidence to suggest that increased resources moderate the effect of orphanhood. The interaction terms are negative in five of the surveys for maternal and paternal death and significant in only two and three surveys respectively.

Case and Ardington (2006) found that the presence of a female pensioner mitigated some of the impact of maternal death. I also included interactions between the orphan status

indicators and indicators that there were pension age-eligible males and females in the household. The regressions already control for household composition and economic status so the aim was to assess whether the presence of the pension rather than the older adult moderates orphan outcomes. No consistent interaction effects were found (results not shown).

Parental death and parental absence

The literature suggests that loss of parental involvement may be one of the pathways through which parental death influences a child's schooling outcomes. Investigating the impact of parental absence may allow us some insight into the role of parental involvement in orphan deficits. If parental involvement matters one would expect to see a negative impact of parental absence and one would expect this impact to be less than or equal to that of parental death. Parental involvement is one of many pathways through which parental death may affect schooling and living but absent parents may still exert some influence on their children's schooling through, for example, the provision of financial and emotional support.

The different patterns of co-residency with the surviving parent between maternal and paternal orphans may explain the greater impact of maternal orphanhood on educational outcomes. There is no data on the parents' residency status at the time of their death but the death of an absent parent is unlikely to have as large an impact as the death of a co-resident parent. Given the patterns of parental co-residency among non-orphaned children fathers are much more likely to have been absent than mothers when they died.

Table 7 presents coefficients and standard errors of regressions that include indicators that a child's living parent is absent. Each row in Table 7 shows results from a single regression. The deficit in educational attainment is slightly larger for maternal deaths when comparing outcomes to children who co-reside with their mother. Children whose mothers have died are on average a quarter of a year behind children who co-reside with their mother. There is a significant negative association between a mother's absence and a child's educational attainment that is not explained by socio-economic status. Children whose mothers are absent are on average between 0.11 and 0.14 years behind children who co-reside with their mothers. In the fixed effects specification the impact of maternal death is statistically significantly larger than the impact of maternal absence in 6 of the 7 surveys. There is a small deficit associated with an absent father but this is largely explained by the household's socio-economic status and when household controls are included the impact of an absent father is significant only in 1993. Compared to other children with whom they live, children with absent fathers do tend to fare worse at school. The coefficients on paternal death and paternal absence are only significantly different from each other in two of the surveys. I experimented with models where I fully interacted parents' vital and residency status. The results are merely suggestive as small cell sizes resulted in limited statistical power to reliably estimate impacts. As a general pattern I found that children with two co-resident parents had the best schooling outcomes and, conditional on a mother being resident, the father's status does not seem to matter.

An alternate specification of the interaction between parents' vital and residency status is presented in Table 8. Children are divided into four mutually exclusive categories – children with two living parents who co-reside with at least one parent, foster children, single orphans who co-reside with the surviving parent, "virtual" double orphans and double orphans. The results support an interpretation that parental absence has a detrimental effect on children's schooling but that living parents are able to exert some influence. In general, single orphans who live with the surviving parent are only at a small disadvantage once the household's socio-economic status is taken into account. Foster children fare significantly worse than non-orphaned children who co-reside with at least one parent and results are not affected by controlling for socio-economic status. Foster children are however at less of a disadvantage than "virtual" double orphans who in turn are better off than double orphans. On average double orphans have completed around 0.43 fewer years of education than non-orphaned children who co-reside with at least one of their parents.

To the extent that parental involvement may make schooling more productive, in the absence of parents the presence of other prime-aged adults in households may substitute for the parental involvement to some extent and assist children with schooling. A skip generation household is defined as a household where there are no residents aged 18 to 54 years old. Orphans are at higher risk for living in a skip generation household with 16% of double orphans, 12% of maternal orphans, 9% of paternal orphans and 7% of non-orphans living in such households. In order to investigate the impact of the absence of prime aged adults in the household I included interaction terms between the orphan status indicators and an indicator that the child lives in a skip generation household. There is no evidence to suggest that children in general and orphans in particular have worse outcomes when they live in skip generation households.

Relatedness to the household and schooling

Case *et al.* (2004) find that orphan deficits in enrolment are largely explained by the relatedness of orphans to the household head. More distant relatives may have weaker incentives to invest in orphans' human capital both due to weaker altruistic ties and because they may be less likely to realize financial returns from orphans' education. Following Case *et al.* (2004) I estimate household fixed effects models that include indicators for the child's relationship to the household head. Children who classified themselves as the household head were excluded from this analysis as this category was so small. As discussed in the previous section two measures of relatedness to the household head are considered. Results for specifications where the reference category is children who are either the son or daughter of the household head or living with either parent are presented in Table 9. Findings are robust to just considering the relationship between the child and the household head. Once the relationship to the household head is taken into account the coefficients on maternal and paternal death are substantially reduced. The impact of maternal and paternal deaths are reduced on average by around 37% and 30% and are significant in only four and two of the six surveys respectively. Children living in households headed by grandparents have marginally lower school attainment than children who live with at least one parent. The coefficients on

grandparent heads are only significant in three of the six surveys and are positive but insignificant in two. Children living in households headed by other relatives are on average a quarter of a year behind and the estimated coefficients are significant in all surveys. Children living in households headed by a non-relative are at risk for the worst schooling outcomes being on average 0.96 of a year behind children living with at least one parent.

The previous section documented changes in the living conditions of maternal and paternal orphans over the last decade with a shift from living with the surviving parent to an increasing reliance on grandparents. The results above suggest that living with a grandparent does not put children at a large disadvantage relative to living with a parent. This may in part explain why in the face of shifting patterns of care giving there seems to be no systematic change in the vulnerability of orphans to poorer educational outcomes.

Relatedness to the household is clearly associated with educational attainment and explains some of the orphan deficit. Table 10 investigates whether orphans fare worse than non-orphans with the same relationship to household head by comparing double orphans with foster children. A full set of interaction terms between the relationship with the household head and double orphan or foster status are included in the regressions. The sample was restricted to double orphans and foster children and the regressions control for household characteristics. As with the previous results outcomes are negatively associated with the degree of relatedness to the household head for both foster children and double orphans. However double orphans have lower educational attainment than foster children with the same living arrangements. These findings are similar to those of Case *et al.* (2004).

Gender and orphan vulnerability

There is concern among researchers and international agencies that female orphans may be particularly vulnerable to poor schooling outcomes (Giese *et al.* 2003, UNAIDS 2002, World Bank 2002). In order to see whether female orphans were especially disadvantaged all the analyses above were replicated with the inclusion of an interaction term between the parental death indicators and an indicator for the gender of the orphan. Consistent with Case *et al.* (2004), Case and Ardington (2006) and Ainsworth and Filmer (2006) I find no evidence that female orphans are at any greater disadvantage (results not shown). Interestingly in all regressions for educational attainment female children are significantly ahead of male children of the same age.

Community effects

Overall the results in the previous section provide no evidence of a systematic deterioration in orphan schooling deficits across time. Orphan vulnerabilities may however vary across space. According to Foster (2000:57) “where traditional values are maintained, such as in rural communities, the extended family safety net is better preserved.” I investigated whether orphans in rural settings tended to fare better by including an interaction term between the orphan status indicators and the urban indicator

(results not shown). There is no evidence that orphans in urban settings are worse off. If family support networks are indeed struggling to cope in the face of ever-increasing numbers of orphans one may expect that orphans would fare worse in areas with higher concentrations of orphans. I regressed educational attainment on interactions between orphan status indicators with the percentage of orphans by rural/urban location within each province (results not shown). There is no evidence that orphans fare significantly worse in communities with higher orphan rates. These findings are similar to those of Fortson (2007) and Evans and Miguel (2007: 49) who conclude "that recent claims in the popular media that social networks in rural Africa are rapidly breaking down under the strain of HIV/AIDS deaths – and that as a result, neither orphans nor other children can be adequately taken care of by surviving relatives – are probably overstated."

Non-parental death

Earlier I found no evidence of systematic changes in orphans' relative poverty. The surveys do not collect information on the timing of the death so there is no indication of how recently the parent died. In the OHS and the 2001 Census households were asked about any deaths in the household in the preceding twenty-two months and year respectively. I created indicators for the death in the preceding 12 months of at least one adult (aged 18 or older) and at least one prime-age adult (18-50). The relationship between adult deaths and household poverty does not appear to have changed over the period 1995 to 2001. Adult deaths had no significant effect on the schooling of children nor did they affect the estimated coefficients for maternal and paternal death (results not shown). These results suggest that parental death affects children's schooling outcomes through pathways other than the financial shock associated with an adult death.

Government response

In 2002 the Departments of Social Development, Health and Education came together with UNICEF and Save the Children Alliance for a three day national conference entitled "A Call for Coordinated Action for Children Affected by HIV and AIDS". The conference mandated the Department of Social Development (DSD) to set up the National Action Committee for Children Affected by AIDS to "coordinate mechanisms at national, provincial, district and community levels, to alleviate the impact of HIV and AIDS on the lives of children (Department of Social Development 2005:9)." In 2005 DSD launched the Policy Framework and the National Action Plan for orphans and other children made vulnerable by HIV and AIDS. The framework aims to promote "an enabling environment for more effective delivery on the existing obligations and commitments on orphans and other children made vulnerable by HIV and AIDS at legislative, policy and programme levels (Department of Social Development 2005:7)." The existing legislation, policies and programmes most pertinent to the schooling of orphans are social assistance through cash grants and fee exemptions.

The South African government's primary mechanism for poverty alleviation is social assistance through cash grants. In 2005 41% of households had at least one grant beneficiary and in many of these household grants were the primary source of income.

There are three grants available to children – the child support grant, the foster care grant and the care dependency grant. The Child Support Grant (CSG) targets children who are cared for by adults living in poverty and currently has over 7 million beneficiaries. The grant of R200 per month is payable to all children under 14 years of age whose primary caregiver passes a means test. The Foster Care Grant (FCG) is available to children under 18 who have placed in the care of foster parents by the Children's Court and is substantially larger (R620) than the CSG. The FCG is not means tested as its purpose is to provide for children in need of care rather than poverty alleviation. The Care Dependency Grant (CDG) is available for children up to the age of 18 who require permanent home care for severe mental or physical disabilities and is currently R870 per month (Leatt 2006).

The DSD ministry and officials actively promote the use of the FCG for orphans as a result of the AIDS pandemic (Leatt 2006:3). While take up of the FCG has increased considerably in recent years there are many children who qualify who are still excluded. The number of FCG beneficiaries at the end of 2004 was less than the number of newly orphaned children who would have qualified that year alone (Meintjies *et al.* 2005:34-35). In the 2005 GHS the percentage of African children under the age of 18 who are reported as receiving the foster care grant is only 0.2%, 0.3%, 2.1% and 9.9% for non-orphans, paternal, maternal and double orphans respectively. Meintjies *et al.* (2005:34) point out that “the administrative processes for foster care placement ... are complex and impractical for the applicants, as well as for social services and court systems, which are already severely over-burdened and under-resourced”.

Any child under the age of 14 whose primary care giver passes a means test is eligible for the CSG. Using the rules for assigning care givers and income as set out in Budlender *et al.* (2005) one can estimate the number of children eligible for the CSG and examine take up. Take up rates among African children classified as eligible in the 2005 GHS are around fifty percent. The ability to provide the required documentation and problems physically accessing government offices are the most commonly cited reasons for take up being less than one hundred percent (Hall and Monson 2006:41-43). Patterns of take up differ by orphan status. Just over half (53%) of the non-orphaned children classified as eligible are reported as receiving the CSG. Eligible paternal orphans are almost as likely (50%) as non-orphans to report receipt while only 26% of maternal and double orphans are receiving the CSG. A child may not receive both the FCG and CSG but only 2.6% and 9.7% of maternal and double orphans respectively were receiving FCG leaving a large differential in take up unaccounted for. Caregivers of children who have lost their mothers may have greater difficulties in producing the required documentation. More importantly, until recently grants lapsed upon the death of the child's primary caregiver. Between April 2005 and March 2006 over 100,000 children lost their grant payments with the death of their primary caregiver (Leatt 2006:13). A new regulation allows for the appointment of a person to take over the grant on the death of a primary caregiver but this legislation has not yet been introduced leaving children who have lost a parent without social support at a time when they are particularly vulnerable (Leatt 2006:13). Take up among eligible children is a concern but so too are the large portion of school age children who fall outside of the social security net by virtue of their age. There is

considerable lobbying by child advocacy groups for the CSG to be extended to children under the age of 18.

Research findings suggest that the CSG has a positive impact on nutrition and school enrolment. Woolard *et al.* (2005) found that receipt of the CSG in early childhood resulted in significant gains in height. Case *et al.* (2005) found that children receiving the grant were significantly more likely to be enrolled in school than equally poor children of the same age.

The 2003, 2004 and 2005 GHSs included questions about whether individuals in the household received any of the social grants available. There are only a few years where children are both eligible for the CSG and should be enrolled in school so the three GHSs were pooled to examine the relationship between grant receipt and enrolment. The CSG when first introduced was restricted to children under the age of seven. The age cut off was extended to nine, eleven and fourteen in April of 2003, 2004 and 2005 respectively. Take up was initially low for children who became eligible when the age extensions were introduced so the sample is restricted to children aged 6 to 8. The sample is further restricted to children who were identified as eligible for the CSG using the rules as set out in Budlender *et al.* (2005)¹⁰. The regressions in Table 11 control for household socioeconomic status and the year of the survey. Incomes were inflated to 2005 Rands and the weights were rescaled so that each survey received equal weight. The first column shows the coefficients and standard errors for the parental death indicators and an indicator that the child is a beneficiary of any grant. Interaction terms between parental death indicators and the indicator that the child receives a grant are shown in the second column.

There is a small positive effect of grant receipt on enrolment. Children who are grant beneficiaries are on average 3.5 percentage points more likely to be enrolled than other equally poor children who are eligible for the CSG. Grants also seem to mitigate the impact of paternal loss with the coefficients on the interaction term between paternal death and grant receipt being positive and of greater magnitude than the coefficient on the paternal death main effect. The interaction term for maternal death is also positive although not significant. Children whose mothers have died are much less likely to access grants and so in this restricted sample the interaction between maternal death and grant receipt is imprecisely measured.

In South Africa school fees are determined by the school's governing body and are used over and above the income from the government subsidy to maintain infrastructure and employ additional staff. Hall and Monson (2006:45) argue that "compulsory education places a responsibility ... on the state to ensure that schools are accessible and affordable". The South African Schools Act of 1996 provided for a fee exemption to parents whose income is less than ten times the annual school fees. New regulations introduced in late 2006 automatically exempt CSG and FCG beneficiaries from school fees. These new exemption rules increase concerns around poor take up of grants for maternal and double orphans. In practice the fee exemption policy has not been

¹⁰ The results are qualitatively quite similar if we only restrict the sample based on age eligibility.

implemented. In the 2005 GHS for example, less than one percent of learners report paying no school fees. There are a number of reasons why schools have not implemented this policy - poor awareness, no monitoring or enforcement and most importantly no budget to compensate schools for loss of revenue through the exemption policy. In 2007 the No-Fee Schools policy was introduced. This policy abolishes school fees in the poorest 40% of schools nationally for learners from Grade R to Grade 9. These schools will be compensated for the loss of revenue from fees through a larger funding allocation from the Department of Education. As with the CSG older learners will not be able to benefit from the No-Fees policy. In the 2005 GHS 37% of African children aged 14 to 17 who were not enrolled in school cited no money to pay for school fees as the main reason for not attending school.

The evidence in section 4 suggests that parental death has a significant negative effect on educational attainment. Parental death is also associated with small but significant deficits in enrolment. The magnitude of the enrolment deficits suggests that attendance is less of an issue than performance at school. Appropriate policies to address these deficits depend on the mechanisms through which orphanhood affects performance in school. More research is needed to understand the multiple pathways through which parental death affects a child in school in order to ensure that government policies effectively target orphans and reduce their risk of poor schooling outcomes.

