PARENTAL DEATH AND SCHOOLING OUTCOMES IN SOUTH AFRICA

by

Carolyn Ardington

Thesis Presented for the Degree of

DOCTOR OF PHILOSOPHY

in the Department of Economics

UNIVERSITY OF CAPE TOWN

August 2008

Supervisor: Professor Murray Leibbrandt

School of Economics – University of Cape Town

Co-Supervisor: Professor Anne Case

Woodrow Wilson School and Economics Department – Princeton University

ABSTRACT

The HIV/AIDS pandemic is leaving in its wake a generation of children who have lost parents, care-givers, and other loved ones to illness and death. One of the lasting effects of the HIV/AIDS crisis will be the impact it is having on the education of the generation of children now of school going age. This thesis examines the extent to which South African children who have experienced parental loss are vulnerable to poorer educational outcomes. It contributes to the literature on orphans and schooling in Africa in a number of ways. Firstly, I 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 provides an avenue to explore whether the fear that extended families are no longer effective safety nets may be overstated or whether traditional coping strategies are indeed breaking down. At every point in time cross-sectional evidence suggests that orphans are at risk of poorer educational outcomes with maternal deaths generally having stronger negative effects than paternal deaths. Despite a significant increase in the number of orphans over the last decade I find no evidence of a systematic deterioration in traditional coping strategies with respect to orphans' educational outcomes. Secondly, I analyse two geographically and socioeconomically distinct longitudinal datasets to investigate whether parental death effects are causal. My evidence is consistent with mother's deaths having a causal effect on children's schooling. Thirdly, I exploit the longitudinal data to investigate the extent to which orphan disadvantage precedes parental death and whether orphans begin to recover in the period following a parent's death or whether they continue to fall behind. Finally, I investigate the longer run impact of parental loss in childhood on human capital formation by focusing on the completion of secondary school by early adulthood. These results suggest that parental death will reduce the ultimate human capital attainment of the child.

ACKNOWLEDGEMENTS

I gratefully acknowledge funding from the National Institute of Child Health and Development and the National Institute of Aging R01 HD045581-01 and NIH Fogarty International Center, Grant Number 2 D43 TW000657. Analysis in Chapter 4 is based on data collected through the Africa Centre Demographic Information System (ACDIS). I have benefited from the ACDIS field and data centre staff under the leadership of the principal investigator, Dr. Kobus Herbst. This work was supported by Wellcome Trust Grants 065377 and 067181 to the Africa Centre for Health and Population Studies. Analysis in Chapter 5 is based on data collected by the Cape Area Panel Study (CAPS). The CAPS Waves 1-2-3-4 were collected between 2002 and 2006 by the University of Cape Town, the University of Michigan and Princeton University, with funding provided by the US National Institute for Child Health and Human Development, the US National Institute for Aging and the Andrew W. Mellon Foundation. I am thankful for the energy and enthusiasm of field staff at Africa Centre and the CAPS and to the respondents who gave willingly of their time.

I am deeply grateful to my two supervisors Murray Leibbrandt and Anne Case for their continuous and generous support, encouragement, guidance and most especially, friendship. It has been a true privilege and pleasure to work with both of them. I look forward to many more years of exciting research together. Special thanks also go out to David Lam, Alicia Menendez, Francie Lund and Tim Dunne for their ongoing support and interest. I thank the UNAIDS/World Bank Economics Reference Group, Angus Deaton, Frances Lund, Libby Ardington, seminar participants at several universities and anonymous ERSA, Demography and Economic Development and Cultural Change referees for helpful comments.

On a personal note there is a long list of people to whom I would like to express my appreciation. 'The Cottage' – Anna, Brenda, Dudley, Linda, Lloyd and Nicola – for a great research home; Ingrid for many hours of 'therapy'; Urly for her 'haven for working mothers' and so much more; my running partners Ol and Jen who graciously endured kilometres of thesis talk;

Queenie, Libby, Cindy, Amelia and everyone else who provided love and care for Issy while her mother was working; 'Sunday Lunch' and 'The Plot' for existing; Lucy for reminding me that nothing was more important than food; Sally for saving me from endless hours at SARS; Andrew for taking me seriously when I said I couldn't and for never believing it for a second; my other friends (in alphabetical order) Bruce, Cathy, Dave, Dodge, James, James, Lee, Stanley, Vix and Wayne for endless entertainment and distraction; my parents for their unconditional love, support and constant interest in everything I do; Issy for graciously tolerating an absent mother and being so great when her mother was around. Finally, I am deeply and forever grateful to Luke whose love and support are beyond any telling.

DEDICATION

To my husband Luke and daughter Isabella, with love. To Maureen Ndlovu and grandmothers all over South Africa, the true heroines of the orphan crisis.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1:

INTRODUCTION

"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 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)."

1.1 Background

The HIV/AIDS pandemic is leaving in its wake a generation of children who have lost parents, care-givers, and other loved ones to illness and death. Since 1990, orphan rates have increased by more than a third in sub-Saharan Africa, the region with the highest prevalence of HIV/AIDS. UNAIDS (2004) estimates that fifty million children under the age of 15 in sub-Saharan Africa will have lost at least one parent by 2010. In South Africa, an estimated 2.3 million children under the age of 18 have lost one or both of their parents, representing 13.3% of all South African children (South African Census 2001). Since the early 1990s the percentage of children in South Africa who have lost mothers and fathers has tripled and doubled respectively and further increases in the prevalence of orphanhood are expected for the next decade (Johnson and Dorrington 2001).

The extended family has been the predominant social safety net mechanism in sub-Saharan Africa, with children who lost their parents being absorbed into their relatives' families

leading to the traditional assertion that "there is no such thing as an orphan in Africa (Foster 2002:1907)." However, 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. Orphaning is preceded by the weakening of these same extended families resulting from increasing numbers of sick adults, who subsequently die.

There is growing 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 (Foster 2000 & 2002; Guarcello *et al.* 2004; Kelly 2000; UNICEF 2003). The consequence has been a growing body of research on the prevalence of orphanhood and the living arrangements, health and education outcomes of orphans.

The critical importance of education to many of the issues facing sub-Saharan Africa is widely acknowledged. Education lies at the foundation of "lifelong learning and human development (UNESCO 1990:3)" and is key to understanding the intergenerational transmission of inequality. One of the lasting effects of the HIV/AIDS crisis will be the impact it is having on the education of the generation of children now of school going age. Poor educational outcomes in childhood are likely to have a lasting effect into adulthood. Throughout sub-Saharan Africa, the crisis is reducing educational attainment, a result that can be expected in turn to dampen economic growth and the health and general well-being of Africans. It is no surprise, therefore that educational outcomes have featured prominently in assessing the impact of orphanhood. Recent empirical evidence suggests that children who have suffered parental loss are at risk of poorer educational outcomes (Beegle, de Weerdt and Dercon 2006; Bicego, Rutstein and Johnson 2003; Case, Paxson and Ableidinger 2004, Evans and Miguel 2007; Guarcello *et al.* 2004; Monash and Boerma 2004). These papers challenge 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 distinguishable from non-orphaned children in that they are at risk for poorer outcomes. Yet, 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.

This thesis examines the extent to which South African children who have experienced parental loss are vulnerable to poorer educational outcomes. It contributes to the literature on orphans and schooling in Africa in a number of ways. Firstly, I 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 provides an avenue to explore whether the fear that extended families are no longer effective safety nets may be overstated or whether traditional coping strategies are indeed breaking down. Secondly, I analyse two longitudinal datasets to investigate whether the loss of a parent has a causal effect on children's schooling outcomes. These two longitudinal datasets follow geographically and socioeconomically distinct populations and each dataset lends itself to particular analyses that allow a more nuanced understanding of the impact of parental death. Thirdly, I exploit the longitudinal data to investigate the extent to which orphan disadvantage precedes parental death and whether orphans begin to recover in the period following a parent's death or whether they continue to fall behind. Finally, I investigate the longer run impact of parental loss in childhood on human capital formation by focusing on the completion of secondary school by early adulthood.

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. Adult mortality prior to the AIDS epidemic was much lower in South Africa 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 (Anderson and Phillips 2006; Johnson and Dorrington 2001).

In addition, South Africa has an interesting educational context. 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, Case and Lam 2001; Keswell and Poswell 2003). Education is therefore key to understanding persisting racial differences in income and employment and the intergenerational transmission of inequality. Indeed the pivotal role of education in development and redressing the imbalances of the past is reflected in the South African constitution's recognition of education as a basic right.

Given the combination of high unemployment, a history of labour migration, the impact of HIV/AIDS on the working age population, and a welfare policy that is dominated by an extensive state old-age non-contributory pension, family support structures in South Africa are unusually complex. 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. On the other hand, South Africa has a well developed system of social grants that may strengthen traditional support mechanisms. A number of researchers (Case and Deaton 1998; Duflo 2003 for example) have found that living with a pensioner has benefits for poor children.

1.2 Organisation of the thesis

Five chapters follow. The next chapter reviews the literature on schooling and orphan status in Africa. Chapter 3 uses a series of 11 nationally representative datasets to document the vulnerability of orphans to poorer educational outcomes and to assess the extent to which this vulnerability is changing over time as the AIDS crisis deepens. Chapter 4 employs a large longitudinal dataset from a rural demographic surveillance site in northern KwaZulu-Natal to investigate whether the impact of parental death on schooling outcomes is causal. Chapter 5 extends the analysis in the preceding chapter to an urban panel of young adults and adolescents in the Western Cape. This chapter also focuses on the longer run impact of parental loss in childhood on human capital formation by analyzing the timing of parental death effects and by focusing on completion of secondary school by early adulthood. Together these three main chapters aim to provide as thorough a body of empirical evidence as possible with the available data on the impact of parental death on schooling in South Africa. Each of the datasets has specific strengths and limitations that lend themselves to particular analyses and allow a more nuanced understanding of the impact of parental death on schooling. The final chapter summarises empirical findings, documents government response to the growing number of orphans and vulnerable children, discusses the policy implications of my empirical results and concludes by highlighting areas for further research.

CHAPTER 2:

THEORETICAL AND EMPIRICAL PERSPECTIVES ON SCHOOLING AND ORPHAN STATUS

2.1 Introduction

This chapter provides a review of recent literature on schooling and orphan status. The chapter begins by drawing out from the literature a summary of the theoretical mechanisms through which parental death may affect schooling outcomes. The next section discusses methodological challenges and empirical issues highlighted in the literature. The following section summarises the empirical evidence to date on the impact of parental death on children's schooling outcomes in Africa. In the final section, I outline the ways in which this thesis contributes to the literature on orphans and schooling.

2.2 Theoretical mechanisms and conceptual framework

The literature on orphanhood and schooling suggests a range of mechanisms through which parental death may influence a child's schooling outcomes (see Ainsworth, Beegle and Koda 2005; Beegle *et al.* 2005; Case *et al.* 2004; Evans and Miguel 2007; Gertler, Levine and Amis 2004; Guarcello *et al.* 2004; Yamano and Jayne 2005). For the most part, these empirical papers do not explicitly locate the discussion of these mechanisms within a particular discipline or conceptual framework. There are two exceptions. Gertler *et al.* (2004) briefly consider the theoretical implications of parental death within the conceptual framework of economic models of human capital accumulation put forward by Becker and Tomes. Then, Case *et al.* (2004) draw on evolutionary biology to hypothesise how the degree of relatedness of an orphan to the household may affect outcomes. Within the literature on orphans and schooling, there are no attempts to formally model the process through which parental death affects schooling outcomes.

Following the lead of Gertler *et al.* (2004), research on parental death and schooling is usefully seen as a natural extension to the substantial literature on the determinants of children's

human capital attainments. This literature investigates "the processes that explain why some children achieve success in young adulthood while others do not (Haveman and Wolfe 1995:1832)." In their detailed review of theoretical and empirical work on determinants of children's attainment in the United States of America, Haveman and Wolfe (1995) point out that the primary theoretical perspectives that have guided research in this area draw from economic theory and other social sciences such as psychology and sociology. Ginther and Pollak (2004:672) argue that "the distinction between psychological, sociological, and economic theories is seldom useful because most theories draw on insights from all three disciplines." From an economic perspective, this literature focuses on the allocation of resources within the family and how parental investments translate into children's human capital attainment. If resources are broadly conceptualised to include parental time then the gap between economic theories, on one hand, and sociological and psychological theories on the other is substantially narrowed.

Two branches of the literature on determinants of children's attainment have particular relevance for the study of orphanhood and schooling. The first branch, and the focus of much of the empirical work in developed countries, is research on the relationship between family structure and children's educational outcomes (see Ginther and Pollak (2004) for a brief review of this literature). These studies have tended to focus on divorce as a reason for parental absence. A few researchers have considered parental death as a quasi-natural experiment or exogenous cause of absence that allows for the identification of the impact of parental divorce (Biblarz and Gottainer 2000; Corak 2001; Lang and Zagorsky 2001). Aside from these studies, parental death has received little theoretical or empirical attention, most likely due to the low death rates among prime aged adults in developed countries. Parental death is, however, readily conceptualised as a shock to family structure and there are obvious parallels between the theoretical impact of divorce and that of death.

The second branch of the literature with particular relevance for research on parental death and schooling focuses on intrahousehold resource allocation and children's human capital.

Particularly relevant is work on gender disparities in children's outcomes and differences in the preferences of men and women. Behrman (1997) reviews empirical studies on the allocation of human capital investments in children within a family. Theoretical consideration of how disparities between orphans and non-orphans within a household may arise follows along much the same lines as an analysis of disparities between male and female children. Researchers have considered a number of reasons why households might appear to discriminate against girls. Differential investment in boys and girls may be solely due to differences in costs or expected returns. Alternatively, households may discriminate against girls due to a parental preference for male children. Similarly, care givers may invest more in their biological children than orphans as it is more efficient to do so or because they discriminate against orphans in favour of their own children. Bergstrom (1997) reviews empirical studies of gender differences in preferences. Models of intrahousehold household resource allocation that allow for men and women to exhibit different preferences have implications for the differential impact of maternal and paternal death on children's educational outcomes.

In what follows I briefly summarise the main theoretical perspectives that have guided work on children's attainment and within these conceptual frameworks explicitly hypothesise how parental death might affect the intergenerational transmission of human capital. In so doing, I attempt to situate the various mechanisms suggested in the literature on orphans and schooling within appropriate theoretical frameworks and within the broader literature on children's attainments. I begin with the main economic models underlying work in this area and then briefly consider theoretical approaches from other disciplines.

Economists' work on children's attainment is mainly based on models of family behaviour, most notably those of Becker and Tomes (1976, 1979, 1986). While the focus of Becker and Tomes' work is on intergenerational mobility, their models nevertheless provide a systematic framework with which to explore the impact of parental death on investments in a child's human capital. I begin by briefly summarising their models and then hypothesise how

parental death might affect the intergenerational transmission of human capital within this theoretical framework. I then consider the implications of parental death under alternative models of intrahousehold resource allocation.

Building on earlier work, Becker and Tomes (1986) develop a model of the intergenerational transmission of earnings, assets and consumption in which a child's human capital is determined by endowments inherited from parents and by parental and public expenditures on the child's development. Both cultural and genetic endowments are transmitted from parents to children with the relation between the endowments of parents and children determined by the degree of inheritability. Parents are assumed to be altruistic in the sense that their utility depends on the utility of their children and parents can influence the human capital of their children by making expenditures on their children.