6. Conclusion

Despite a significant increase in the number of orphans over the last decade this paper finds no evidence of a systematic deterioration in traditional coping strategies at least with respect to orphan's educational outcomes. Patterns of care giving for orphans do appear to be shifting over time but these changes are taking place within the extended family safety net. Orphans are still absorbed into extended families but single orphans are increasingly less likely to live with the surviving parent and there is an increasing reliance on grandparents as caregivers. At every point in time cross-sectional evidence suggests that that orphans are at risk for poorer educational outcomes with maternal deaths generally having stronger negative effects than paternal deaths. Paternal deaths are strongly associated with poorer socio-economic status and much of the deficit experienced by children who have lost a father is explained by the relative poverty of their current household. In contrast maternal deaths appear to be directly associated with poorer schooling outcomes rather than channeled through socio-economic status. The results in this paper suggest that parental involvement and relatedness to the household are two of the multiple pathways through which parental death affects a child's schooling.

Although HIV prevalence in South Africa is already high the rates of orphanhood are expected to continue to rise until 2015 thereby placing additional strain on the extended family safety net. Ongoing monitoring of the vulnerability of orphans to poor outcomes is needed as the AIDS crisis further deepens.

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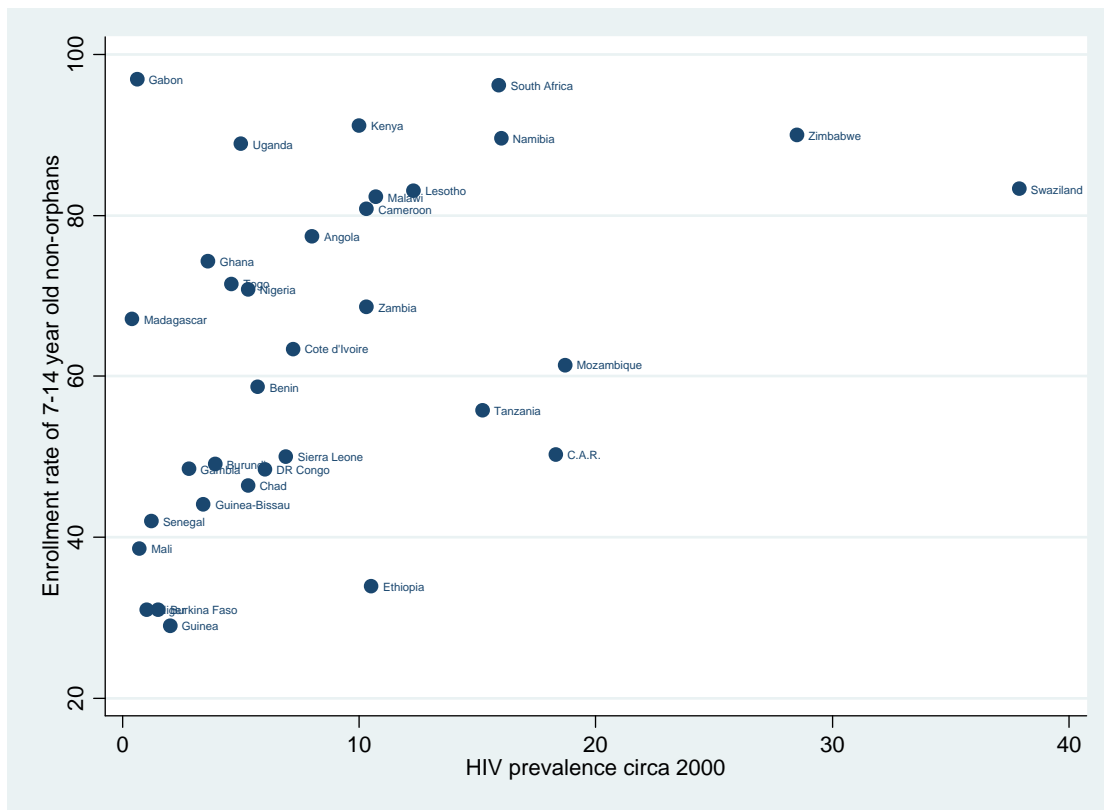
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Figure 1: Enrolment rates of 7 to 14 year old non-orphans by HIV prevalence circa 2000 for 33 African countries



Source: Ainsworth and Filmer (2006) Appendix Table A1

Figure 2: Parental death by survey – Africans aged 0 to 17.

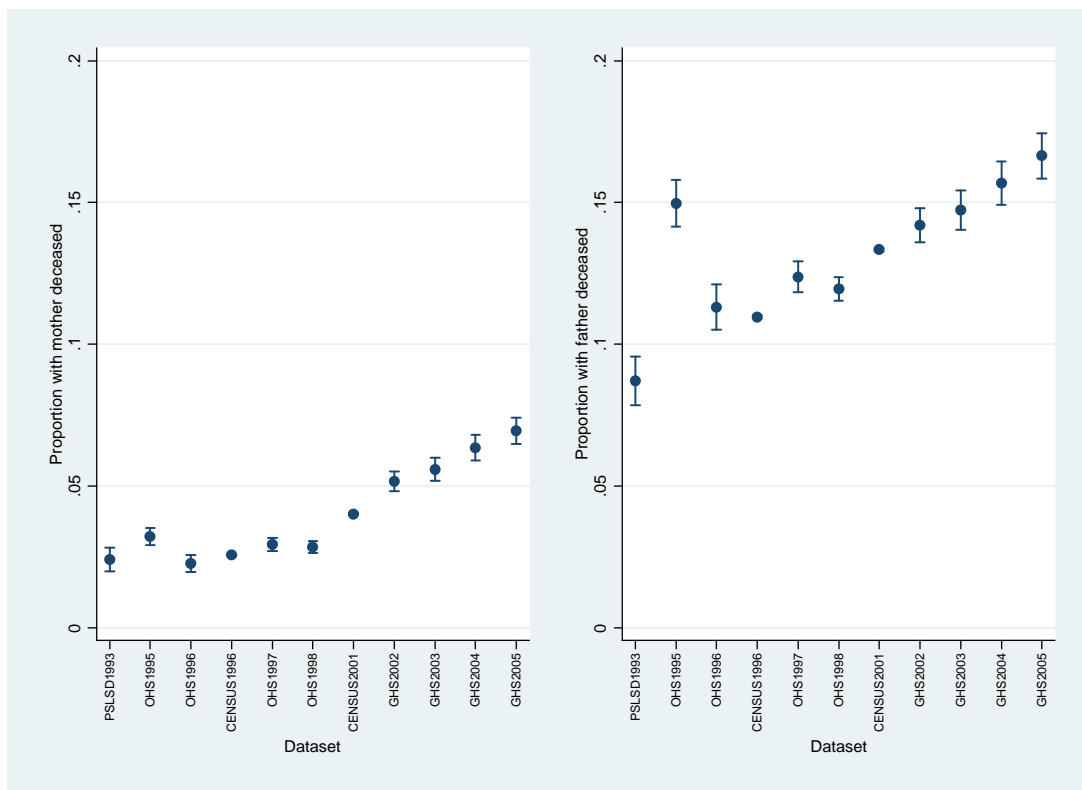


Figure 3: Proportion of maternal, paternal and double orphans – Africans aged 0 to 17.

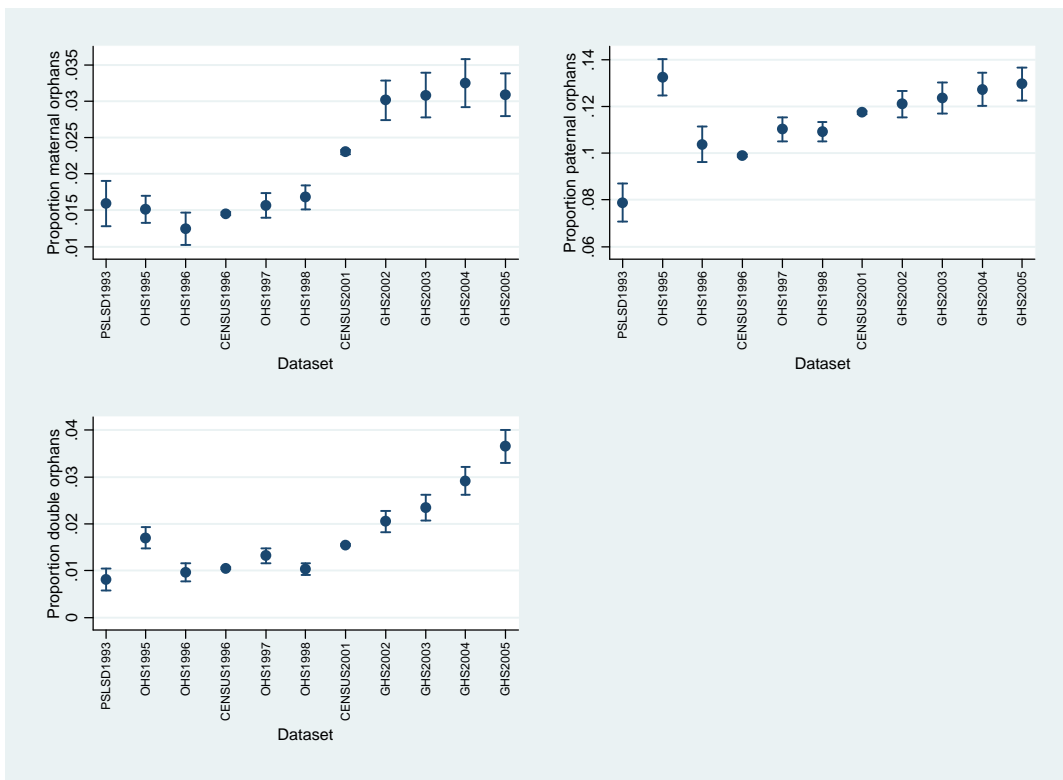


Figure 4: Parental death by age and year – Africans aged 0 to 17.

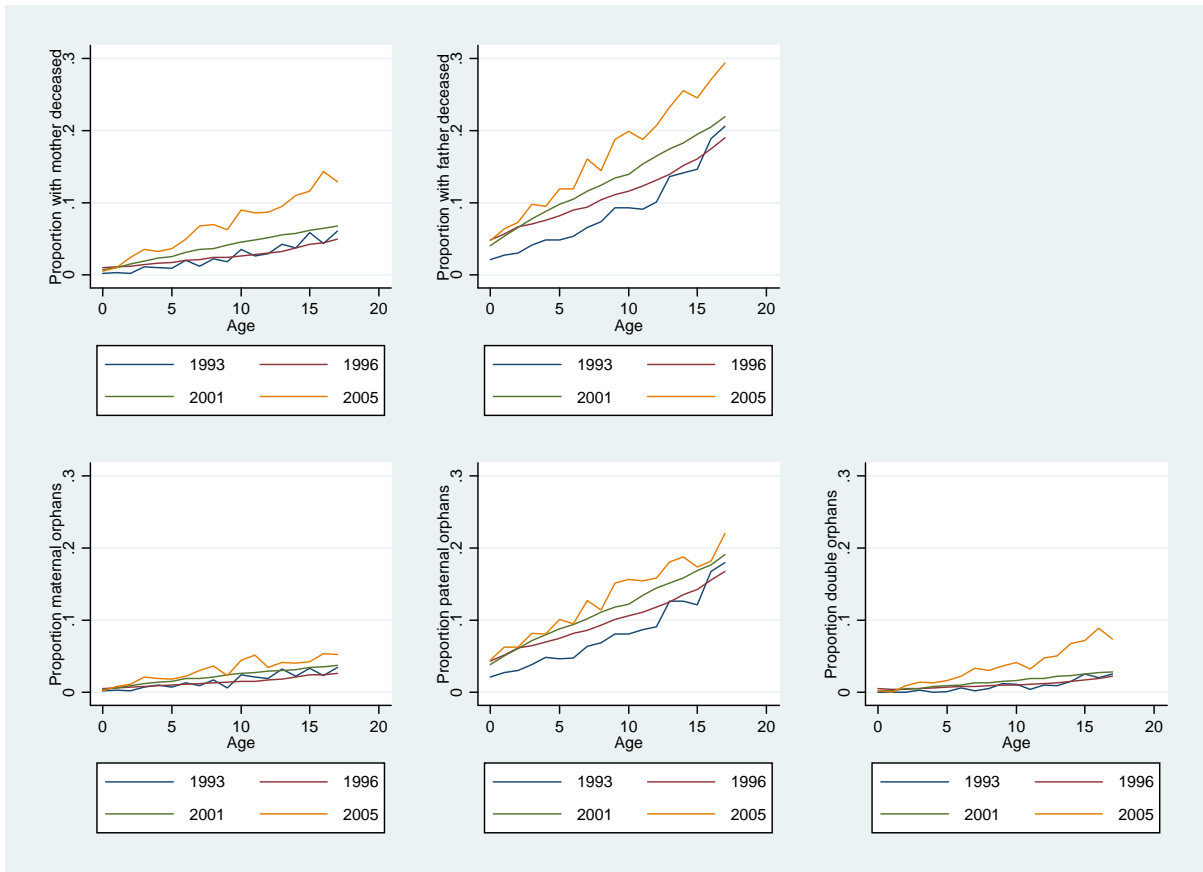


Figure 5. Coefficient estimates and 95% confidence intervals – Africans aged 8 to 17. Regressions of years of completed education on indicators that mother and father are deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Indicators that parent's vital status is missing included in all regressions.

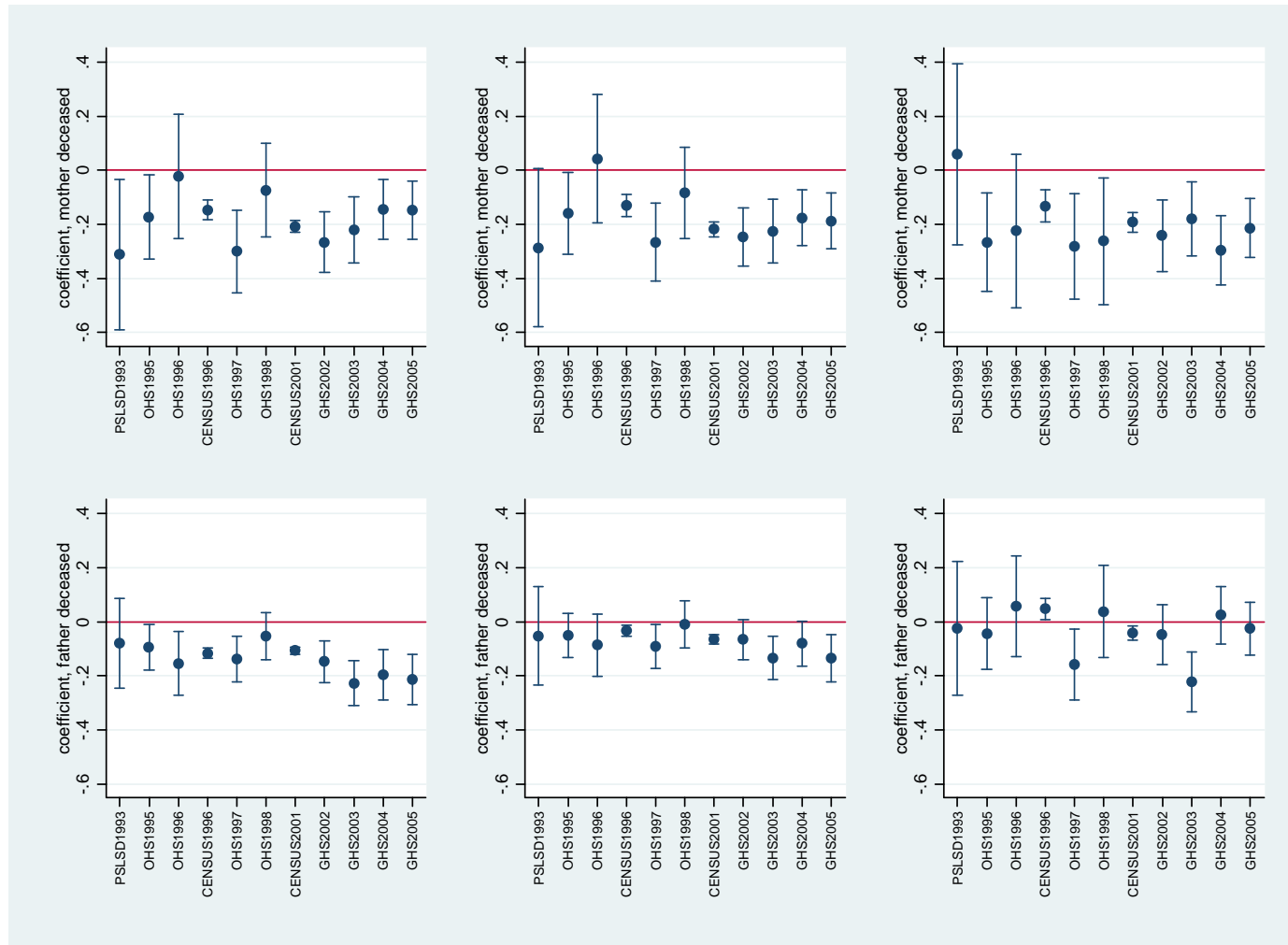


Figure 6. Coefficient estimates and 95% confidence intervals – Africans aged 7 to 15. Regressions of enrolment on indicators that mother and father are deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Indicators that parent's vital status is missing included in all regressions.