Becker and Tomes initially assume perfect capital markets and that parents can leave debt to children. Under this scenario poor parents can borrow what is needed to finance the optimal investment in their children and all parents will invest in each child until the marginal returns to education equate the marginal costs associated with it. Becker and Tomes then consider the implications of imperfect capital markets where parents cannot borrow against their children's future earnings. In this scenario expenditures are determined not only by the abilities (or endowments) of the children but also by the incomes, preferences and fertility of the parents. In households that are capital constrained parents can only invest in children if they lower their own consumption. Investments in children therefore depend on the degree of altruism or generosity towards children and the expectation that children will care for parents in old age. The fertility of parents also determines the level of investment as there is a trade off between the number of children and the investment in each. Parents allocate resources among their children as if a unified parental preference function is maximised subject to constraints. The model assumes that parents trade off efficiency and equity in determining the allocation of resources among their

children but does not allow for parental preference for a particular type of child, i.e., differences in endowments are isolated from differences in preferences.

The death of a parent has a number of implications for this model of parents' investments in children. Firstly, the financial resources of the family may be reduced through the loss of earnings of the deceased parent and high medical and funeral costs thereby making the capital constraint more likely to bind and so reducing investments in children's education. Parental death often results in the child being absorbed into a new household. The Becker-Tomes model posits that in households that are capital constrained, the addition of another child to the household will result in less being invested in each child. When orphans are absorbed into another household the effect on the level of investment in their schooling is ambiguous; depending on both the relative wealth of their original household and on resource allocation among children within the original and the new households.

Secondly, parental death may both increase the costs and reduce the returns to schooling. In this utility maximising framework this would result in decreased investments in orphan's education. As an important example in a less developed country context, parental death may raise the opportunity cost of children's time by an increased demand for them to care for critically ill parents and to substitute for the labour of the ill or deceased parent.

The Becker-Tomes model assumes parents and children have an implicit contract with parents investing in children in return for support in old age. This is useful in drawing attention to the possibility of differential treatment by parents of biological children and foster children. If foster parents or guardians are less likely to realise investments in orphans than biological parents then incentives to invest in orphans will be weaker.

Parental death may reduce the 'inheritability' of cultural endowments, particularly if the parent dies when the child is still young. These cultural endowments include parent's norms and values such as commitment to learning and educational aspirations. Whether reduced 'inheritability' will result in the orphan being better or worse off depends on the extent to which

their parent's cultural endowment would have had a positive or negative impact on the child's returns to schooling.

If resources are broadly conceptualised to include parental time, and if schooling is more productive when parental involvement is high then orphanhood may reduce returns to education. Orphan's cognitive and emotional development may be affected by the psychosocial impact of losing a parent (see the discussion on developmental psychology later in this section). Scarring may result in the child being less school-ready than they were prior to the death of a parent, reducing returns to schooling.

Orphaned children are often absorbed into a new household with other children who are the biological children of the parent figures. To the extent that parental death increases the costs and reduces the returns to schooling for the child as described above, it will be more efficient for any parent figures (or household decision makers) to invest more in their biological children than in orphans and disparities will arise. This is irrespective of the utility function of the household decision maker. Where this utility function becomes important is in respect to the trade off between efficiency and equity that depends on the parental attitude towards averting inequality among siblings. It is plausible that parents have less aversion to inequality between their biological children and orphans than inequality among their biological children. If so, this would reinforce disparities in resource allocation among children in the household.

I now consider the implications of relaxing two of the Becker-Tomes assumptions, namely; 'child-neutral' preferences and a common household preference function. The Becker-Tomes model allows for heterogeneity in investments between children within a family but assumes 'child-neutral' preferences (Becker and Tomes 1976). Case, Lin and McLanahan (2001:270) argue that "while this assumption may be plausible when all children in the household are birth children of the parent figures, it seems less realistic when some children are birth children and others are stepchildren." Similarly, it seems less realistic when some children are foster children or wards of adults in the household. In poorer households that are credit

constrained, investments in children depend on the degree of altruism towards the child and foster parents or guardians may not have the same altruistic ties to orphaned children as their own biological children. Even in wealthier households it is unlikely that adults derive equal utility from investing in biological children and other children in the household (see the discussion on evolutionary biology later in this section).

Unitary household models, such as the Becker-Tomes model, assume that all household members share a single preference function or that a single member dictates all household allocations. These models have been criticised by those who consider the household as a collection of individuals with specific preference functions. Such collective models of intrahousehold allocation permit preference heterogeneity and incorporate the relative bargaining power of different household members (see Behrman 1997 for a summary of models of household behaviour). Decision makers in households where all children do not share the same biological parents may have different preferences to each other depending on who their biological children are. In collective models the level of investment in orphans will depend on the relative bargaining power of different decision makers in the household.

Aside from differences in preferences based on whether children are biological offspring, a number of researchers have argued that men and women have different preferences. An important example here is differences in preferences of fathers and mothers. "It is often asserted that, relative to fathers, mothers care more about the health, education and well-being of their children (Strauss and Thomas 1995:1996)." This would suggest that women would seek to allocate more resources towards children's education and the death of a mother would not only have an income effect but also a substitution effect with less resources allocated towards investments in children's human capital. Empirically one observes a net effect of a mother's or father's death rather than this pure substitution effect. Whether the net impact of a mother's death is greater than that of a father's would depend on this substitution effect together with the

relative earning power of men and women and the importance of liquidity constraints in the investment in children's human capital.

In addition to economic theory, psychology, sociology and evolutionary biology suggest causal mechanisms that might explain the association between parental death and children's educational outcomes. Many of these mechanisms are complementary to economic theories of family behaviour. Perspectives from other disciplines are briefly considered below.

Theoretical models of altruistic behaviour from evolutionary biology support the notion that adults will have stronger incentives to invest in their biological children than other children in the household. Hamilton's theory of inclusive fitness or kin selection hypothesizes that "an altruistic exchange between two people is more likely to occur as their degree of genetic relatedness increases (Anderson 2005:2)." This theory or rule predicts that adult care givers will discriminate against orphans in favour of their biological children and that orphans in the care of close relatives will have preferable outcomes to orphans living with more distant relatives and non-relatives (Case *et al.* 2004).

Evolutionary psychology postulates that a child's well being is of greater interest to the mother than the father. Women's potential for having children is far lower than that of men with the result that mothers have more of their reproductive investment tied up in any one child than fathers (Biblarz and Gottainer 2000:535; Ginther and Pollak 2004:673). This evolutionary perspective accords with a collective model of intrahousehold allocation where maternal and paternal preferences differ and suggests that the death of a mother will have a greater impact than the death of a father.

Developmental psychology suggests that stressful events during childhood create emotional uncertainties and may impede normal development (Haveman and Wolfe 1995:1835). The trauma associated with the death of a parent may affect a child's cognitive and emotional development making schooling less productive. From an economist's perspective this psychosocial scarring potentially lowers the child's returns to education. AIDS orphans

potentially face additional psychological trauma through stigmatization. The economic theories surveyed above are then very useful in highlighting the fact that these lowered returns will lead to lower investments in orphans relative to non-orphans in most credit constrained households.

Socialisation theory stresses the importance of role models and socialisation in childhood on aspirations and achievements in young adulthood. In much the same way as parents pass on their cultural endowments to children in the Becker-Tomes model, parents are seen as primary role models whose behaviour, aspirations and values directly affect the cognitive and social-psychological development of children (Haveman and Wolfe 1995).

The AIDS epidemic may also affect schooling through channels other than parental death. In the Becker-Tomes' model, parental investments in children's human capital depend partly on the parents' perception of future uncertainty or their child's 'market luck'. 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 (Forston 2007; Yamano and Jayne 2005). AIDS may also impact on the labour market in ways that change returns to education and therefore the optimal level of investment in a child's schooling.

In summary, economic theory and other social sciences suggest multiple pathways through which parental death might result either in reduced investments in orphans or lower returns to their education, or both. However, data and modelling limitations constrain the empirical literature from revealing the nature of the underlying processes by which children succeed or fail (Haveman and Wolfe 1995:1838). In empirical work it is generally not possible to estimate structural parameters or identify specific pathways through which parental death affects schooling outcomes. With available data one cannot distinguish between the efficient allocation of resources within the household (i.e. orphans having lower returns) and discrimination against orphans (i.e. non child-neutral preferences). Additionally, one cannot separate out the myriad of ways in which parental death could lower returns in investments in orphans' human capital - from psychological scarring to lower expectations of reciprocity in old age. The focus of the

empirical work is therefore generally on the estimation of cumulative or reduced form effects on children's schooling via all pathways. Nevertheless the theoretical perspectives outlined above provide a useful framework to interpret the empirical results. In the next section I consider some of the methodological challenges and empirical issues highlighted in the literature.

2.3 Methodological and empirical issues

Although theory is seldom explicitly acknowledged, cognisance of the theoretical frameworks considered in the preceding section is evident in the empirical work on orphans and schooling. Data and methodological constraints do not permit identification of the mechanisms through which parental death impacts on a child's schooling. However, researchers have employed a range of empirical strategies in order to reveal some important aspects of the underlying process. A number of researchers implicitly test whether it is the capital constraint that binds by including controls for socioeconomic status and employing household fixed effects models to compare orphans to children with whom they currently live. Some researchers have examined whether orphan's outcomes vary by the degree of genetic relatedness to the household in order to give some idea of the importance of biological or genetic motives over economic motives. Most researchers allow for differential effects of maternal and paternal death providing suggestive evidence for collective models of household resource allocation.

In summary, the focus of the empirical work is to estimate the cumulative or reduced form relationship between parental death and schooling outcomes, controlling for as many other relevant factors as the data permit. In order to interpret correlations as evidence of the causal effect of parental death on schooling outcomes, one needs to assume that parental death is exogenous. This assumption is false if there are processes that jointly determine parental death and children's schooling outcomes. For example, orphans may come from households that were systematically poorer prior to a parent's death leading to correlations between the death of a parent, household poverty and schooling. On the other hand, if the socioeconomic distribution of HIV infection is such that AIDS deaths are concentrated in households of higher

socioeconomic status and socioeconomic variation is partially unobserved or mis-measured then estimates of the impact of orphanhood will be biased towards zero (Evans and Miguel 2007). In cross-sectional studies household characteristics observed after a parent's death may have been affected by the death and are therefore potentially endogenous.

Researchers attempting to control for the endogeneity of parental death have made various identifying assumptions. Household fixed effect estimators allow one to control for endogeneity assuming there are unobserved household characteristics that are correlated with both children's schooling outcomes and parental death. Household fixed effect estimation strategies are still limited to comparing orphans to other children with whom they currently live. Beegle *et al.* (2007: 1267) argue insightfully 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." Alternatively, if the education of all children in a household suffers when the household absorbs orphans the impact of parental death may be partially hidden.

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. In addition to the estimation of individual fixed effect models, such data allow one to control for baseline household fixed effects.[1] Longitudinal studies are, however, rare and not without their disadvantages. They are usually localized and the generalizability 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 death.

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

[1] Beegle *et al.* (2008) control for baseline household fixed effects in their examination of the impact of adult death on the growth of household per-capita expenditures using a Tanzanian panel dataset.

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.

Both school attendance and the risk of orphanhood 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) finds 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. This is a serious omission and 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).

2.4 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 age. 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 10 to 14 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 of orphans who are attending school with the proportion of non-orphans who are attending school. The ratio is below one 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 10 sub-Saharan countries to analyse the links between orphanhood, child labour and school dropout. They find that orphans are significantly less likely to attend school in nine of the 10 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 10 countries.

Using data from 19 DHSs in 10 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 enrolled.[2] There were 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. Similar 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 socioeconomic status but find no clear patterns in the data.

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

[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% 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.

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

Yamano and Jayne (2005) use a three year nationwide Kenyan 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.

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 parental 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.

Timæus and Boler (2007) follow a cohort of 925 nine to 14 year olds over six years using the second and third wave of the KwaZulu-Natal Income Dynamics Study in South Africa. They find fathers' deaths and absence to result in slower progress through school and find "no evidence that maternal orphanhood or living apart from their mother adversely affected children's schooling (Timæus and Boler 2007:S83)." This paper is of special interest to this thesis as it investigates orphans in a province of South Africa and the findings differ somewhat from those presented in the following three chapters. Indeed Timæus and Boler (2007: S92) devote considerable attention to comparing their results to those of a published version of Chapter 4 (Case and Ardington 2006) and argue that differences between their findings and those presented in Chapter 4 of this thesis "caution against drawing general conclusions about the impact of the AIDS epidemic from investigations in a few geographically localised populations." However, their conclusion about the limited importance of maternal orphanhood is only partially substantiated in their paper. Their findings on the impact of maternal orphanhood or living apart from one's mother differ depending on whether orphans are identified solely from the household roster or from the household roster and information from previous waves. Analysis based on the former method of identification suggests that children separated from their mothers are more likely to be behind in school than those children who co-reside with their mothers. In analyses based on the latter (and the authors' preferred) method of identification of orphans, the point estimates indicate that children whose mothers have died are more likely to be behind in school but these estimates are not statistically significant. The sample size is relatively limited with resultant imprecise estimates of rare events such as parental death and maternal death in particular. The interpretation of the results is also 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 also a concern

with only 68% of the nine to 14 year olds in the 1998 wave re-contacted in 2004, in addition to considerable attrition in the panel between 1993 and 1998.

Beegle *et al.* (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 they 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.

In general, empirical evidence from Africa suggests that children who have suffered parental loss are at risk of poorer educational outcomes even after controlling for their relative poverty. Educational deficits are typically larger for maternal and double orphans while paternal orphans tend to live in poorer households. The final section of this chapter outlines the ways in which this thesis contributes to the literature on orphans and schooling.

2.5 Primary contributions of this thesis

To date, there is very little nationally representative research on orphanhood in South Africa in spite of sharp increases in the prevalence of orphanhood and the availability of over a decade of large nationally representative datasets.[3] Together the next three chapters provide as comprehensive a body of empirical evidence as is possible with the available data on the impact of parental death on schooling in South Africa. In addition, the empirical work of this thesis contributes to the literature on orphans and schooling in a number of ways.

First, Chapter 3 explicitly examines changes in the vulnerability of orphans to poor educational outcomes over time within a particular country (South Africa). In spite of the concerns about the capacity of extended family networks to cope with ever increasing numbers

[3] 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 in their analysis.

of orphans, surprisingly little is known about whether the vulnerabilities of orphans are changing as the AIDS crisis deepens. The focus of the empirical literature reviewed in the previous section of this chapter is on cross-country and within-child comparisons with little attention paid to changes over time.[4] Examining changes over time within a country provides an avenue to explore whether the fear that extended families are no longer effective safety nets is overstated or whether traditional coping strategies are indeed breaking down.

Second, I analyse whether parental death has a causal impact on children's education. 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. Longitudinal data in which one observes children before and after a parental death, allow one to evaluate alternative explanations for children's outcomes after a parent's death and to be more persuasive in arguing for a causal interpretation of the effect of parental death on children's schooling. Longitudinal datasets large enough to precisely estimate rare events such as parental death are relatively scarce in developing countries. Two exceptions are the Africa Centre and Cape Area Panel Study (CAPS) databases. In Chapters 4 and 5 I use the timing of parents' deaths relative to children's educational shortfalls to argue that mothers' deaths have a causal effect on children's education.

Third, while a number of studies document that orphans are vulnerable to poorer schooling outcomes there is very little evidence that orphanhood matters in the long run for education outcomes. The CAPS data provides a rare opportunity to investigate the longer run impact of parental loss in childhood on human capital formation in two ways. Firstly, I focus

[4] Ainsworth and Filmer (2006) calculate enrolment differentials for multiple years for many of the countries included in their study. However, the focus of their 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 Appendix A2.1) no clear time trends in the vulnerabilities of orphans emerge. Bennel (2005) also includes datasets from multiple years for some countries but only provided a very cursory analysis of changes in orphan schooling deficits over time. Bicego *et al.* (2003) 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. 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.