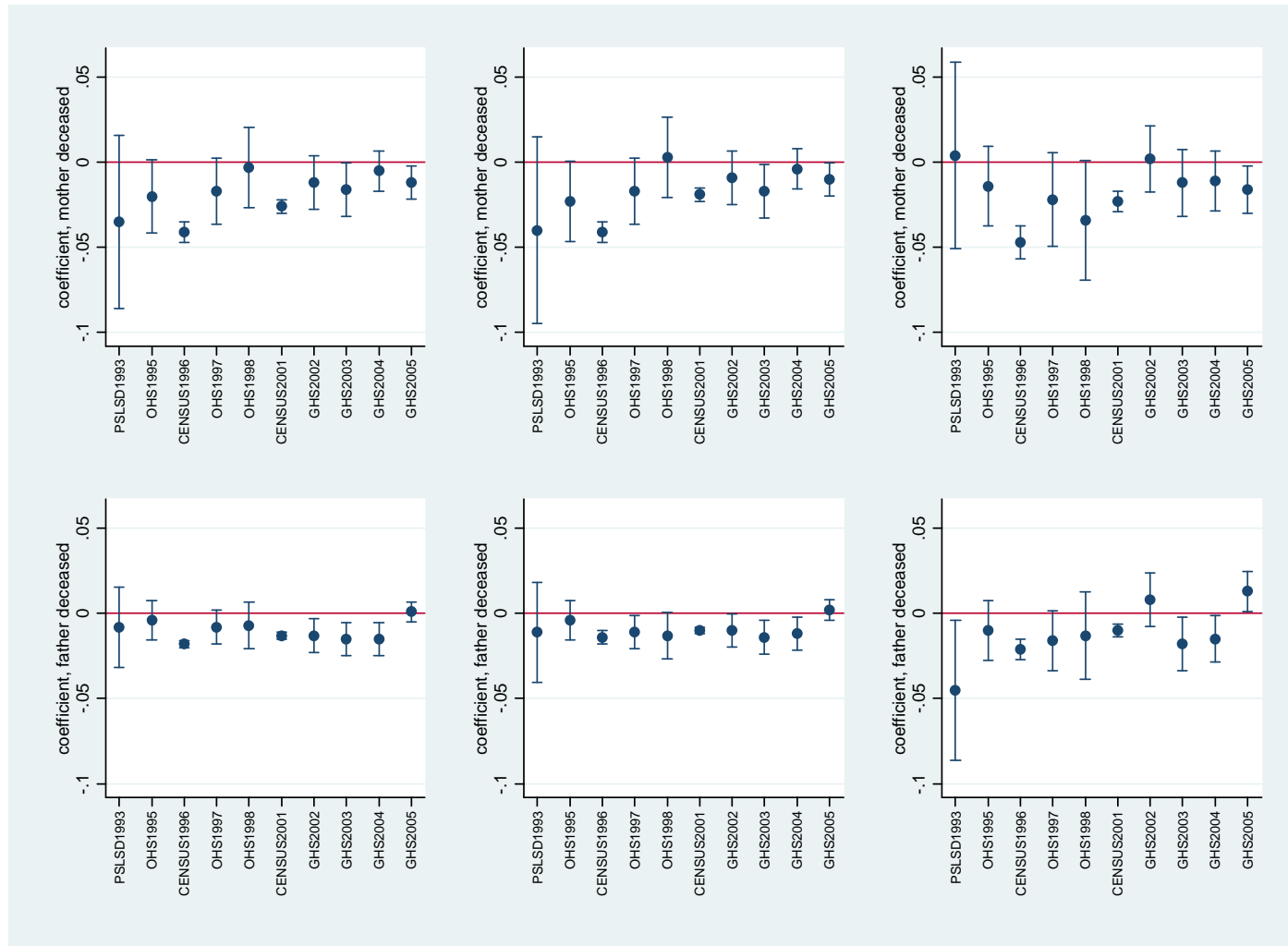


Figure 7. Coefficient estimates and 95% confidence intervals – Africans aged 16 to 18 who have not completed Grade 12. Regressions of enrolment on indicators that mother and father are deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Indicators that parent's vital status is missing included in all regressions.

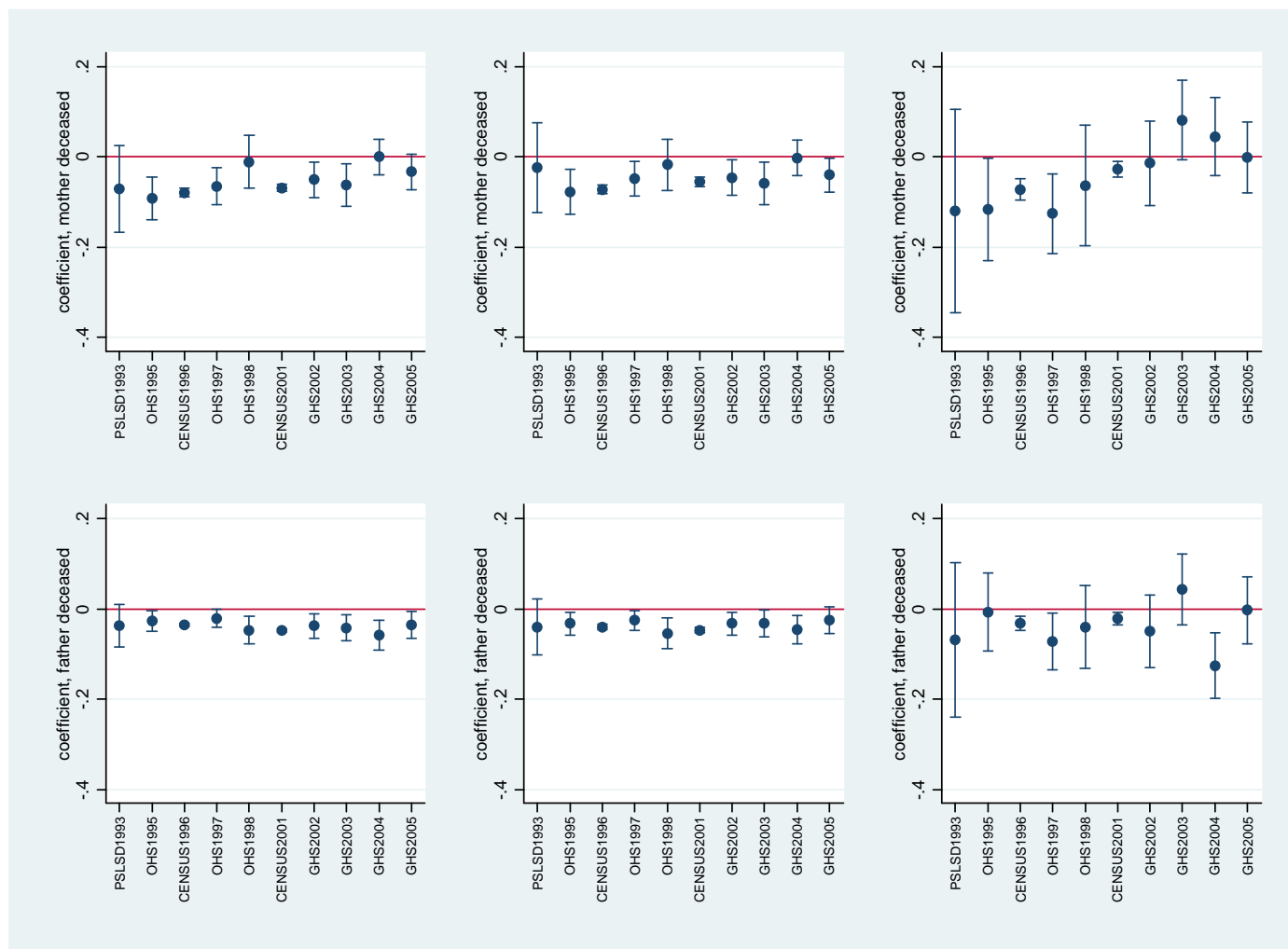


Table 1. Living Arrangements of Africans aged 8 to 17 – 1993 to 2005

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	8,059	22,858	14,588	636,977	28,494	16,376	635,914	19,805	19,092	18,353	21,296
Children with two living parents											
Fraction of children	0.851	0.809	0.841	0.84027	0.8174	0.8238	0.796	0.775	0.771	0.750	0.733
Mother is co-resident	0.757	0.812	0.731				0.589	0.730	0.726	0.735	0.727
Father is co-resident	0.451	0.581	0.467				0.365	0.433	0.423	0.421	0.413
Living with both	0.424	0.561	0.447				0.313	0.401	0.389	0.389	0.380
Living with mother only	0.333	0.251	0.284				0.276	0.328	0.337	0.346	0.346
Living with father only	0.027	0.020	0.020				0.052	0.032	0.034	0.032	0.032
Living with neither	0.214	0.167	0.200				0.314	0.219	0.225	0.217	0.228
Relationship to head – child	0.654	0.726	0.702	0.684	0.622	0.623	0.651	0.625	0.630	0.627	0.629
Relationship to head – grandchild	0.279	0.215	0.209	0.219	0.280	0.276	0.232	0.280	0.277	0.290	0.272
Relationship to head - other relative	0.059	0.054	0.074	0.072	0.089	0.094	0.092	0.082	0.083	0.073	0.081
Relationship to head - non-relative	0.007	0.004	0.008	0.013	0.006	0.003	0.005	0.007	0.003	0.004	0.010
Relationship to head – self	0.001	0.001	0.007	0.013	0.003	0.004	0.010	0.007	0.007	0.005	0.007
Maternal orphans											
Fraction of children	0.023	0.019	0.017	0.019	0.022	0.023	0.030	0.040	0.038	0.041	0.042
Living with father	0.352	0.419	0.363				0.245	0.290	0.236	0.228	0.269
Relationship to head – child	0.349	0.325	0.405	0.372	0.314	0.315	0.260	0.249	0.197	0.192	0.217
Relationship to head – grandchild	0.366	0.362	0.307	0.283	0.352	0.385	0.430	0.468	0.483	0.537	0.484
Relationship to head - other relative	0.242	0.161	0.215	0.177	0.276	0.242	0.252	0.238	0.275	0.227	0.237
Relationship to head - non-relative	0.043	0.016	0.014	0.023	0.013	0.012	0.009	0.006	0.016	0.010	0.015
Relationship to head - adoptive/foster child		0.132	0.047	0.123	0.035	0.035	0.026	0.024	0.024	0.020	0.036
Relationship to head – self		0.003	0.011	0.022	0.010	0.012	0.022	0.015	0.007	0.014	0.011

Table 1 (continued). Living Arrangements of Africans aged 8 to 17 – 1993 to 2005

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
<i>Paternal orphans</i>											
Fraction of children	0.112	0.152	0.128	0.125	0.141	0.137	0.148	0.154	0.155	0.163	0.168
Living with mother	0.783	0.763	0.733				0.551	0.685	0.654	0.693	0.671
Relationship to head – child	0.692	0.587	0.590	0.562	0.538	0.552	0.515	0.503	0.503	0.533	0.524
Relationship to head – grandchild	0.173	0.297	0.239	0.238	0.285	0.261	0.276	0.330	0.325	0.306	0.306
Relationship to head - other relative	0.073	0.097	0.122	0.110	0.139	0.158	0.152	0.133	0.150	0.131	0.130
Relationship to head - non-relative	0.014	0.004	0.004	0.016	0.008	0.007	0.008	0.007	0.004	0.007	0.012
Relationship to head - adoptive/foster child	0.047	0.014	0.038	0.057	0.023	0.016	0.033	0.018	0.009	0.017	0.019
Relationship to head – self	0.001	0.002	0.007	0.017	0.006	0.006	0.016	0.009	0.008	0.007	0.009
<i>Double orphans</i>											
Fraction of children	0.014	0.021	0.012	0.014	0.018	0.014	0.021	0.029	0.033	0.043	0.054
Relationship to head – grandchild	0.433	0.435	0.384	0.329	0.426	0.511	0.500	0.540	0.539	0.553	0.512
Relationship to head - other relative	0.499	0.310	0.460	0.275	0.372	0.350	0.408	0.381	0.354	0.352	0.403
Relationship to head - non-relative	0.037	0.039		0.038	0.014	0.003	0.017	0.019	0.024	0.017	0.016
Relationship to head - adoptive/foster child	0.031	0.216	0.096	0.309	0.183	0.136	0.046	0.045	0.063	0.071	0.054
Relationship to head – self			0.061	0.048	0.005		0.030	0.015	0.020	0.008	0.014
<i>Mother is deceased - maternal and double orphans</i>											
Fraction of children	0.037	0.040	0.030	0.033	0.040	0.038	0.053	0.070	0.073	0.085	0.098
Fraction who are double orphans	0.367	0.530	0.416	0.428	0.456	0.406	0.428	0.427	0.478	0.522	0.573
Fraction who are "virtual" double orphans	0.410	0.273	0.372	0.572	0.544	0.594	0.432	0.407	0.399	0.369	0.312
Fraction who live with their father	0.223	0.197	0.212	0.000	0.000	0.000	0.140	0.166	0.123	0.109	0.115
<i>Father is deceased - paternal and double orphans</i>											
Fraction of children	0.125	0.173	0.133	0.134	0.155	0.145	0.162	0.179	0.185	0.203	0.218
Fraction who are double orphans	0.108	0.121	0.040	0.067	0.089	0.054	0.091	0.141	0.162	0.193	0.232
Fraction who are "virtual" double orphans	0.193	0.208	0.257	0.933	0.911	0.946	0.408	0.270	0.290	0.248	0.253
Fraction who live with their father	0.699	0.670	0.703	0.000	0.000	0.000	0.501	0.589	0.548	0.559	0.515

Table 2. Orphanhood and household socio-economic status

Dataset	Mother deceased		Father deceased	
Panel A electricity				
PSLSD1993	-0.019	(0.032)	-0.042	(0.022)
OHS1995	-0.034	(0.023)	-0.03	(0.015)*
OHS1996	-0.04	(0.035)	-0.043	(0.020)*
CENSUS1996	0.009	(0.004)**	-0.045	(0.002)**
OHS1997	0.001	(0.021)	-0.054	(0.013)**
OHS1998	0.024	(0.022)	-0.04	(0.012)**
CENSUS2001	0.009	(0.003)**	-0.044	(0.002)**
GHS2002	0.01	(0.019)	-0.057	(0.014)**
GHS2003	0.003	(0.02)	-0.045	(0.015)**
GHS2004	0.036	(0.019)	-0.039	(0.015)**
GHS2005	0.015	(0.017)	-0.036	(0.015)*
Panel B logarithm of per capita expenditure				
PSLSD1993	-0.071	(0.064)	-0.145	(0.038)**
OHS1995	0.04	(0.041)	-0.227	(0.027)**
OHS1996	-0.104	(0.065)	-0.05	(0.038)
CENSUS1996	0.06	(0.009)**	-0.201	(0.005)**
OHS1997	0.005	(0.039)	-0.14	(0.022)**
OHS1998	-0.088	(0.035)*	-0.112	(0.021)**
CENSUS2001	-0.058	(0.007)**	-0.223	(0.004)**
GHS2002	-0.09	(0.033)**	-0.18	(0.027)**
GHS2003	0.005	(0.036)	-0.246	(0.027)**
GHS2004	-0.059	(0.033)	-0.229	(0.027)**
GHS2005	0.005	(0.032)	-0.232	(0.032)**
Panel C piped water				
PSLSD1993	-0.027	(0.039)	-0.038	(0.026)
OHS1995	-0.023	(0.024)	-0.035	(0.015)*
OHS1996	-0.007	(0.035)	-0.054	(0.020)**
CENSUS1996	0.016	(0.003)**	-0.047	(0.002)**
OHS1997	0.043	(0.022)*	-0.066	(0.013)**
OHS1998	0.053	(0.022)*	-0.057	(0.012)**
CENSUS2001	0.011	(0.003)**	-0.053	(0.002)**
GHS2002	0.004	(0.02)	-0.065	(0.014)**
GHS2003	0.024	(0.021)	-0.069	(0.015)**
GHS2004	0.009	(0.021)	-0.028	(0.015)
GHS2005	0.061	(0.020)**	-0.051	(0.015)**
Panel D toilet				
PSLSD1993	0.002	(0.037)	-0.019	(0.023)
OHS1995	-0.013	(0.024)	-0.037	(0.015)*
OHS1996	-0.007	(0.031)	-0.033	(0.018)
CENSUS1996	-0.008	(0.003)**	-0.036	(0.002)**
OHS1997	0.052	(0.022)*	-0.014	(0.013)
OHS1998	0.006	(0.022)	-0.016	(0.012)
CENSUS2001	0.017	(0.003)**	-0.034	(0.002)**
GHS2002	0.009	(0.019)	-0.037	(0.014)**
GHS2003	0.031	(0.021)	-0.041	(0.015)**
GHS2004	-0.027	(0.019)	-0.03	(0.014)*
GHS2005	-0.003	(0.019)	-0.037	(0.016)*

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

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table 3. Educational attainment of Africans aged 8 to 17

	Mother deceased		Father deceased	
Panel A - No household controls				
1993 to 1998	-0.221	(0.037)**	-0.104	(0.019)**
2001	-0.236	(0.012)**	-0.143	(0.007)**
2002 to 2005	-0.189	(0.025)**	-0.197	(0.019)**
Panel B - Household controls				
1993 to 1998	-0.209	(0.038)**	-0.065	(0.020)**
2001	-0.241	(0.014)**	-0.092	(0.009)**
2002 to 2005	-0.203	(0.025)**	-0.104	(0.018)**
Panel C - Household fixed effects				
1993 to 1998	-0.196	(0.020)**	-0.008	(0.014)
2001	-0.232	(0.017)**	-0.059	(0.013)**
2002 to 2005	-0.239	(0.033)**	-0.069	(0.027)*

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

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table 4. Enrolment

	(1)				(2)			
	Africans aged 7 to 15		Africans aged 16 to 18 without Grade 12		Africans aged 7 to 15		Africans aged 16 to 18 without Grade 12	
	Mother deceased		Father deceased		Mother deceased		Father deceased	
Panel A - No household controls								
1993 to 1998	-0.023	(0.005)**	-0.009	(0.003)**	-0.065	(0.013)**	-0.034	(0.007)**
2001	-0.026	(0.002)**	-0.013	(0.001)**	-0.065	(0.004)**	-0.046	(0.002)**
2002 to 2005	-0.011	(0.003)**	-0.011	(0.002)**	-0.035	(0.011)**	-0.043	(0.007)**
Panel B - Household controls								
1993 to 1998	-0.023	(0.006)**	-0.01	(0.003)**	-0.048	(0.013)**	-0.04	(0.007)**
2001	-0.019	(0.002)**	-0.01	(0.001)**	-0.053	(0.005)**	-0.046	(0.003)**
2002 to 2005	-0.009	(0.003)**	-0.009	(0.002)**	-0.036	(0.010)**	-0.035	(0.008)**
Panel C - Household fixed effects								
1993 to 1998	-0.026	(0.003)**	-0.019	(0.002)**	-0.086	(0.011)**	-0.054	(0.008)**
2001	-0.023	(0.003)**	-0.011	(0.002)**	-0.032	(0.010)**	-0.031	(0.008)**
2002 to 2005	-0.012	(0.003)*	-0.004	(0.004)	0.029	(0.022)	-0.035	(0.019)

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

Each row presents selected coefficients and standard errors in parenthesis from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table 5. Educational attainment of Africans aged 8 to 17. "Blended" and non-"blended" households

Dataset	Mother deceased –blend		Mother deceased - non blend		Father deceased - blend		Father deceased - non blend		Mother alive - blend		Father alive- blend	
PSLSD1993	0.175	(0.22)	-0.533	(0.185)**	-0.007	(0.196)	-0.041	(0.101)	0.010	(0.151)	0.137	(0.129)
OHS1995	-0.254	(0.114)*	-0.091	(0.102)	-0.071	(0.074)	-0.054	(0.049)	-0.031	(0.1)	-0.067	(0.071)
CENSUS1996	-0.224	(0.031)**	-0.166	(0.024)**	-0.098	(0.019)**	-0.057	(0.011)**	-0.016	(0.023)	-0.115	(0.015)**
OHS1997	-0.294	(0.121)*	-0.230	(0.093)*	-0.257	(0.076)**	-0.044	(0.048)	-0.166	(0.095)	-0.102	(0.062)
OHS1998	-0.293	(0.119)*	0.121	(0.12)	-0.154	(0.083)	0.022	(0.05)	0.025	(0.095)	-0.188	(0.077)*
CENSUS2001	-0.241	(0.021)**	-0.234	(0.018)**	-0.152	(0.015)**	-0.081	(0.010)**	-0.009	(0.016)	-0.101	(0.013)**
GHS2002	-0.275	(0.078)**	-0.235	(0.078)**	-0.047	(0.063)	-0.069	(0.048)	-0.090	(0.075)	0.025	(0.062)
GHS2003	-0.246	(0.090)**	-0.189	(0.079)*	-0.243	(0.071)**	-0.1	(0.048)*	-0.002	(0.075)	-0.047	(0.061)
GHS2004	-0.206	(0.079)**	-0.138	(0.071)	0.005	(0.065)	-0.141	(0.051)**	0.103	(0.074)	-0.127	(0.058)*
GHS2005	-0.173	(0.076)*	-0.178	(0.070)*	-0.158	(0.081)	-0.16	(0.050)**	0.092	(0.064)	-0.201	(0.062)**
Average	-0.203		-0.187		-0.118		-0.073		-0.008		-0.079	
1993 to 1998	-0.243	(0.058)**	-0.173	(0.049)**	-0.128	(0.037)**	-0.048	(0.022)*	-0.040	(0.042)	-0.065	(0.029)*
2002 to 2005	-0.209	(0.030)**	-0.185	(0.042)**	-0.100	(0.024)**	-0.145	(0.025)**	-0.011	(0.023)	-0.067	(0.019)**

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

Individual level and household controls and indicators that parents vital status is missing included in all regressions.

Table 6. Educational attainment of Africans aged 8 to 17. Wealth interactions with household fixed effects.

Dataset	Mother deceased		Father deceased		ln(xpc)*Mother dead		ln(xpc)*Father dead		Mother coefficients		Father coefficients	
									F-test	p-value	F-test	p-value
PSLSD1993	-0.371	(1.071)	-2.061	(0.849)*	0.102	(0.224)	0.43	(0.176)*	0.31	0.735	3.00	0.050
OHS1995	-0.147	(0.605)	0.07	(0.42)	-0.027	(0.119)	-0.021	(0.082)	4.20	0.015	0.17	0.843
CENSUS1996	-0.258	(0.186)	-0.069	(0.117)	0.006	(0.026)	0.012	(0.017)	27.02	0.000	0.50	0.609
OHS1997	0.731	(0.488)	-0.16	(0.367)	-0.231	(0.113)*	-0.002	(0.086)	5.09	0.006	3.17	0.042
OHS1998	-0.764	(0.629)	0.237	(0.448)	0.098	(0.147)	-0.035	(0.106)	4.43	0.012	0.59	0.554
CENSUS2001	-0.442	(0.102)**	-0.071	(0.077)	0.042	(0.020)*	0.001	(0.015)	76.70	0.000	10.62	0.000
GHS2002	-0.295	(0.387)	-0.169	(0.298)	0.012	(0.09)	0.03	(0.068)	6.35	0.002	0.35	0.708
GHS2003	-0.227	(0.386)	-0.903	(0.310)**	-0.011	(0.087)	0.148	(0.070)*	7.40	0.001	12.63	0.000
GHS2004	-0.632	(0.395)	0.48	(0.339)	0.077	(0.085)	-0.098	(0.072)	9.59	0.000	1.03	0.356
GHS2005	0.131	(0.335)	-0.62	(0.294)*	-0.073	(0.071)	0.127	(0.063)*	6.92	0.001	2.32	0.098

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

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table7. Educational attainment of Africans aged 8 to 17. Parental death and parental absence.

Dataset	Mother deceased		Father deceased		Mother absent		Father absent	
Panel A - No household controls								
PSLSD1993	-0.314	(0.144)*	-0.162	(0.095)	-0.054	(0.064)	-0.146	(0.069)*
OHS1995	-0.209	(0.080)**	-0.126	(0.045)**	-0.207	(0.045)**	-0.098	(0.037)**
CENSUS2001	-0.285	(0.012)**	-0.173	(0.008)**	-0.118	(0.005)**	-0.057	(0.006)**
GHS2002	-0.321	(0.059)**	-0.173	(0.047)**	-0.210	(0.036)**	-0.063	(0.038)
GHS2003	-0.256	(0.065)**	-0.263	(0.050)**	-0.141	(0.038)**	-0.078	(0.040)*
GHS2004	-0.173	(0.059)**	-0.219	(0.053)**	-0.114	(0.039)**	-0.046	(0.038)
GHS2005	-0.189	(0.055)**	-0.257	(0.051)**	-0.151	(0.036)**	-0.083	(0.039)*
Average	-0.250		-0.196		-0.142		-0.082	
Panel B - Household controls								
PSLSD1993	-0.269	(0.15)	-0.261	(0.108)*	-0.082	(0.067)	-0.247	(0.084)**
OHS1995	-0.184	(0.078)*	-0.116	(0.049)*	-0.152	(0.043)**	-0.082	(0.044)
CENSUS2001	-0.292	(0.014)**	-0.089	(0.011)**	-0.105	(0.007)**	0.000	(0.008)
GHS2002	-0.311	(0.058)**	-0.012	(0.054)	-0.175	(0.035)**	0.062	(0.045)
GHS2003	-0.246	(0.064)**	-0.160	(0.056)**	-0.068	(0.037)	-0.035	(0.047)
GHS2004	-0.203	(0.055)**	-0.071	(0.055)	-0.076	(0.037)*	0.010	(0.048)
GHS2005	-0.234	(0.052)**	-0.151	(0.058)**	-0.142	(0.036)**	-0.024	(0.049)
Average	-0.248		-0.123		-0.114		-0.045	
Panel C - Household fixed effects								
PSLSD1993	0.077	(0.174)	-0.240	(0.151)	-0.135	(0.088)	-0.254	(0.107)*
OHS1995	-0.306	(0.098)**	-0.169	(0.092)	-0.121	(0.062)	-0.150	(0.079)
CENSUS2001	-0.309	(0.018)**	-0.196	(0.018)**	-0.154	(0.010)**	-0.164	(0.015)**
GHS2002	-0.299	(0.071)**	-0.101	(0.079)	-0.138	(0.050)**	-0.075	(0.069)
GHS2003	-0.313	(0.075)**	-0.416	(0.084)**	-0.166	(0.052)**	-0.201	(0.074)**
GHS2004	-0.329	(0.069)**	-0.160	(0.080)*	-0.135	(0.051)**	-0.242	(0.072)**
GHS2005	-0.232	(0.062)**	-0.084	(0.073)	-0.079	(0.047)	-0.053	(0.065)
Average	-0.244		-0.195		-0.133		-0.163	

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table 8. Educational attainment of Africans aged 8 to 17. Parent's vital status and residency.

Dataset	Foster child		Single orphan living with surviving parent		"Virtual" double orphan		Double orphan	
Panel A - No household controls								
PSLSD1993	-0.177	(0.070)*	-0.128	(0.098)	-0.077	(0.132)	-0.635	(0.244)**
OHS1995	-0.216	(0.043)**	-0.026	(0.046)	-0.39	(0.088)**	-0.347	(0.106)**
CENSUS2001	-0.122	(0.006)**	-0.134	(0.009)**	-0.26	(0.009)**	-0.432	(0.020)**
GHS2002	-0.218	(0.036)**	-0.137	(0.050)**	-0.378	(0.053)**	-0.451	(0.086)**
GHS2003	-0.155	(0.041)**	-0.158	(0.056)**	-0.375	(0.057)**	-0.524	(0.097)**
GHS2004	-0.144	(0.040)**	-0.211	(0.063)**	-0.245	(0.059)**	-0.358	(0.076)**
GHS2005	-0.179	(0.042)**	-0.216	(0.056)**	-0.373	(0.061)**	-0.349	(0.071)**
Average	-0.173		-0.144		-0.300		-0.442	
Panel B - Household controls								
PSLSD1993	-0.21	(0.076)**	-0.092	(0.1)	-0.134	(0.172)	-0.697	(0.291)*
OHS1995	-0.127	(0.043)**	0.007	(0.046)	-0.302	(0.083)**	-0.279	(0.104)**
CENSUS2001	-0.084	(0.007)**	-0.063	(0.011)**	-0.203	(0.012)**	-0.413	(0.024)**
GHS2002	-0.12	(0.036)**	-0.06	(0.049)	-0.218	(0.052)**	-0.405	(0.081)**
GHS2003	-0.035	(0.042)	-0.065	(0.056)	-0.236	(0.054)**	-0.442	(0.093)**
GHS2004	-0.048	(0.039)	-0.07	(0.053)	-0.144	(0.057)*	-0.296	(0.076)**
GHS2005	-0.117	(0.042)**	-0.139	(0.052)**	-0.285	(0.058)**	-0.33	(0.071)**
Average	-0.106		-0.069		-0.217		-0.409	
Panel C - Household fixed effects								
PSLSD1993	-0.202	(0.083)*	0.16	(0.163)	0.06	(0.164)	-0.566	(0.282)*
OHS1995	-0.149	(0.065)*	-0.091	(0.087)	-0.154	(0.098)	-0.412	(0.131)**
CENSUS2001	-0.195	(0.011)**	-0.038	(0.02)	-0.26	(0.015)**	-0.441	(0.026)**
GHS2002	-0.145	(0.054)**	-0.164	(0.079)*	-0.273	(0.069)**	-0.262	(0.104)*
GHS2003	-0.196	(0.056)**	-0.201	(0.084)*	-0.351	(0.070)**	-0.627	(0.103)**
GHS2004	-0.202	(0.056)**	0.165	(0.079)*	-0.179	(0.070)*	-0.454	(0.088)**
GHS2005	-0.009	(0.051)	0.088	(0.074)	-0.227	(0.064)**	-0.26	(0.077)**
Average	-0.157		-0.012		-0.198		-0.432	

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Reference category is a child with two living parents co-residing with at least one parent.

Table 9. Educational attainment of Africans aged 8 to 17. Household fixed effects with relationship to the household head.