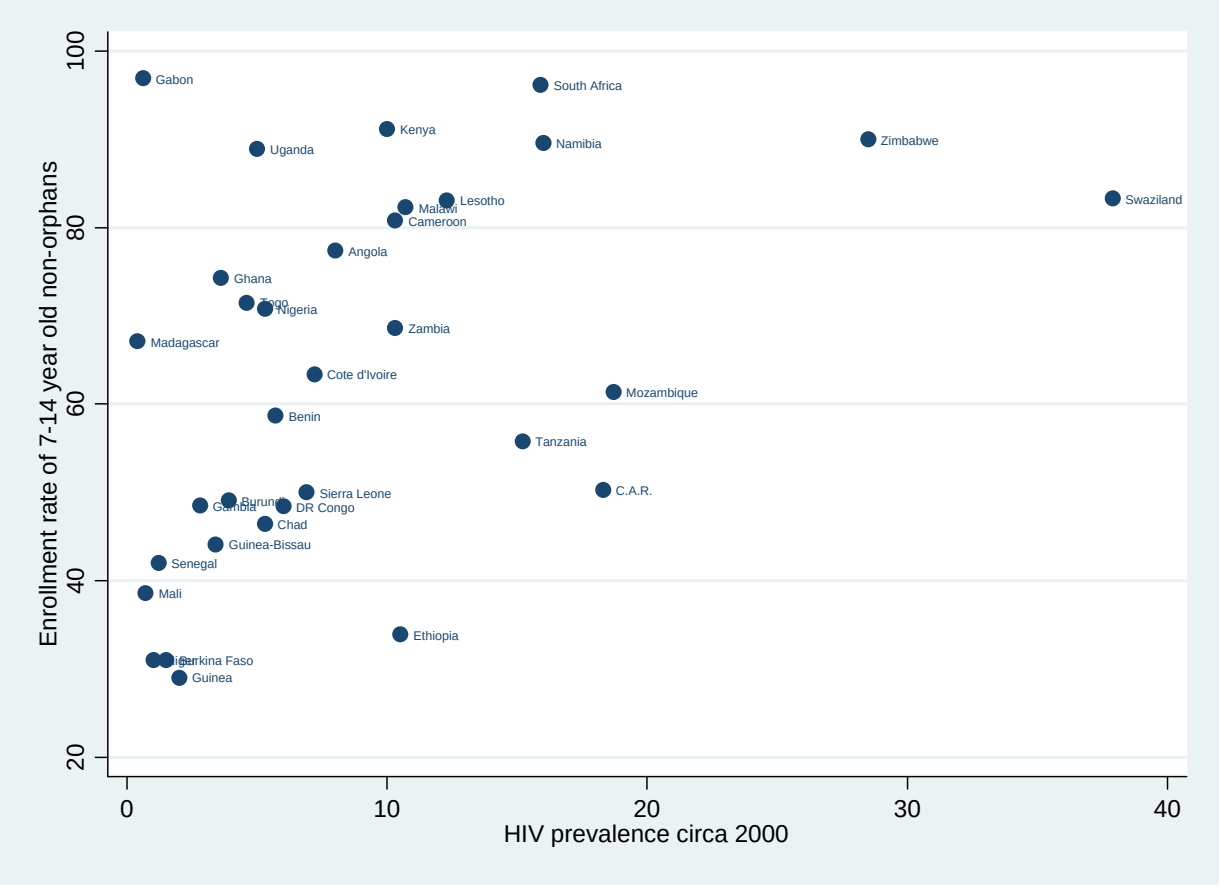
directly on the completion of secondary school by early adulthood. Secondly, I exploit the life history calendar from the base wave to build a panel dataset spanning the 11 years from age 7 to 17. Few datasets contain information covering a sufficiently long period of time to allow investigation into whether parental death results in cumulative schooling deficits or whether children who lose a parent suffer in the short-term and then recover. Following Evans and Miguel (2007) and Ainsworth *et al.* (2005), I investigate the extent to which orphan disadvantage precedes parental death and whether orphans begin to recover in the period following a parent's death or whether they continue to fall behind. The panel constructed from the CAPS spans a considerably longer time period (11 years) than those analysed by Evans and Miguel (2007) (4 years) and Ainsworth *et al.* (2005) (less than 3 years). In addition to an analysis of whether orphans 'bounce back', I exploit the CAPS panel to investigate whether the impact of parental death depends on the age of the child when the death occurs and whether orphanhood has a larger impact on schooling outcomes at younger or older ages.

Fourth, although the focus of the empirical work is on reduced form estimates, I employ a number of empirical strategies in all of the following three chapters to reveal something of the underlying processes through which parental death affects children's schooling. Following the lead of other researchers in this field, I evaluate alternative explanations for orphan deficits by analysing the impact of resource constraints and relatedness to the household. In addition I consider the importance of parental involvement by comparing the impact of parental absence to parental death.

Fifth, I examine the impact of parental death on both enrolment and attainment. Much of the research on orphans and schooling 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 2.1 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 high enrolment any educational deficits that orphans may experience are more likely to be apparent when looking at educational attainment.

Figure 2.1: Enrolment rates of 7 to 14 year old non-orphans by country HIV prevalence circa 2000 for 33 African countries



Notes to Figure 2.1: Own calculations using data from Ainsworth and Filmer (2006) Appendix Table A.3.1

The triangulation of results from eleven nationally representative surveys and two sizeable geographically, ethnically and socioeconomically distinct longitudinal datasets enhances our understanding on the impact of parental death on schooling in a number of critical ways and allows us to go some way towards informing appropriate policy responses. I begin at the national level with an examination of changes in orphan's vulnerabilities over time.

CHAPTER 3:

TRENDS IN THE VULNERABILITY OF ORPHANS TO POORER SCHOOLING OUTCOMES BETWEEN 1993 AND 2005

3.1 Introduction

There is a growing body of research on the prevalence of orphanhood and the living arrangements, health and education outcomes of orphans. Recent empirical evidence from sub-Saharan Africa has shown orphans to be at risk for poor schooling outcomes. However, 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.

This chapter adds to the available literature in showing orphans to be especially vulnerable to poor schooling outcomes. That said, the key contribution of this chapter 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 provides an avenue to explore whether the fear that extended families are no longer effective safety nets may be overstated or whether traditional coping strategies are indeed breaking down.

Using 11 nationally representative surveys conducted between 1993 and 2005 I investigate the relationship between parental death and children's 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 associated with greater disadvantages in schooling than paternal deaths. Results for

maternal deaths are not affected by controlling for socioeconomic status suggesting that maternal death is directly associated with poorer schooling outcomes rather than channelled through socioeconomic 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 with respect to educational outcomes. The evidence of this chapter 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 chapter is organised as follows. The next section describes the data and definitions used in this chapter and presents trends in the rates of orphanhood. Section 3.3 proceeds to examine the living arrangements, economic well-being and schooling outcomes (educational attainment and enrolment) of orphans and non-orphaned children. I discuss results from each of the 11 cross-sections as well as from pooled datasets. Section 3.4 investigates alternative explanations for orphan schooling deficits by examining whether deficits are homogenous among orphans. The final section summarises the key results.

3.2 Data, definitions and rates of orphanhood

Data and definitions

The analysis in this chapter 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).[5] 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.

[5] The PSLSD data can be downloaded from the Data First web site (www.datafirst.uct.ac.za). All other datasets can be ordered through Statistics South Africa (www.statssa.gov.za).

The samples for all surveys other than the censuses were multi-stage stratified random samples of non-institutionalised households in the case of the PSLSD and the OHSs and households and hostels in the case of the GHSs. Hostels are not identified in the GHS data but the analyses in this chapter focus on children of schooling going age and are unlikely to include many hostel dwellers. The sample sizes vary from 9,000 to 30,000 households. The census data used in this chapter are 10% samples of the censuses with weights to adjust for the undercount.[6] These 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 the household. A question that identifies co-resident parents was included in the household roster of 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.[7] Barnes *et al.* (2007) provide a detailed account of the different sample frames and weighting procedures used in each of these questionnaires. Appendix A3.1 provides a detailed discussion on the comparability of particular variables of interest across surveys.