	Mother deceased		Father deceased		Grandparent head		Other relative head		Non-relative head	
OHS1995	-0.118	(0.098)	-0.007	(0.07)	-0.1	(0.072)	-0.234	(0.089)**	-1.501	(0.263)**
CENSUS2001	-0.136	(0.019)**	-0.037	(0.014)**	-0.126	(0.013)**	-0.291	(0.016)**	-0.923	(0.059)**
GHS2002	-0.221	(0.073)**	-0.024	(0.057)	0.051	(0.057)	-0.257	(0.074)**	-0.542	(0.319)
GHS2003	-0.14	(0.075)	-0.244	(0.058)**	-0.136	(0.058)*	-0.359	(0.077)**	-1.102	(0.289)**
GHS2004	-0.161	(0.069)*	0.047	(0.055)	-0.188	(0.057)**	-0.266	(0.078)**	-1.62	(0.310)**
GHS2005	-0.17	(0.062)**	-0.037	(0.051)	0.001	(0.056)	-0.147	(0.067)*	-0.072	(0.241)
Average	-0.158		-0.050		-0.083		-0.259		-0.960	

* significant at 5%; ** significant at 1%. Each row presents selected coefficients and standard errors in parentheses from a single regression. A full set of indicators for age, an indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table 10. Educational attainment and living arrangements of Africans double orphans and foster children aged 8 to 17

	Double - grandchild		Double - other relative		Double - non-relative		Foster - foster child		Foster - grandparent		Foster- other relative		Foster- non-relative	
OHS1995	-0.139	(0.28)	-0.148	(0.284)	-1.431	(0.672)*	0.14	(0.274)	0.025	(0.245)	-0.261	(0.256)	-0.893	(0.409)*
CENSUS2001	0.198	(0.104)	-0.08	(0.109)	-1.303	(0.323)**	0.442	(0.101)**	0.414	(0.100)**	0.237	(0.101)*	-0.418	(0.125)**
GHS2002	-0.155	(0.438)	-0.32	(0.464)	-0.278	(0.593)	-0.048	(0.444)	0.169	(0.428)	-0.019	(0.417)	0.084	(0.498)
GHS2003	0.188	(0.328)	-0.495	(0.358)	-1.507	(0.784)	0.208	(0.372)	0.329	(0.319)	0.198	(0.321)	-0.391	(0.552)
GHS2004	-0.311	(0.309)	-0.587	(0.329)	-1.183	(0.450)**	-0.273	(0.405)	-0.049	(0.298)	-0.308	(0.315)	-1.018	(0.631)
GHS2005	-0.182	(0.193)	-0.591	(0.202)**	-0.699	(0.418)	-0.3	(0.242)	-0.042	(0.179)	-0.308	(0.179)	-0.374	(0.357)
Average	-0.067		-0.370		-1.067		0.028		0.141		-0.077		-0.502	

* significant at 5%; ** significant at 1%. Each row presents selected coefficients and standard errors in parentheses from a single regression

Indicators for missing parents' vital status, individual and household controls included in all regressions. Reference category is double orphan who is foster/adoptive child of household head

Table 11. Grant receipt and enrolment – Africans aged 6 to 8 whose primary caregiver passes the means test

	(1)	(2)
Mother deceased	-0.020 (0.015)	-0.023 (0.019)
Father deceased	-0.001 (0.01)	-0.024 (0.014)
Grant recipient	0.035 (0.009)**	0.026 (0.010)**
Mother dead x Grant		0.011 (0.028)
Father dead x Grant		0.050 (0.020)*
Observations	11496	11496

* significant at 5%; ** significant at 1%. Standard errors presented in parentheses below coefficients.

Indicators for missing parents' vital status, individual and household controls included in all regressions.

Appendix

1. Details on the creation and comparability of specific variables used in the analyses

Parent's vital status

Rates of orphanhood using household surveys are likely to be under-estimates as children living on the streets and in institutionalized settings are excluded by design and child headed households will be under-represented as interviewers are typically instructed to interview a knowledgeable adult about the household. The primary objective of this paper is not to estimate orphan prevalence but rather the impact on orphanhood on schooling so my concern is limited to any biases that may be introduced into the estimates of orphan vulnerability and how this is changing over time. Table A9 presents the question in each survey about parents' vital status. In the 1993 PSLSD, 1995 OHS, 2002 and 2003 GHS the question did not explicitly refer to biological parents. In other years the terms biological, own, own by birth or natural were included in the question or as a note to the interviewer on the questionnaire. Examining the estimated percentage of children who have lost a parent in Figure 2 there does not seem to be any clear indication that those surveys produced under-estimates of rates of orphanhood.

Table A10 shows the percentage of responses for those children aged 7 to 14 that were coded as don't know. The 2001 Census imputed values for missing data but included a flag to identify these imputed values. This paper recoded all imputed values to missing. The percentage of cases where the mother's vital status is unknown varies from 0% in the 1995 OHS to 2.79% in the 1998 DHS. On average mother's vital status is unknown for 0.7% of children aged 7 to 14. The percentage of children with unknown father's vital status is higher and varies between 0% and 5.28% in the 1998 DHS with an average percentage of 2.29%. Rates of orphanhood appear to have been over-estimated in the 1995 OHS survey particularly for paternal orphans. This survey has no missing data on any variable and there is no discussion on missing data or any imputation techniques in the metadata. Barnes et al. (2007:75) warn that "early sample frames are regarded with some suspicion, and consequently, results generated using the 1995 OHS are to be handled cautiously." They also point out that the earlier OHSs should have been re-weighted to the 1996 Census but that these updated weights have not yet been released.

A variety of approaches to dealing with missing data on parent's vital status have been adopted in the literature. Anderson and Phillips (2006) considered a high estimate where they coded all parents with missing vital status as deceased and a low estimate where they ignored the missing data. Bicego et al. (2003) imputed a percentage of the don't know reports to deceased status unless both parent's status was unknown in which case the child was excluded from the analysis. Ainsworth and Filmer (2005) and Ardington and Case (2006) include indicators that a child's orphan status is missing and set all other orphan status variables to zero. Evans and Miguel (2007) experiment with a range of polar opposite assumptions about the missing data and then run simulations to establish

upper and lower bounds of their estimated effects. Case et al. (2004) recode children to be double orphans if both their parents' vital status is missing or if one is deceased and the other's vital status is missing. Children with one living parent and one parent with missing vital status are excluded from their analyses.

The sensitivity of estimates to a range of approaches to the missing data was examined. Figures A1 and A2 present alternative treatments of missing data to Figure 4. The figures show coefficient estimates and confidence intervals for regressions of years of completed schooling on indicators that the child's mother and father are deceased. The regressions all include an indicator for the child's sex and a full set of indicators for the child's age. In the second column household controls are added and the third column presents estimates from household fixed effect models. Estimates for maternal and paternal death are presented in the first and second row of the figures respectively. In Figure A1 children with missing vital status for either parent are excluded from the analysis. Figure A2 shows estimates when parents with missing vital status are considered to be deceased. In Figure 4 indicators that the parents' vital status is missing are included in the regressions and the indicators on maternal and paternal death are set to zero when vital status is unknown. The results seem fairly robust to different treatments of missing data and the analyses in the paper adopt the approach represented in Figure 4.

Parental absence

The surveys all have slightly different rules for household membership and/or residency which may impact on the proportion of parents who are considered to be co-residents. The OHSs and GHSs included "every person who normally resides 4 nights a week in this household" on the household roster. The GHSs then asked whether the individual had stayed in the household for at least four nights per week in the preceding month. No further questions were asked of individuals who did not satisfy this residency requirement. The Census collects information on every person who slept in the household on the night between Wednesday 9 October and Thursday 10 October. The questionnaire then asks whether the person usually spends at least four nights a week in the household. In the 1993 PSLSD household members were identified as any individuals who had lived in the household for at least 15 days in the last year and shared food and contributed to or shared from a common resource pool. Individuals who have lived in the household for more than half of the last 30 days are considered to resident. In surveys that distinguished between membership and residency, the residency requirement was used to identify co-resident parents (i.e. parents on the household roster were not automatically assumed to be co-resident). Estimates of the percentage of children aged whose parent is living but not co-resident are shown in Figures A3 and A4 for mothers and fathers respectively. Relative to other surveys the estimates for the 1998 DHS and 2001 Census seem high, particularly for mothers. This is not surprising for the Census as only people who slept in the dwelling on the night of 10th October 2001 are considered as potential residents. The 1995 OHS estimates seem low. This is also not surprising given the unusually high estimates for parental death in this survey.

Educational attainment

In the 1993 PSLSD and 1995 OHS grades one to three were considered as one category. Children in this category were coded as having completed three years of education. The education of younger children will therefore be biased upwards for these two surveys. It is not clear what effect this will have on estimates of orphan deficits in educational attainment. Orphans in this category who are in grades one and two and who are not at the correct grade for age will be indistinguishable from non-orphans in grade three. On the other hand as the risk of orphanhood increases with age an over-estimate of educational attainment at younger ages may bias estimates of an orphan deficit upwards (in absolute terms).

In all surveys other than the 1997 and 1998 OHSs and the 1996 Census interviewers had to check off a box for years of completed education. For these three surveys respondents were asked the following open-ended question. “What is the highest school class/standard that (the person) completed?” Interviewers were also instructed “If no schooling, or currently in sub A/Grd 1 write none.” Table A11 shows the percentage of children aged 7 to 14 who have either completed no education or have completed Grades one, two or three. As the grades are combined in the first two surveys there is also a column for the percentage of children who have completed any of Grades one, two or three. For the 1997 and 1998 OHSs and the 1996 Census, the percentage of children aged 7 to 14 who are classified as having no education is much higher than in other years. The percentage in Grades one and two is also much lower than in other datasets. The split between Grades one, two and three is fairly equal for all of the other surveys. The percentage in Grade three and higher grades (not shown) corresponds well with the other datasets. It appears that many respondents and/or fieldworkers did not consider Grades one and two as a completed standard or grade. These grades were previously called Sub A and B or Class one and two so this misunderstanding does seem plausible.

Table A12 shows the percentage of children aged 7 to 14 who have no completed education who are enrolled in school. The percentage is much higher for the 1997 and 1998 OHSs and the 1996 Census lending support to the interpretation above. This misclassification would lead to a downward bias in the years of completed education for younger children. As the risk of orphanhood rises with age this would attenuate estimates of orphan disadvantage to zero.

Table A11 also shows that the percentage of children with no completed education is particularly high for the GHSs although the split of children between Grades one, two and three is fairly even. As the sample frame for the GHSs was based on the 2001 Census it is unlikely to be due to a change in sampling. There were two changes in the education system over this period that may explain this anomaly. A reception grade was introduced in schools over this period and the GHSs are the first surveys to include Grade R as an option in their education question. The other change was a change in the age of admission policy. The Education Laws Amendment Act, 2002 (Act 50 of 2002) set the age of admission to Grade one as the year in which the child turns seven. However, a Constitutional Court challenge to the Bill in 2003 resulted in the school-going age of

Grade one being changed to age five if children turn six on or before 30 June in their Grade one year. This was implemented with effect from the 2004 school year.

For ease of interpretation this paper uses the number of years of completed education as the measure of educational attainment. The sensitivity of estimates of orphan deficits to this specification was explored and the results for maternal and paternal deaths are presented in Figures A5 and A6 respectively. Educational attainment is measured as the percentage of total possible years completed in the first row, an indicator for being at the correct grade for age in the second row and an indicator that the child is at least two years behind the correct grade for age in the third row. All substantive findings are consistent across the various measures of educational attainment.

That the rate of progression through school has changed over the period under study can be seen in Table A13. The table shows the coefficient on age from a regression of age and sex on years of completed education for Africans aged 8 to 17. It is not clear how or whether this would affect comparability of orphan deficits over time.

Enrolment

The estimates of enrolment are substantially lower for the 1996 Census compared to all the other surveys. The following excerpt from the meta-data sheds some light on the reasons for this under-estimate. “The questionnaire included an instruction to the effect that correspondence education, but not pre-school education, were to be included. The instruction read as follows: ‘This includes study by correspondence, but excludes creche and pre-school.’ Analysis of the results of this question indicated that there may have been a problem with the quality of the data. Some responses to this question contradicted responses given to a later question. That is, some persons recorded as not studying for question 16.3 were recorded as being ‘scholar/full-time student’ for question 18.1 on usual activity. The cause of this problem is not clear but respondents could have mistakenly thought that the question on studying applied only to post-school institutions as it appeared after the question on post-school qualifications (Statistics South Africa 1996:24).”

Hygienic toilet

Households were coded as having access to a hygienic toilet if there was a flush toilet, chemical toilet or pit latrine with a ventilation pipe on or off site. The 1996 OHS and Census did not distinguish between pit latrines and pit latrines with a ventilation pipe. Any pit latrine was therefore considered a hygienic toilet with the result that estimates for these two surveys are higher than those from other surveys.

Expenditure

Household expenditure was expressed in bands in the 1996, 1997 and 1998 OHS and all the GHSs. The mid-point of each band was used as an estimate of expenditure in these surveys. Expenditure was not collected in the 1996 and 2001 Census so income was used

instead. The 1995 OHS was merged with the 1995 Income and Expenditure Survey and the total expenditure variable was taken from the latter.

2. Ainsworth and Filmer (2006) results for Eastern and Southern Africa

Ainsworth and Filmer (2006) calculate enrolment differentials for multiple years for many of the countries included in their study but do not comment in detail on changes over time. No clear time trends in the vulnerabilities of orphans emerge when examining their results. For the sake of thoroughness the changes in their calculations of orphan deficits in Eastern and Southern Africa are summarized below.

In Kenya there were no significant orphan deficits in 1993. In 1998 deficits were large and significant. These deficits declined but remained significant in 2003. Double orphan deficits increased in Madagascar between 1992 and 2000 while paternal and maternal orphan deficits experienced a slight decrease. In Malawi orphan deficits decreased over the period from 1992 to 2000. In Tanzania there was no clear pattern between 1991 and 1999. In Uganda deficits increased for double orphans and decreased for paternal and maternal orphans. Deficits decreased for paternal orphans, increased for maternal orphans and showed no clear trend for double orphans between 1992 and 2003 in Zambia. In Zimbabwe deficits for double orphans increased between 1994 and 1999.

There were large increases in non-orphan enrolment in many of these countries in the 1990s. Non-orphan enrolment rates improved from 80% to 93% in Kenya, from 65% to 83% in Malawi and from 75% to 90% in Uganda.

Figure A1. Coefficient estimates and 95% confidence intervals – Africans aged 8 to 17. Regressions of years of completed education on indicators that mother and father are deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Children whose parents' vital status is missing are excluded from the analysis.

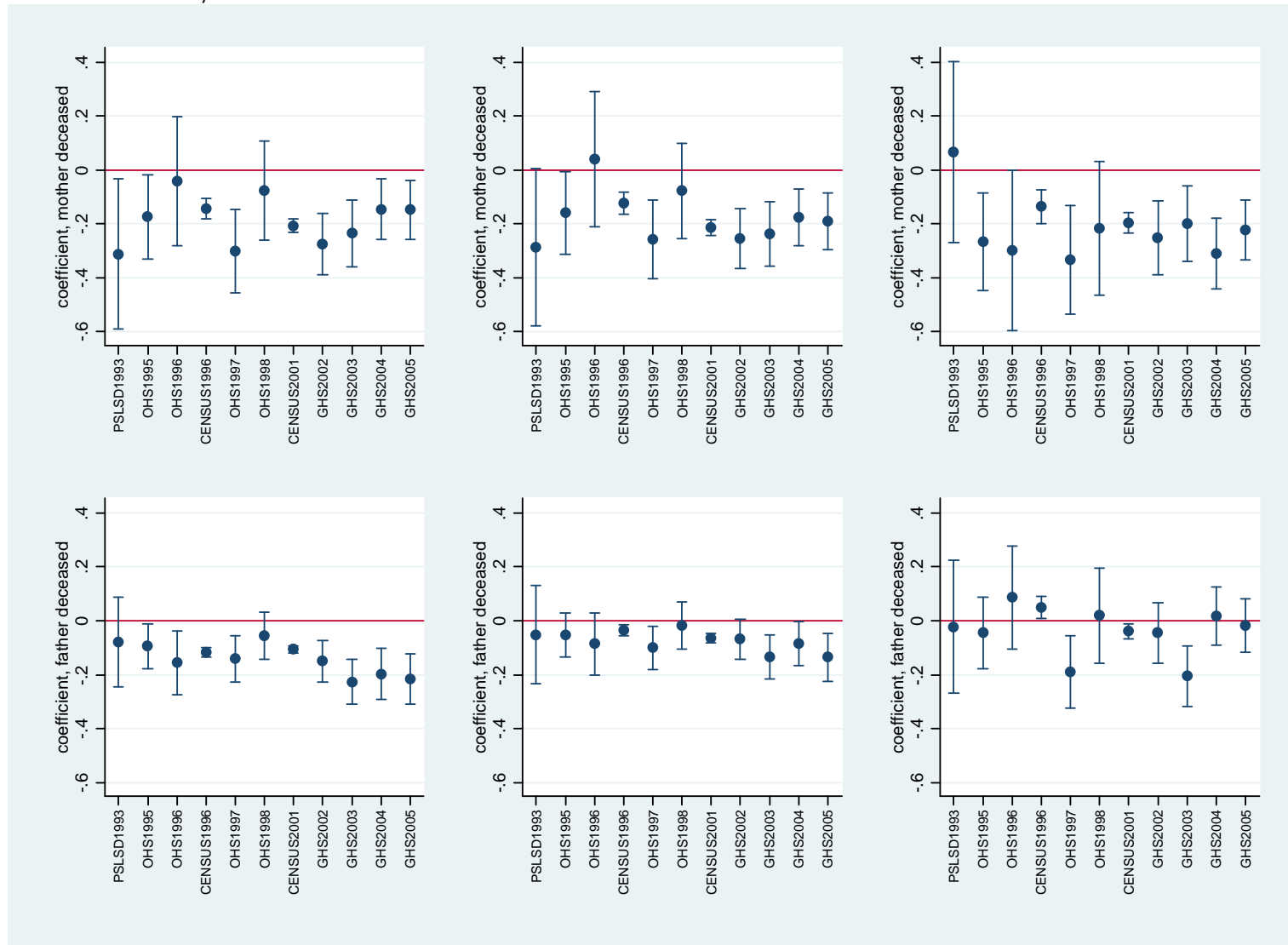


Figure A2. Coefficient estimates and 95% confidence intervals – Africans aged 8 to 17. Regressions of years of completed education on indicators that mother and father are deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Parents with missing vital status are coded as deceased.