UNAIDS (2004) defines an orphan as a child under the age of 18 who has lost at least one parent. In this thesis I will refer to individuals under the age of 18 as children and the period of life up to the age of 18 as childhood. Orphans refer to children who have lost at least one parent and non-orphans have two surviving parents. 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 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

[6] Institutions are included in the 10% samples but were excluded from the analyses in this paper to make the census data consistent with the other data sets.
[7] See Lee, Forthofer and Lorimor (1989) for discussion on variance estimation with complex sample surveys.

paternal orphans. 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 African children of school going age.[8] I focus on African children for three reasons. Firstly, HIV prevalence amongst non-Africans is low.[9] 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 3.1 shows for each survey the percentage of African children under the age of 18 whose mother is deceased or whose father is deceased. Figure 3.2 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 12 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 which has occurred since 1998. The percentage of children who are maternal, paternal and double orphans has risen by

[8] Under apartheid, South Africans were classified into four population groups, namely African, coloured, Asian and white. Africans represent over 80% of the South African population. The apartheid classification was used to differentiate the rights and opportunities of these groups across all spheres of life. Apartheid enforced the privileges of whites at the expense of the black majority. All blacks were severely discriminated against but coloureds and Asians occupied an intermediate status under apartheid with greater rights and opportunities than Africans. Educational institutions were racially segregated and "all aspects of education – governance, funding, professional training and curriculum – were defined and operated along racial lines in an egregiously unequal manner (Fiske and Ladd 2004:3)." In 1994, after substantial reductions in racial disparities in funding, spending on white learners was 15%, 46%, 147%, 413% more than spending on Asian, coloured, urban African and rural African learners respectively (Fiske and Ladd 2004:102). Fiske and Ladd (2004) provide an excellent discussion on the history of apartheid education and the reform of the education system in the post-apartheid era.

[9] 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).

94%, 64% and 348% respectively. The percentage of double orphans among children who have lost at least one parent increased from 7.9% in 1993 to 18.5% in 2005.

Figure 3.1: Parental death by survey for Africans aged 0-17

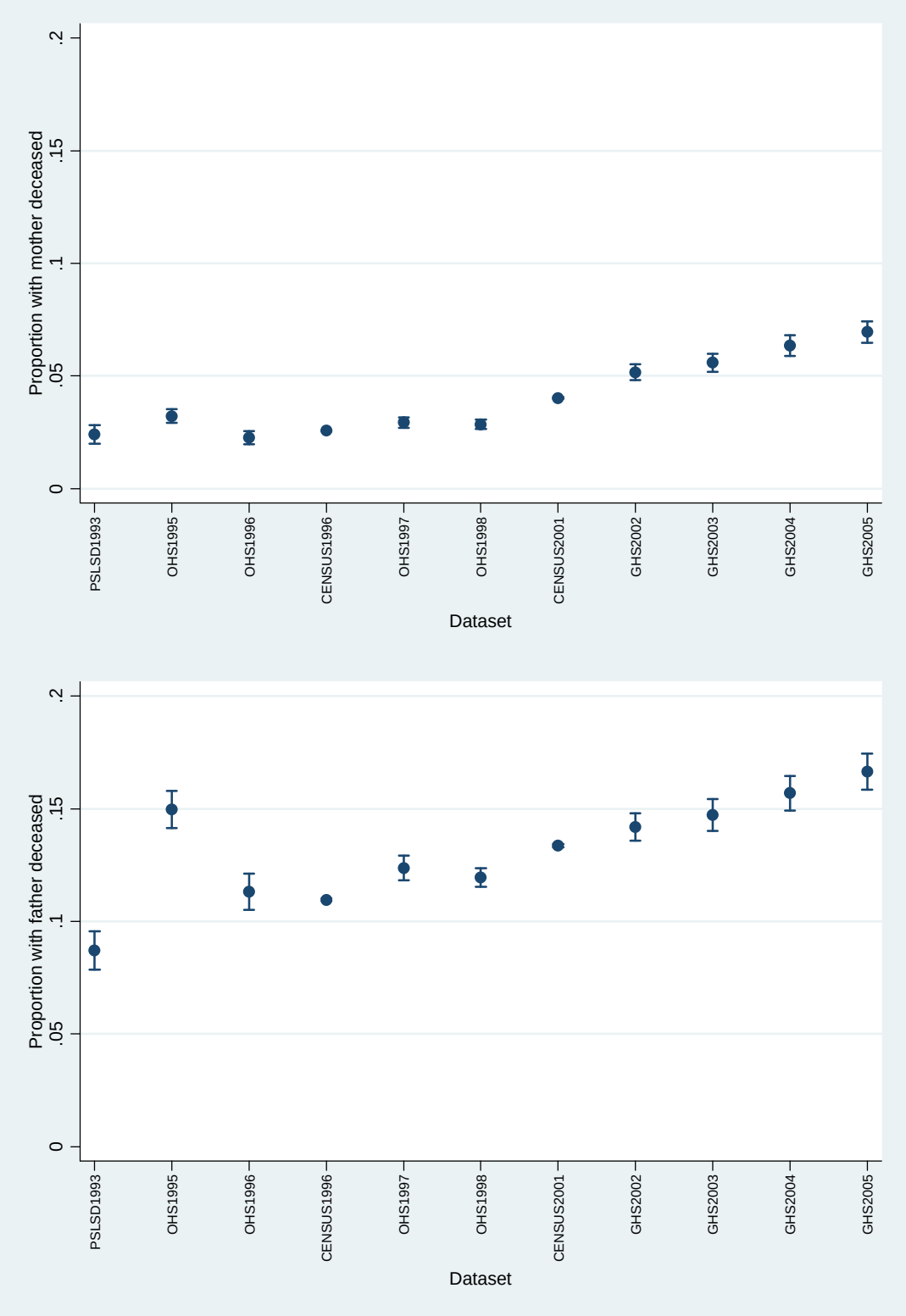


Figure 3.2: Proportion of maternal, paternal and double orphans for Africans aged 0-17