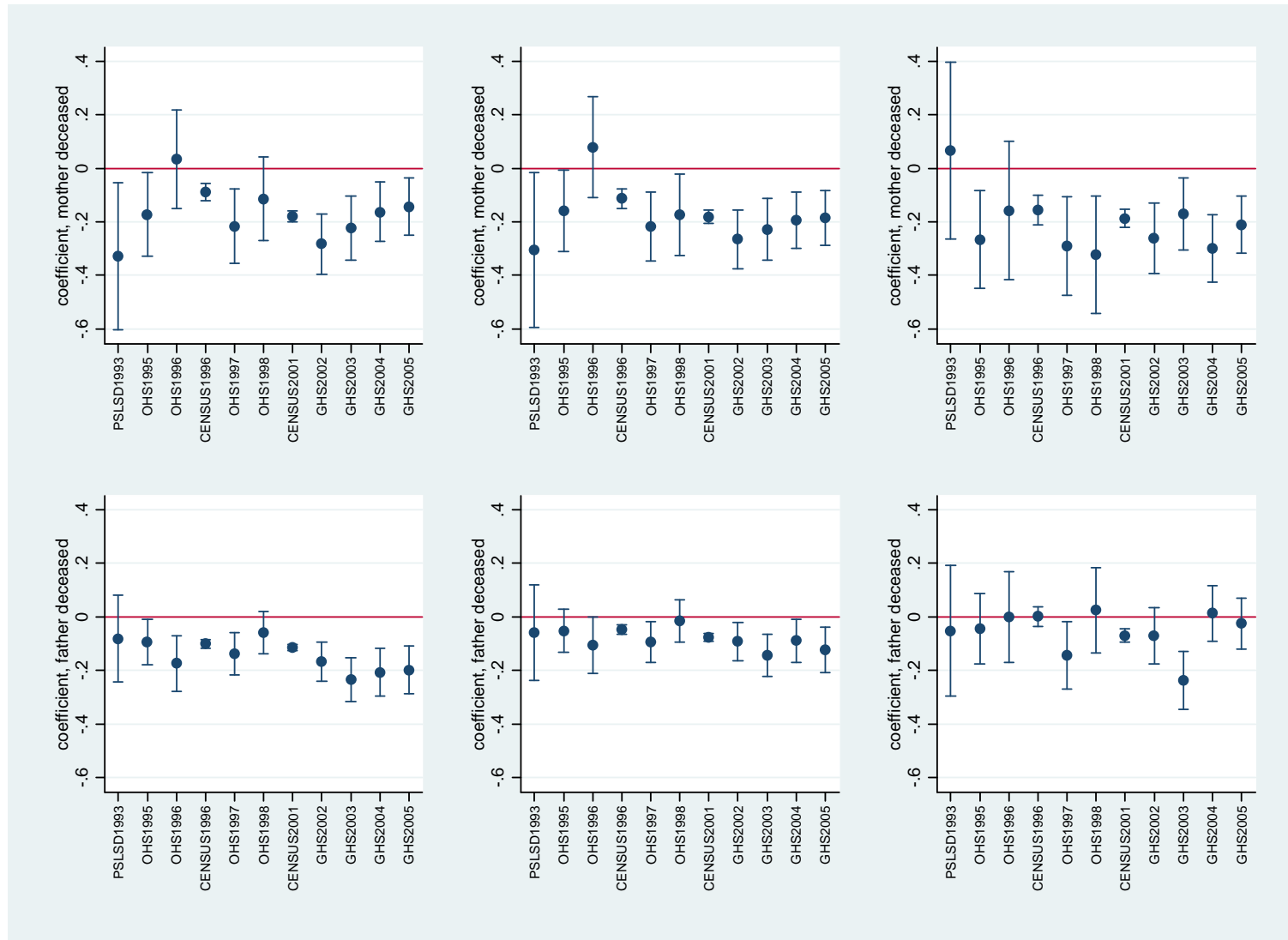


Figure A3. Proportion of children aged 0 to 14 whose mothers are alive but not co-resident

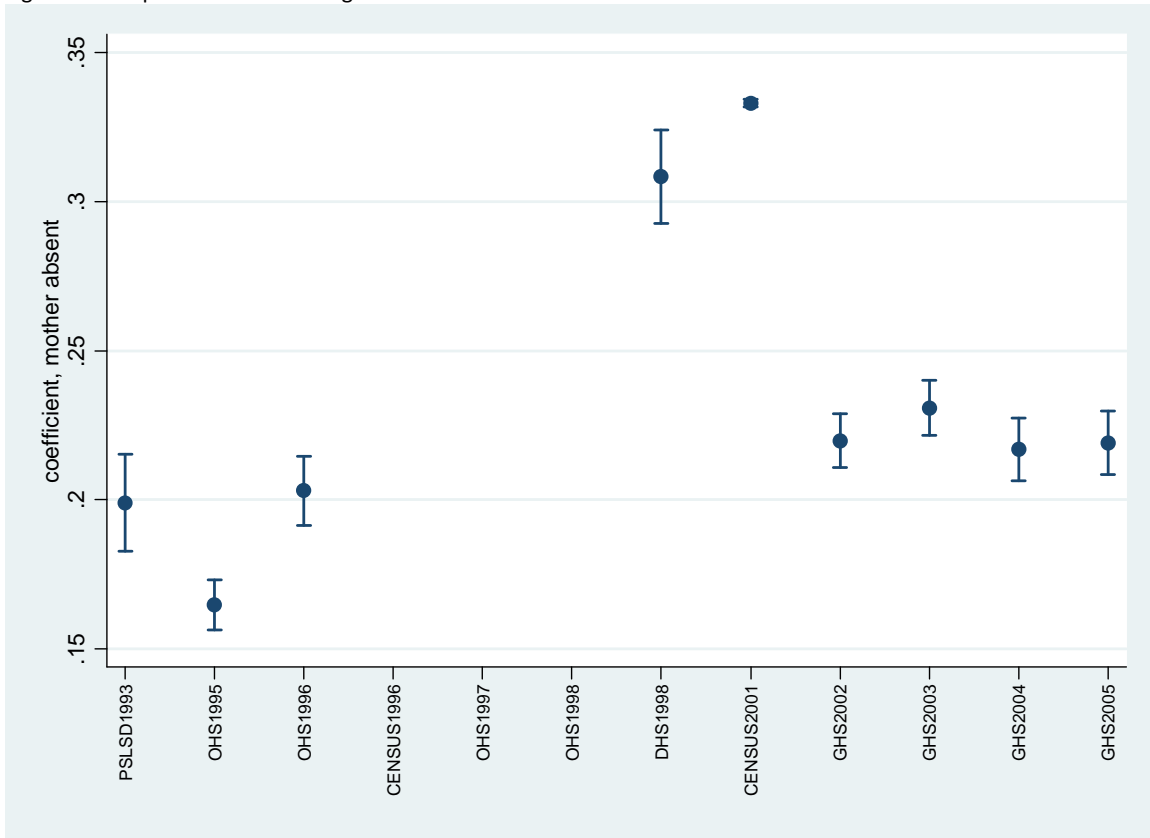


Figure A4. Proportion of children aged 0 to 14 whose fathers are alive but not co-resident

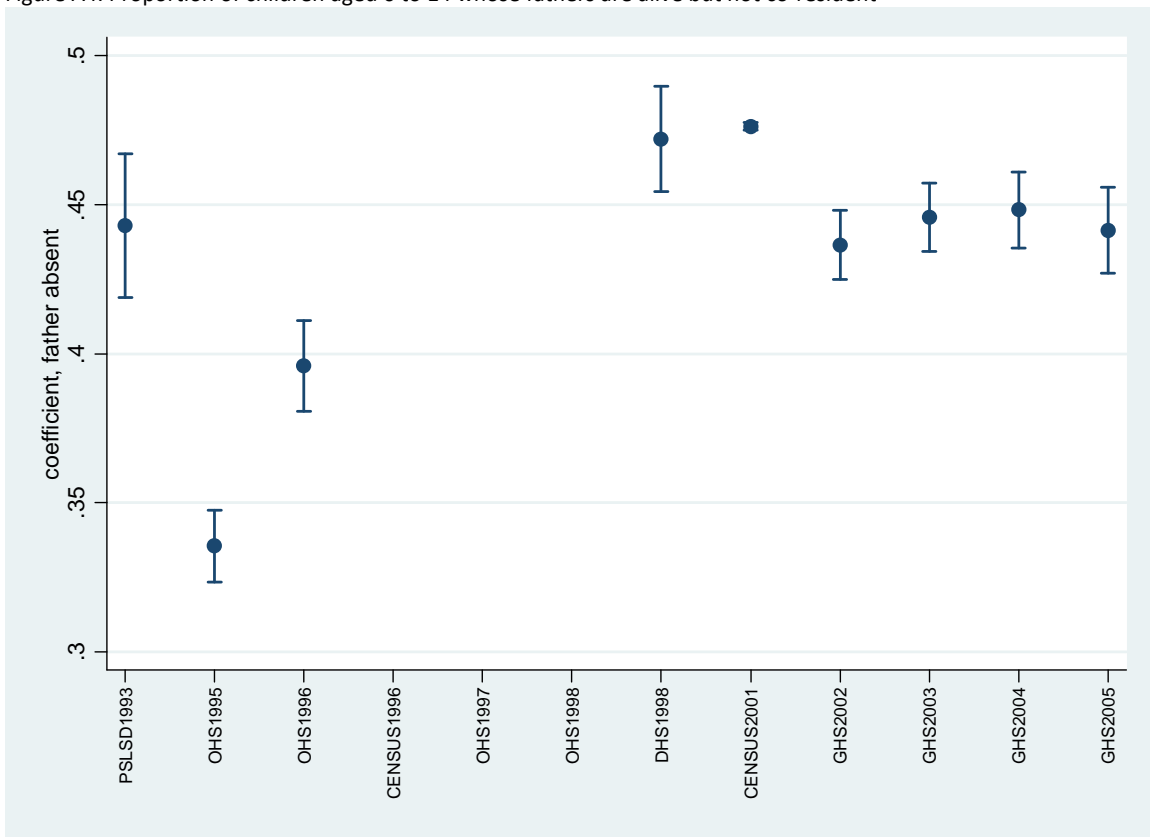


Figure A5. Coefficient estimates and confidence intervals. Regressions of a range of measures of educational attainment on indicators that child's mother is deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Educational attainment is measured as the percentage of total possible years completed in the first row, an indicator for being at the correct grade for age in the second row and an indicator that the child is at least two years behind the correct grade for age in the third row. Children whose parents' vital status is missing are excluded from the analysis.

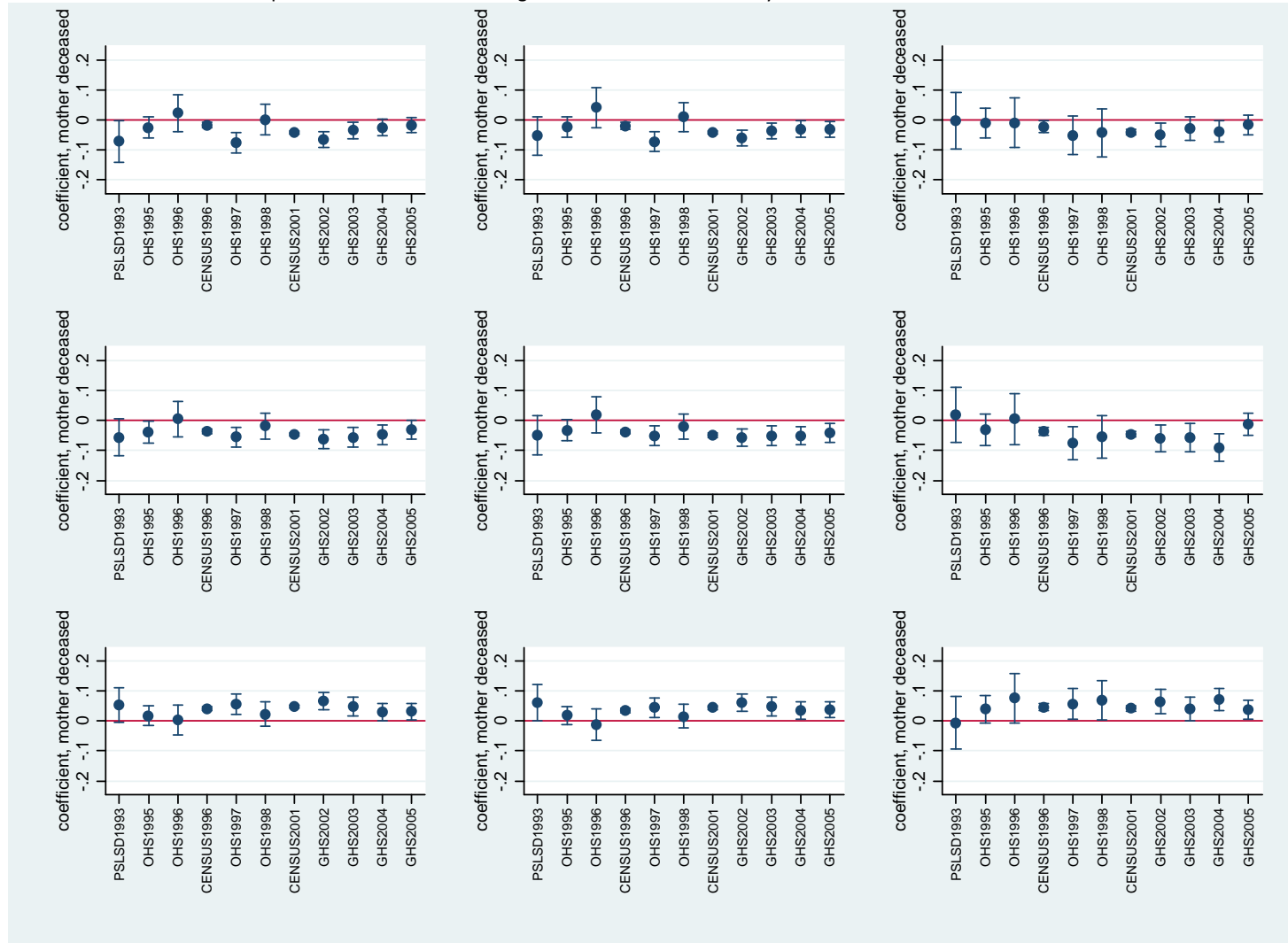


Figure A6. Coefficient estimates and confidence intervals. Regressions of a range of measures of educational attainment on indicators that child's father is deceased. First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Educational attainment is measured as the percentage of total possible years completed in the first row, an indicator for being at the correct grade for age in the second row and an indicator that the child is at least two years behind the correct grade for age in the third row. Children whose parents' vital status is missing are excluded from the analysis.