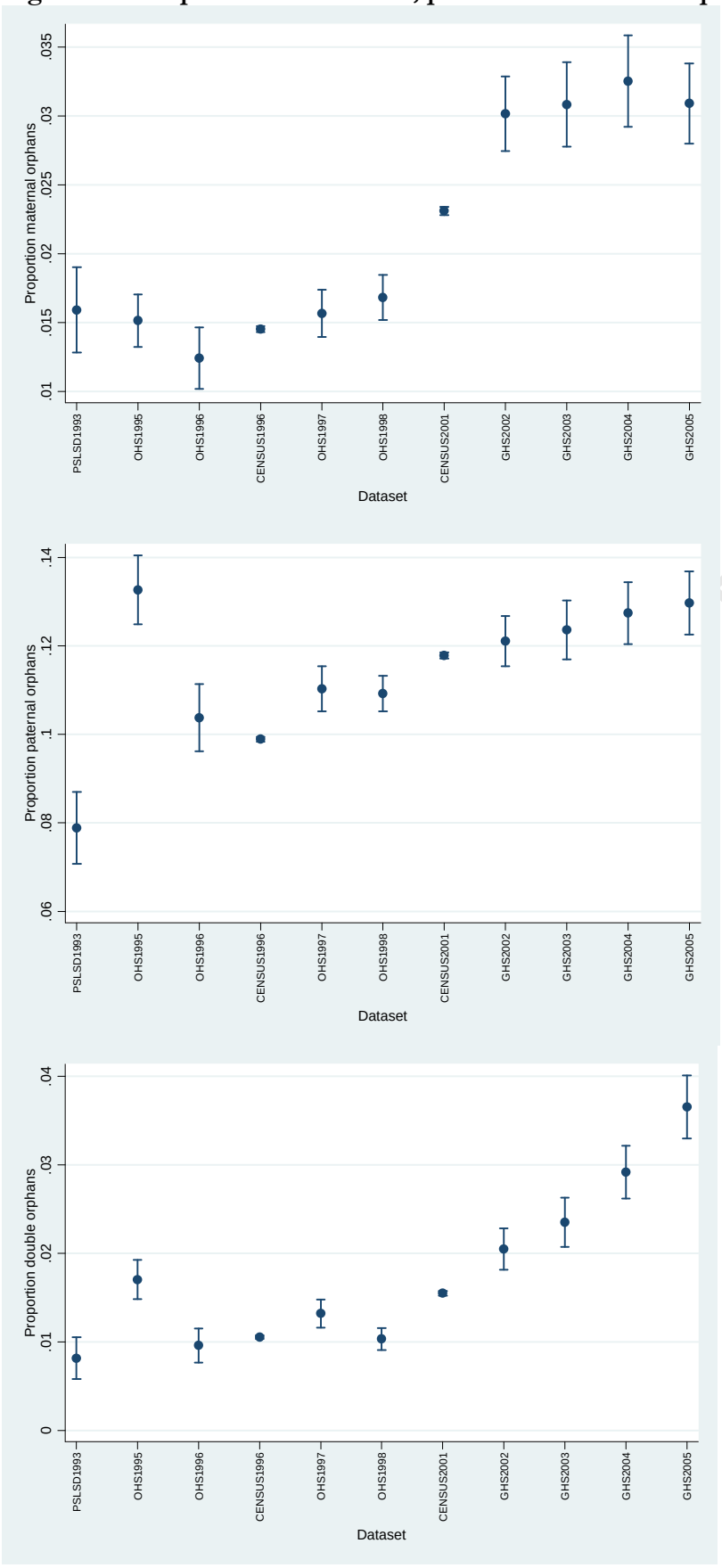


Figure 3.3: Parental death by age and year for Africans aged 0-17

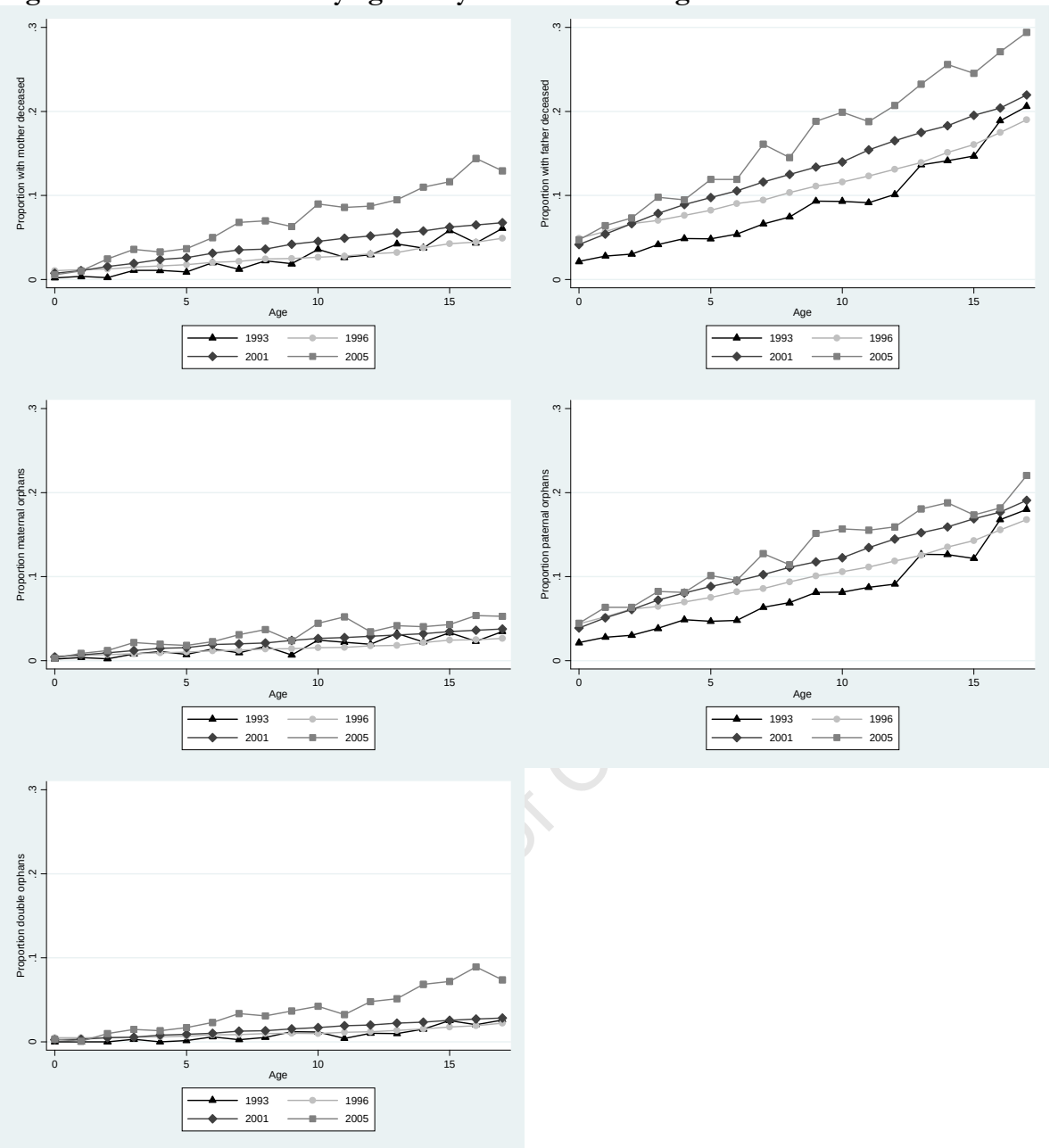


Figure 3.3 shows rates of orphanhood by age for African children under the age of 18 in 1993, 1996, 2001 and 2005. The risk of orphanhood clearly increases with age. The most recent estimates from 2005 indicate that by the age of 17 over a quarter (29.4%) of children have lost their father, 12.9% have 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 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 2 million maternal orphans under the age of 15 and 3 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.

3.3 Orphan status, living arrangements, 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 institutionalised 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 3.1 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) 73% of non-orphans lived with their mother, 41% 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.

Maternal and paternal orphans are less likely than non-orphans to live with their father and mother respectively. Between 1993 and 2005, children who have lost one parent are increasingly less likely to live with the surviving parent. 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. In 2005 57% percent of children whose mother had died are 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. I classified children 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 in 2005) 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. I reclassified double orphans, maternal orphans in female headed households and paternal orphans in male headed households as foster/adoptive children if they had been identified as sons or daughters of the household head. This classification is used as an indicator of the relatedness of the child to the household.

Table 3.1: Living Arrangements of Africans aged 8-17: 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	0.840	0.817	0.824	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 3. 1: (continued). Living Arrangements of Africans aged 8-17: 1993 to 2005

Year	1993	1995	1996	1996	1997	1998	2001	2002	2003	2004	2005
Paternal orphans											
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
Double orphans											
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
Mother is deceased - maternal and double orphans											
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
Father is deceased - paternal and double orphans											
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

Relationship to the household head is, however, 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 in 2005 around 27% of African children aged 8 to 17 lived 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.

In 2005 the majority of non-orphans (63%) lived in a household headed by a parent. Twenty seven percent (27%) lived in households headed by a grandparent, 8% lived 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 13 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 between 1993 and 2005 from 37% to 48% and 17% to 31% for maternal and paternal orphans respectively. In 2005 only around 1% of single orphans lived in a household headed by a non-relative and for paternal orphans the mother was co-resident in many of these households.