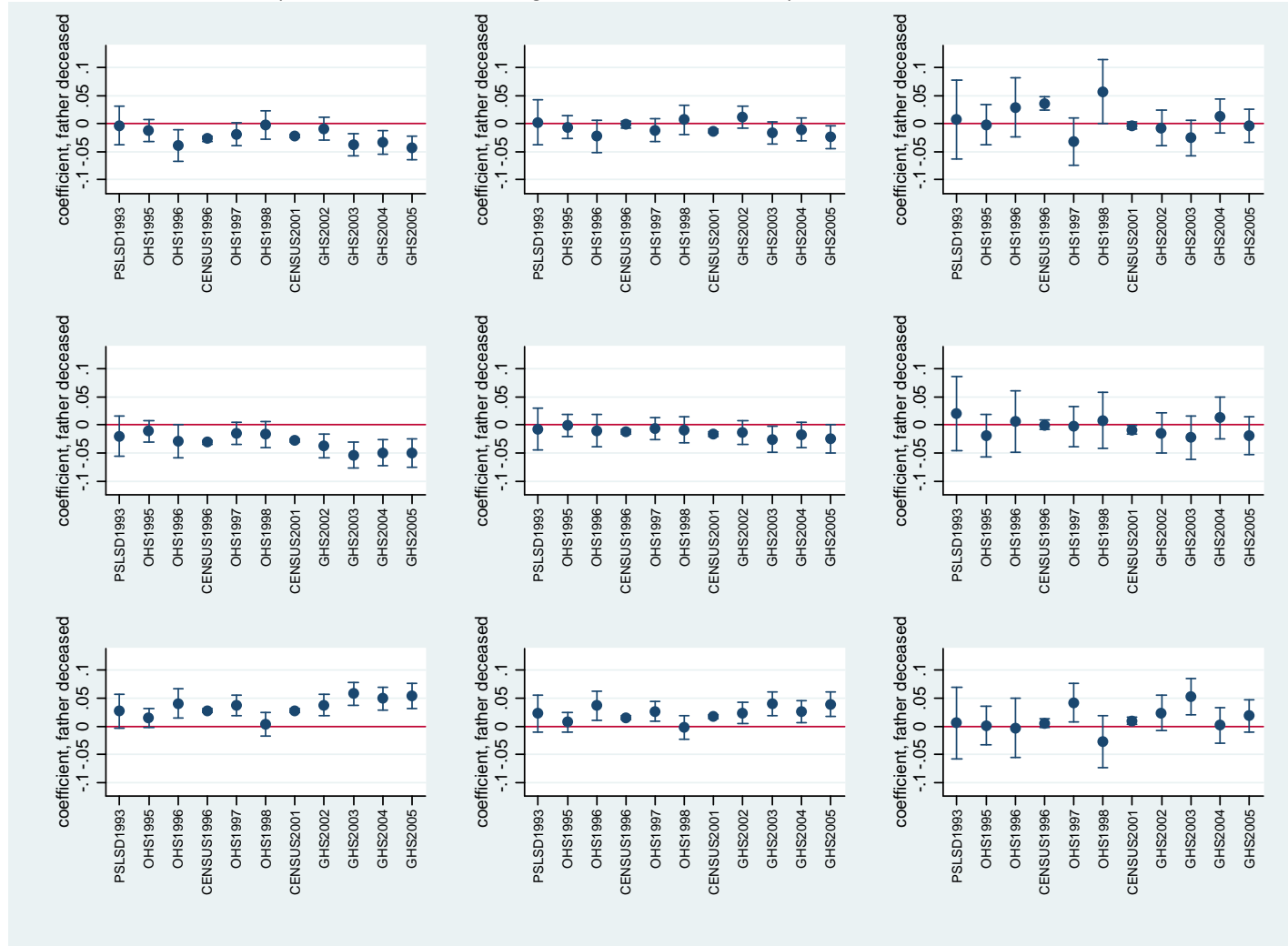


Table A1. Educational attainment of Africans aged 8 to 17. Interaction between maternal and paternal death

Dataset	Mother deceased		Father deceased		Double orphan	
Panel A - No household controls						
PSLSD1993	-0.188	(0.152)	-0.052	(0.09)	-0.356	(0.296)
OHS1995	-0.122	(0.109)	-0.087	(0.045)	-0.102	(0.153)
OHS1996	0.13	(0.137)	-0.129	(0.062)*	-0.417	(0.246)
CENSUS1996	-0.189	(0.021)**	-0.141	(0.009)**	-0.025	(0.036)
OHS1997	-0.348	(0.100)**	-0.147	(0.045)**	0.115	(0.156)
OHS1998	-0.107	(0.109)	-0.061	(0.046)	0.097	(0.187)
CENSUS2001	-0.235	(0.014)**	-0.143	(0.007)**	-0.015	(0.025)
GHS2002	-0.276	(0.070)**	-0.151	(0.043)**	0.026	(0.114)
GHS2003	-0.186	(0.078)*	-0.217	(0.046)**	-0.085	(0.128)
GHS2004	-0.161	(0.072)*	-0.202	(0.053)**	0.036	(0.114)
GHS2005	-0.227	(0.073)**	-0.24	(0.051)**	0.16	(0.108)
Average	-0.174		-0.143		-0.051	
Average excluding OHS1996 & 1998	-0.215		-0.153		-0.027	
Panel B - Household controls						
PSLSD1993	-0.136	(0.158)	-0.015	(0.097)	-0.485	(0.339)
OHS1995	-0.112	(0.108)	-0.044	(0.044)	-0.092	(0.152)
OHS1996	0.33	(0.137)*	-0.036	(0.061)	-0.769	(0.234)**
CENSUS1996	-0.151	(0.023)**	-0.052	(0.010)**	-0.118	(0.040)**
OHS1997	-0.272	(0.091)**	-0.093	(0.043)*	0.017	(0.146)
OHS1998	-0.032	(0.106)	0	(0.045)	-0.149	(0.18)
CENSUS2001	-0.213	(0.017)**	-0.085	(0.009)**	-0.082	(0.030)**
GHS2002	-0.202	(0.068)**	-0.052	(0.041)	-0.114	(0.107)
GHS2003	-0.162	(0.076)*	-0.115	(0.044)**	-0.152	(0.12)
GHS2004	-0.148	(0.069)*	-0.072	(0.045)	-0.062	(0.108)
GHS2005	-0.226	(0.071)**	-0.149	(0.047)**	0.08	(0.103)
Average	-0.120		-0.065		-0.175	
Average excluding OHS1996 & 1998	-0.180		-0.075		-0.112	
Panel C - Household fixed effects						
PSLSD1993	0.389	(0.2)	0.124	(0.135)	-0.992	(0.355)**
OHS1995	-0.209	(0.135)	-0.026	(0.076)	-0.127	(0.195)
OHS1996	0.289	(0.184)	0.218	(0.099)*	-1.171	(0.292)**
CENSUS1996	-0.082	(0.034)*	0.063	(0.018)**	-0.306	(0.051)**
OHS1997	-0.231	(0.131)	-0.14	(0.070)*	-0.149	(0.197)
OHS1998	-0.302	(0.149)*	0.088	(0.091)	-0.016	(0.246)
CENSUS2001	-0.191	(0.021)**	-0.042	(0.014)**	-0.108	(0.034)**
GHS2002	-0.324	(0.085)**	-0.08	(0.061)	0.196	(0.137)
GHS2003	-0.212	(0.089)*	-0.236	(0.064)**	-0.117	(0.137)
GHS2004	-0.116	(0.086)	0.115	(0.062)	-0.38	(0.125)**
GHS2005	-0.194	(0.080)*	-0.044	(0.056)	-0.015	(0.116)
Average	-0.108		0.004		-0.290	
Average excluding OHS1996 & 1998	-0.130		-0.030		-0.222	

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, and indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table A2. Africans aged 8 to 17 - descriptive statistics

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	8,059	22,858	14,588	636,977	28,494	16,376	625,585	19,805	19,092	18,353	21,296
<i>Educational outcomes</i>											
Years of completed education	5.3	5.34	4.90	4.61	4.67	4.58	5.15	4.94	5.02	4.88	4.93
Currently attending	0.918	0.957	0.952	0.897	0.940	0.925	0.927	0.954	0.959	0.963	0.963
<i>Individual controls</i>											
Female	0.507	0.498	0.494	0.507	0.504	0.503	0.505	0.494	0.488	0.469	0.476
Age*	12.4	12.3	12.4	12.4	12.5	12.3	12.5	12.5	12.6	12.4	12.4
<i>Household controls</i>											
Education of head	4.53	5.20	5.09	4.70	5.10	5.02	5.08	5.47	5.58	5.61	5.73
Female headed household	0.326	0.416	0.487	0.513	0.524	0.516	0.528	0.523	0.536	0.546	0.555
Age of head	52.1	49.9	48.3	47.4	50.4	50.2	47.9	50.8	50.8	51.1	49.8
Household size	7.51	6.92	6.84	6.84	7.07	6.91	6.14	6.69	6.46	6.60	6.37
Fraction under 14	0.432	0.394	0.401	0.423	0.411	0.409	0.39	0.386	0.381	0.393	0.396
At least one female of pension eligible age	0.24	0.235	0.234	0.228	0.28	0.258	0.218	0.255	0.258	0.253	0.228
At least one male of pension eligible age	0.082	0.106	0.092	0.088	0.101	0.096	0.072	0.086	0.086	0.086	0.073
Logarithm of expenditure per capita	4.91	5.22	4.55	7.21	4.42	4.41	5.26	4.51	4.67	4.83	4.86
Access to electricity from the grid	0.255	0.380	0.435	0.401	0.471	0.495	0.610	0.672	0.686	0.713	0.724
Access to piped water	0.328	0.432	0.399	0.385	0.415	0.417	0.429	0.486	0.471	0.467	0.484
Access to a hygienic toilet	0.246	0.408	0.773	0.750	0.483	0.433	0.397	0.382	0.410	0.429	0.460
Western Cape	0.017	0.014	0.019	0.019	0.020	0.019	0.025	0.025	0.026	0.027	0.028
Eastern Cape	0.207	0.204	0.208	0.205	0.202	0.207	0.180	0.185	0.184	0.199	0.199
Northern Cape	0.004	0.006	0.008	0.008	0.008	0.008	0.007	0.007	0.006	0.007	0.009
Free State	0.075	0.072	0.065	0.068	0.068	0.067	0.067	0.059	0.059	0.059	0.062
KwaZulu-Natal	0.245	0.241	0.232	0.229	0.233	0.229	0.242	0.237	0.237	0.232	0.234
North West	0.093	0.090	0.093	0.094	0.093	0.095	0.088	0.089	0.090	0.090	0.085
Gauteng	0.112	0.088	0.110	0.109	0.112	0.110	0.119	0.141	0.140	0.130	0.125
Mpumalanga	0.100	0.088	0.083	0.084	0.082	0.082	0.088	0.084	0.084	0.080	0.083
Limpopo	0.148	0.197	0.182	0.183	0.182	0.183	0.183	0.172	0.175	0.177	0.175
Urban	0.301	0.273	0.355	0.344	0.347	0.351	0.379	0.395	0.385	0.375	0.418

Table A3. Non-orphaned Africans aged 8 to 17 - descriptive statistics

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	6,850	18,391	11,579	515,714	22,644	12,970	476,089	14,976	14,406	13,424	15,029
Educational outcomes											
Years of completed education	5.23	5.31	4.85	4.57	4.63	4.52	5.10	4.88	4.99	4.84	4.85
Currently attending	0.925	0.961	0.956	0.901	0.945	0.928	0.934	0.961	0.965	0.969	0.968
Individual controls											
Female	0.505	0.500	0.489	0.507	0.503	0.503	0.504	0.494	0.489	0.472	0.477
Age*	12.2	12.2	12.3	12.3	12.3	12.2	12.4	12.4	12.4	12.3	12.2
Household controls											
Education of head	4.60	5.32	5.25	4.78	5.22	5.15	5.24	5.66	5.83	5.89	5.94
Female headed household	0.258	0.327	0.422	0.461	0.464	0.455	0.473	0.457	0.467	0.473	0.482
Age of head	52.2	49.5	47.7	47.0	50.0	49.7	47.3	50.2	50.1	50.3	49.3
Household size	7.60	6.94	6.83	6.88	7.10	6.94	6.15	6.68	6.47	6.56	6.38
Fraction under 14	0.439	0.398	0.405	0.429	0.417	0.416	0.395	0.393	0.386	0.398	0.401
At least one female of pension eligible age	0.231	0.213	0.21	0.213	0.260	0.238	0.196	0.226	0.227	0.222	0.200
At least one male of pension eligible age	0.089	0.112	0.093	0.092	0.105	0.097	0.072	0.083	0.087	0.083	0.070
Logarithm of expenditure per capita	4.93	5.26	4.57	7.24	4.45	4.44	5.3	4.55	4.72	4.89	4.92
Access to electricity from the grid	0.262	0.387	0.445	0.408	0.478	0.500	0.618	0.681	0.692	0.719	0.728
Access to piped water	0.333	0.439	0.411	0.392	0.424	0.420	0.440	0.497	0.483	0.475	0.489
Access to an hygienic toilet	0.247	0.414	0.778	0.755	0.482	0.434	0.403	0.390	0.415	0.439	0.469
Western Cape	0.018	0.013	0.020	0.019	0.020	0.020	0.026	0.024	0.025	0.028	0.030
Eastern Cape	0.199	0.192	0.201	0.199	0.197	0.198	0.174	0.181	0.179	0.193	0.183
Northern Cape	0.004	0.006	0.008	0.008	0.008	0.008	0.007	0.007	0.006	0.007	0.009
Free State	0.070	0.075	0.065	0.068	0.067	0.066	0.066	0.056	0.055	0.057	0.056
KwaZulu-Natal	0.245	0.238	0.234	0.230	0.225	0.227	0.232	0.228	0.233	0.219	0.221
North West	0.098	0.090	0.095	0.095	0.096	0.099	0.090	0.089	0.087	0.089	0.087
Gauteng	0.114	0.091	0.110	0.111	0.116	0.113	0.125	0.146	0.149	0.136	0.139
Mpumalanga	0.100	0.095	0.089	0.089	0.088	0.085	0.093	0.088	0.087	0.082	0.086
Limpopo	0.152	0.200	0.178	0.181	0.184	0.184	0.186	0.179	0.179	0.189	0.189
Urban	0.298	0.270	0.361	0.346	0.348	0.349	0.386	0.393	0.387	0.379	0.423

Table A4. Maternal orphan Africans aged 8 to 17 - descriptive statistics

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	180	437	253	11,699	605	361	17,740	811	754	751	995
Educational outcomes											
Years of completed education	5.61	5.56	5.41	4.93	4.79	4.77	5.32	5.07	5.15	4.84	5.07
Currently attending	0.871	0.914	0.952	0.870	0.910	0.918	0.897	0.927	0.930	0.960	0.941
Individual controls											
Female	0.555	0.473	0.494	0.504	0.492	0.515	0.495	0.472	0.47	0.445	0.469
Age*	13.1	12.8	12.9	13.0	13.0	12.7	13.0	13.0	12.9	12.5	12.8
Household controls											
Education of head	3.95	4.96	4.29	4.59	4.97	4.17	4.63	4.70	4.64	4.97	5.10
Female headed household	0.330	0.438	0.478	0.419	0.474	0.401	0.465	0.483	0.537	0.549	0.513
Age of head	54.8	52.7	51.3	49.5	52.6	54.2	51.0	53.6	55.7	55.9	53.8
Household size	7.79	6.84	7.03	6.67	7.15	6.96	6.19	6.88	6.92	7.08	6.41
Fraction under 14	0.408	0.344	0.360	0.377	0.377	0.392	0.357	0.361	0.351	0.384	0.363
At least one female of pension eligible age	0.300	0.294	0.315	0.263	0.349	0.334	0.313	0.383	0.432	0.411	0.334
At least one male of pension eligible age	0.088	0.134	0.141	0.142	0.166	0.213	0.117	0.143	0.145	0.154	0.131
Logarithm of expenditure per capita	4.85	5.25	4.49	7.22	4.36	4.32	5.19	4.40	4.63	4.74	4.83
Access to electricity from the grid	0.229	0.348	0.371	0.392	0.464	0.472	0.611	0.675	0.686	0.733	0.744
Access to piped water	0.332	0.398	0.340	0.383	0.440	0.451	0.433	0.501	0.482	0.478	0.514
Access to an hygienic toilet	0.269	0.409	0.718	0.729	0.517	0.428	0.402	0.374	0.435	0.398	0.436
Western Cape	0.015	0.022	0.020	0.017	0.013	0.039	0.019	0.018	0.014	0.013	0.017
Eastern Cape	0.195	0.223	0.292	0.232	0.208	0.258	0.180	0.182	0.149	0.191	0.224
Northern Cape	0.000	0.008	0.019	0.009	0.012	0.008	0.008	0.013	0.012	0.010	0.009
Free State	0.130	0.074	0.061	0.082	0.095	0.069	0.084	0.088	0.074	0.067	0.081
KwaZulu-Natal	0.311	0.278	0.212	0.241	0.292	0.224	0.297	0.275	0.296	0.314	0.281
North West	0.067	0.106	0.099	0.096	0.099	0.089	0.095	0.089	0.104	0.083	0.085
Gauteng	0.091	0.068	0.049	0.100	0.095	0.107	0.105	0.096	0.113	0.112	0.075
Mpumalanga	0.115	0.062	0.105	0.081	0.070	0.101	0.094	0.107	0.106	0.100	0.084
Limpopo	0.076	0.159	0.144	0.142	0.116	0.104	0.118	0.131	0.133	0.111	0.145
Urban	0.365	0.288	0.290	0.349	0.346	0.376	0.394	0.392	0.370	0.385	0.411

Table A5. Paternal orphan Africans aged 8 to 17 - descriptive statistics

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	904	3,523	1,797	76,648	3,819	2,123	87,767	2,967	2,886	2,965	3,626
Educational outcomes											
Years of completed education	5.82	5.48	5.20	4.88	4.94	4.96	5.41	5.23	5.22	5.11	5.11
Currently attending	0.887	0.947	0.938	0.886	0.924	0.911	0.908	0.929	0.946	0.940	0.958
Individual controls											
Female	0.513	0.490	0.513	0.509	0.504	0.516	0.508	0.495	0.488	0.459	0.475
Age*	13.3	12.6	13.0	12.9	12.9	12.9	13.0	13.0	13.0	12.9	12.8
Household controls											
Education of head	4.18	4.59	4.55	4.35	4.64	4.67	4.65	4.91	4.94	4.89	5.24
Female headed household	0.822	0.861	0.849	0.827	0.849	0.836	0.801	0.833	0.842	0.845	0.836
Age of head	51.6	51.3	49.4	48.4	51.1	50.5	48.4	51.5	51.4	51.3	49.8
Household size	6.91	6.85	6.65	6.60	6.84	6.66	5.99	6.49	6.26	6.59	6.27
Fraction under 14	0.392	0.383	0.383	0.399	0.388	0.384	0.373	0.366	0.371	0.382	0.396
At least one female of pension eligible age	0.282	0.321	0.291	0.281	0.332	0.288	0.257	0.301	0.302	0.285	0.258
At least one male of pension eligible age	0.035	0.069	0.055	0.048	0.057	0.060	0.049	0.067	0.053	0.056	0.059
Logarithm of expenditure per capita	4.79	5.03	4.53	7.03	4.29	4.32	5.07	4.36	4.46	4.65	4.66
Access to electricity from the grid	0.218	0.358	0.399	0.361	0.424	0.454	0.572	0.622	0.646	0.676	0.693
Access to piped water	0.302	0.403	0.352	0.342	0.354	0.359	0.385	0.435	0.410	0.451	0.429
Access to an hygienic toilet	0.235	0.379	0.741	0.717	0.465	0.418	0.366	0.347	0.374	0.408	0.420
Western Cape	0.013	0.013	0.016	0.021	0.020	0.020	0.024	0.030	0.033	0.032	0.027
Eastern Cape	0.252	0.252	0.239	0.255	0.228	0.263	0.215	0.209	0.216	0.229	0.264
Northern Cape	0.000	0.005	0.006	0.007	0.009	0.004	0.005	0.007	0.005	0.007	0.007
Free State	0.090	0.055	0.066	0.065	0.059	0.052	0.065	0.060	0.063	0.055	0.071
KwaZulu-Natal	0.236	0.246	0.241	0.235	0.271	0.244	0.277	0.270	0.246	0.262	0.256
North West	0.063	0.087	0.075	0.078	0.072	0.073	0.070	0.082	0.085	0.083	0.068
Gauteng	0.109	0.080	0.112	0.097	0.092	0.084	0.099	0.127	0.123	0.119	0.086
Mpumalanga	0.094	0.063	0.050	0.061	0.056	0.065	0.067	0.065	0.066	0.067	0.070
Limpopo	0.144	0.198	0.196	0.180	0.192	0.195	0.178	0.150	0.161	0.147	0.152
Urban	0.315	0.283	0.335	0.330	0.321	0.329	0.353	0.406	0.375	0.368	0.374

Table A6. Double orphan Africans aged 8 to 17 - descriptive statistics

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Dataset	PSLSD	OHS	OHS	CENSUS	OHS	OHS	CENSUS	GHS	GHS	GHS	GHS
Observations	108	507	168	8,552	497	234	12,577	578	665	808	1,231
Educational outcomes											
Years of completed education	5.54	5.52	5.31	4.86	4.76	5.30	5.29	5.09	5.00	5.10	5.48
Currently attending	0.829	0.914	0.914	0.815	0.900	0.905	0.866	0.934	0.926	0.939	0.924
Individual controls											
Female	0.461	0.494	0.532	0.514	0.522	0.514	0.521	0.493	0.488	0.466	0.469
Age*	13.6	13.0	13.4	13.2	13.0	13.4	13.1	13.2	13.1	13.0	13.3
Household controls											
Education of head	4.64	5.38	5.56	4.75	4.83	4.16	4.84	5.37	4.92	5.07	5.21
Female headed household	0.511	0.593	0.649	0.585	0.594	0.706	0.596	0.615	0.663	0.600	0.647
Age of head	47.8	52.6	46.5	47.2	53.2	55.5	49.9	54.3	55.5	54.6	51.8
Household size	6.66	6.93	6.16	6.71	7.34	6.85	6.22	7.04	6.64	6.89	6.54
Fraction under 14	0.371	0.358	0.341	0.378	0.388	0.340	0.359	0.350	0.338	0.357	0.351
At least one female of pension eligible age	0.323	0.393	0.410	0.318	0.430	0.447	0.361	0.417	0.452	0.416	0.379
At least one male of pension eligible age	0.055	0.103	0.081	0.102	0.130	0.126	0.093	0.134	0.111	0.155	0.095
Logarithm of expenditure per capita	4.76	5.12	4.44	7.22	4.41	4.29	5.11	4.36	4.57	4.67	4.78
Access to electricity from the grid	0.224	0.334	0.424	0.406	0.453	0.551	0.603	0.652	0.663	0.735	0.714
Access to piped water	0.232	0.404	0.422	0.395	0.432	0.483	0.418	0.431	0.467	0.458	0.528
Access to an hygienic toilet	0.205	0.362	0.791	0.739	0.549	0.438	0.407	0.392	0.420	0.391	0.464
Western Cape	0.000	0.021	0.005	0.016	0.012	0.006	0.019	0.039	0.020	0.008	0.021
Eastern Cape	0.316	0.307	0.256	0.227	0.240	0.170	0.180	0.186	0.213	0.198	0.201
Northern Cape	0.000	0.016	0.014	0.008	0.010	0.013	0.008	0.009	0.012	0.011	0.009
Free State	0.132	0.069	0.098	0.078	0.055	0.103	0.092	0.065	0.081	0.079	0.092
KwaZulu-Natal	0.236	0.270	0.166	0.261	0.257	0.263	0.325	0.318	0.290	0.276	0.322
North West	0.072	0.079	0.073	0.086	0.120	0.078	0.086	0.082	0.100	0.120	0.090
Gauteng	0.100	0.082	0.145	0.119	0.095	0.074	0.101	0.123	0.101	0.098	0.104
Mpumalanga	0.077	0.037	0.109	0.066	0.064	0.107	0.067	0.068	0.078	0.084	0.067
Limpopo	0.066	0.120	0.134	0.138	0.148	0.186	0.123	0.110	0.104	0.126	0.096
Urban	0.275	0.308	0.374	0.380	0.392	0.394	0.393	0.406	0.408	0.357	0.475

Table A7. Educational attainment of Africans aged 8 to 12

Dataset	Mother deceased		Father deceased	
Panel A - No household controls				
PSLSD1993	-0.212	(0.174)	-0.016	(0.079)
OHS1995	-0.086	(0.087)	-0.044	(0.039)
OHS1996	0.065	(0.146)	-0.175	(0.070)*
CENSUS1996	-0.046	(0.023)*	-0.085	(0.011)**
OHS1997	-0.237	(0.088)**	-0.071	(0.047)
OHS1998	0.063	(0.112)	0	(0.054)
CENSUS2001	-0.138	(0.013)**	-0.066	(0.007)**
GHS2002	-0.223	(0.064)**	0.022	(0.046)
GHS2003	-0.137	(0.065)*	-0.115	(0.044)**
GHS2004	-0.093	(0.056)	-0.102	(0.043)*
GHS2005	-0.022	(0.058)	-0.148	(0.049)**
Average	-0.097		-0.073	
Average excluding OHS1996 & 1998	-0.133		-0.069	
Panel B - Household controls				
PSLSD1993	-0.105	(0.164)	-0.04	(0.085)
OHS1995	-0.068	(0.089)	-0.016	(0.039)
OHS1996	0.102	(0.149)	-0.079	(0.073)
CENSUS1996	-0.049	(0.025)	-0.002	(0.013)
OHS1997	-0.261	(0.085)**	-0.043	(0.045)
OHS1998	0.136	(0.101)	0.02	(0.053)
CENSUS2001	-0.157	(0.015)**	-0.036	(0.009)**
GHS2002	-0.208	(0.061)**	0.1	(0.045)*
GHS2003	-0.131	(0.064)*	-0.037	(0.043)
GHS2004	-0.106	(0.056)	-0.014	(0.04)
GHS2005	-0.043	(0.059)	-0.107	(0.045)*
Average	-0.081		-0.023	
Average excluding OHS1996 & 1998	-0.125		-0.022	
Panel C - Household fixed effects				
PSLSD1993	-0.109	(0.221)	-0.03	(0.174)
OHS1995	-0.203	(0.136)	0.023	(0.097)
OHS1996	-0.788	(0.221)**	-0.036	(0.148)
CENSUS1996	-0.032	(0.043)	0.057	(0.028)*
OHS1997	-0.411	(0.145)**	-0.034	(0.096)
OHS1998	-0.318	(0.199)	0.287	(0.132)*
CENSUS2001	-0.135	(0.023)**	-0.035	(0.018)*
GHS2002	-0.222	(0.094)*	-0.012	(0.08)
GHS2003	-0.084	(0.102)	0.01	(0.088)
GHS2004	-0.087	(0.091)	0.035	(0.078)
GHS2005	0.027	(0.082)	-0.111	(0.077)
Average	-0.215		0.014	
Average excluding OHS1996 & 1998	-0.140		-0.011	

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, and indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table A8. Educational attainment of Africans aged 13 to 17

Dataset	Mother deceased		Father deceased	
Panel A - No household controls				
PSLSD1993	-0.369	(0.194)	-0.12	(0.117)
OHS1995	-0.239	(0.112)*	-0.141	(0.064)*
OHS1996	-0.086	(0.151)	-0.143	(0.083)
CENSUS1996	-0.306	(0.024)**	-0.19	(0.012)**
OHS1997	-0.353	(0.108)**	-0.192	(0.061)**
OHS1998	-0.169	(0.131)	-0.091	(0.067)
CENSUS2001	-0.313	(0.018)**	-0.204	(0.010)**
GHS2002	-0.295	(0.084)**	-0.274	(0.056)**
GHS2003	-0.281	(0.095)**	-0.313	(0.062)**
GHS2004	-0.178	(0.082)*	-0.278	(0.076)**
GHS2005	-0.232	(0.079)**	-0.266	(0.067)**
Average	-0.256		-0.201	
Average excluding OHS1996 & 1998	-0.285		-0.220	
Panel B - Household controls				
PSLSD1993	-0.411	(0.205)*	-0.045	(0.135)
OHS1995	-0.251	(0.106)*	-0.083	(0.064)
OHS1996	0.019	(0.155)	-0.107	(0.081)
CENSUS1996	-0.292	(0.027)**	-0.107	(0.014)**
OHS1997	-0.274	(0.101)**	-0.128	(0.059)*
OHS1998	-0.258	(0.128)*	-0.021	(0.067)
CENSUS2001	-0.305	(0.021)**	-0.135	(0.013)**
GHS2002	-0.266	(0.080)**	-0.187	(0.055)**
GHS2003	-0.296	(0.090)**	-0.207	(0.059)**
GHS2004	-0.243	(0.075)**	-0.137	(0.064)*
GHS2005	-0.291	(0.072)**	-0.139	(0.062)*
Average	-0.261		-0.118	
Average excluding OHS1996 & 1998	-0.292		-0.130	
Panel C - Household fixed effects				
PSLSD1993	0.132	(0.305)	0.146	(0.243)
OHS1995	-0.377	(0.182)*	-0.058	(0.135)
OHS1996	0.067	(0.255)	0.132	(0.178)
CENSUS1996	-0.324	(0.046)**	-0.007	(0.032)
OHS1997	-0.391	(0.184)*	-0.146	(0.132)
OHS1998	-0.462	(0.234)*	0.104	(0.169)
CENSUS2001	-0.29	(0.033)**	-0.053	(0.025)*
GHS2002	-0.159	(0.129)	-0.257	(0.112)*
GHS2003	-0.554	(0.142)**	-0.291	(0.116)*
GHS2004	-0.581	(0.122)**	0.004	(0.114)
GHS2005	-0.277	(0.105)**	-0.039	(0.1)
Average	-0.292		-0.042	
Average excluding OHS1996 & 1998	-0.313		-0.078	

* significant at 5%; ** significant at 1%.

Each row presents selected coefficients and standard errors in parentheses from a single regression.

A full set of indicators for age, and indicator for sex and indicators that parents' vital status is missing included in all regressions.

Table A9. Question about parents' vital status

Dataset	Question about parent's vital status
PSLSD1993	If the mother/father of _____ lives here, write the mother/father's code. If deceased code 88.
OHS1995	Are the parents of still alive?
CENSUS1996	Is (the person's) own mother/father still alive? [There is a note on the questionnaire beneath the question – "These questions refer to the person's biological parents."]
OHS1996	Is (the person's) own mother/father still alive?
OHS1997	Is (the person's) own mother/father by birth still alive?
DHS1998	Is (NAME)'s natural mother/father alive? [There is a note on the top of the questionnaire "These questions refer to the biological parents of the child."]
OHS1998	Is (the person's) own mother/father by birth still alive?
CENSUS2001	Is (the person's) own biological mother/father still alive?
GHS2002	Is's mother/father still alive?
GHS2003	Is's mother/father still alive?
GHS2004	Is 's biological mother/father still alive?
GHS2005	Is 's biological mother/father still alive?

Table A10. Percentage of parent's vital status unknown – children aged 7 to 14

Dataset	Father	Mother
PSLSD1993	0.20%	0.07%
OHS1995	0.00%	0.00%
CENSUS1996	3.58%	1.10%
OHS1996	4.19%	1.35%
OHS1997	2.84%	1.27%
DHS1998	5.28%	2.79%
OHS1998	3.83%	1.34%
CENSUS2001	3.87%	1.39%
GHS2002	1.91%	0.24%
GHS2003	1.63%	0.18%
GHS2004	1.89%	0.24%
GHS2005	1.38%	0.16%

Table A11. Percentage of children aged 7 to 14 who either have no education or have completed Grades 1, 2 or 3

Dataset	No education	Grade 1	Grade 2	Grade3	Grades 1-3
PSLSD1993	6.00%				42.10%
OHS1995	4.73%				41.93%
CENSUS1996	23.24%	5.62%	8.19%	14.69%	28.49%
OHS1996	5.81%	15.00%	15.90%	14.64%	45.53%
OHS1997	21.27%	5.93%	9.36%	16.81%	32.10%
DHS1998	3.76%	12.28%	14.03%	15.50%	41.80%
OHS1998	19.57%	6.25%	11.38%	16.30%	33.93%
CENSUS2001	2.70%	13.16%	14.21%	16.28%	43.65%
GHS2002	12.71%	13.11%	12.39%	13.82%	39.32%
GHS2003	13.35%	13.40%	12.56%	13.01%	38.97%
GHS2004	13.78%	14.60%	13.67%	12.90%	41.18%
GHS2005	12.27%	13.87%	13.86%	13.54%	41.27%

Table A12. Fraction of children aged 7 to 14 with no completed schooling who are enrolled

Dataset	Fraction enrolled
PSLSD1993	0.028
OHS1995	0.026
CENSUS1996	0.137
OHS1996	0.035
OHS1997	0.171
DHS1998	0.036
OHS1998	0.153
CENSUS2001	0.001
GHS2002	0.105
GHS2003	0.116
GHS2004	0.126
GHS2005	0.110

Table A13. Changes in rates of progression through school

Dataset	Coefficient on age
PSLSD1993	0.620
OHS1995	0.651
CENSUS1996	0.738
OHS1996	0.738
OHS1997	0.765
OHS1998	0.765
CENSUS2001	0.734
GHS2002	0.802
GHS2003	0.835
GHS2004	0.843
GHS2005	0.850