In the most recent survey (2005) over half (51%) of the double orphans lived in a household headed by a grandparent. Forty percent (40%) lived with other relatives and less than 2% lived in households headed by a non-relative. Five percent (5%) were 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 51% 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.[10] Within the family network there 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) document a similar increasing reliance on grandparents in Tanzania, Namibia and Zimbabwe. The relationship between living arrangements and the schooling of orphans and non-orphans will be investigated in section 3.4 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, Ardington and Leibbrandt 2007), the relationship between orphanhood and economic well-being is less clear. Ainsworth and Filmer (2006:1107) 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 socioeconomic distribution of HIV infection." In his analysis of DHS data from Burkino Faso, Cameroon, Kenya and Tanzania, De Walque (2006) finds no significant

[10] One caveat to this finding that orphans are still absorbed by the extended family is that street children are excluded from the samples by design so there is no way of knowing whether increasing numbers of orphans are living on the streets. Despite extensive searching, I was unable to find reliable statistics on the number of children living on the street. Email correspondence with Helen Meintjes and Katharine Hall from the Children's Institute confirmed that there are no reliable estimates of the number of children living on the street in South Africa.

association between years of education and HIV infection but finds that wealth, measured by an index of assets, tends to be associated with HIV infection, especially for women. Comparing the relative poverty of orphans in the early and late 1990s Bicego *et al.* (2003:1243) 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) and Ainsworth and Filmer (2006) find that paternal orphans currently reside in poorer households while maternal orphans are not systematically better or worse off than non-orphans.

The relationship between parental death and household economic well-being is investigated in Table 3.2. Indicators that the child's mother/father is deceased are regressed on a range of measures of economic well-being. These include 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 dummy variables 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 examine the well-being of the child's household only after a parental death. 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.

Table 3.2: Orphanhood and household socioeconomic status for Africans aged 8-17

Dataset	Mother deceased		Father deceased	
Panel A - Dependent variable: 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)**	-0.045	(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 - Dependent variable: 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	0.139	(0.022)**	-0.653	(0.012)**
OHS1997	0.005	(0.039)	-0.14	(0.022)**
OHS1998	-0.088	(0.035)*	-0.112	(0.021)**
CENSUS2001	0.123	(0.014)**	-0.459	(0.009)**
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 - Dependent variable: 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	0.012	(0.003)**	-0.052	(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 - Dependent variable: 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	0.016	(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)*

Notes to Table 3.2: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

If children are fostered into 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 2 members) and have lower well-being on all measures 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 the examination of the vulnerabilities of orphans with respect to educational outcomes.

Orphan status and schooling

The South African Schools Act of 1996 makes schooling compulsory from the age of 7 till the age of 15 or the completion of grade 9, whichever comes earlier. Very few children complete grade 9 before they are 15 years old therefore this policy effectively makes schooling compulsory between the ages of 7 and 15. 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 socioeconomic 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. Given that the South African schooling system is characterised by high enrolment and high rates of grade repetition I look at both enrolment and grades completed in the analyses that follow.

I estimate equations of the following form for each survey separately:

$$Y_{ih} = \beta_m M_{ih} + \beta_F F_{ih} + \gamma X_{ih} + \varphi W_h + \varepsilon_{ih}. \qquad (3.1)$$

Y_{ih} is a schooling outcome for individual i in household h.[11] The schooling outcomes are modelled as a function of the mother's vital status (M_{ih} =1 if the mother of child i in household h is deceased, =0 otherwise) and father's vital status (F_{ih} =1 if the father of child i in household h is deceased, =0 otherwise). Also included in equation 3.1 are a set of individual (X) and household (W) level controls.

Around a quarter of orphans live in 'blended' households allowing me to modify equation 3.1 to allow for household fixed effects. That is, the unobservable component of 3.1 can be written

$$\varepsilon_{ih} = \alpha_h + u_{ih}, \tag{3.2}$$

where α_h is a household-specific fixed effect. This effect will absorb all time invariant household level unobservable, unmeasured or mis-measured characteristics.[12] The fixed effects models are estimated from ordinary least squares regressions of the following form:

$$Y_{ih} - \bar{Y}_{h.} = \beta_m(M_{ih} - \bar{M}_{h.}) + \beta_F(F_{ih} - \bar{F}_{h.}) + \gamma(X_{ih} - \bar{X}_{h.}) + (u_{ih} - \bar{u}_{h.}), \tag{3.3}$$

where $\bar{Y}_{h.}$ is the average value of Y across all individuals in household h. Subtracting the household means removes α_h and φW_h from the equation.[13]

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.[14] Generally, empirical evidence suggests that the death of a mother has greater effects on children's schooling than the death of a father (Beegle *et al.* 2006; Bicego *et al.* 2003; Case *et al.*

[11] The household subscript, *h*, is redundant in equation 3.1 as each observation (individual) is uniquely identified by the subscript *i*. The household subscript is included in equation 3.1 merely to facilitate the comparison with equation 3.3.

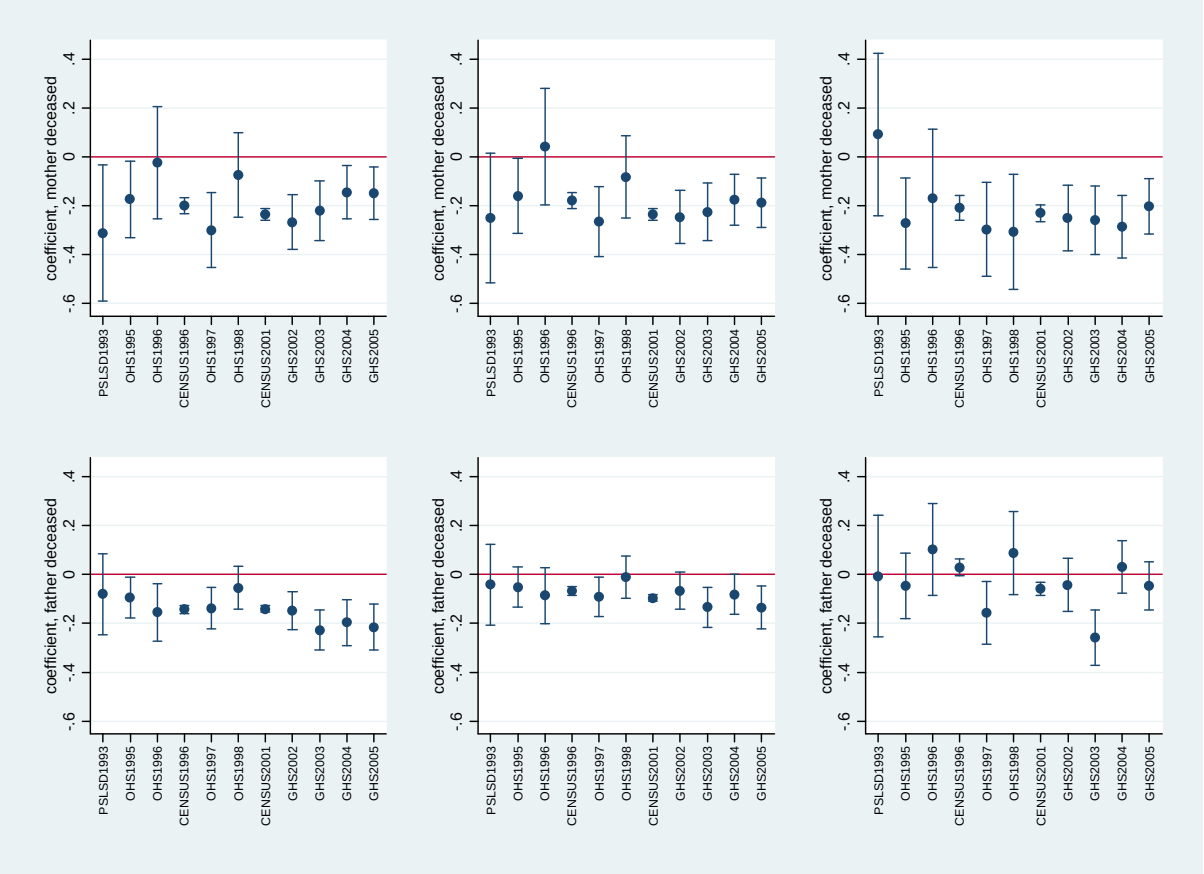
[12] As noted in the previous chapter, with cross sectional data household fixed effect estimation strategies are limited to comparing orphans to other children with whom they currently live. For children that move following a parental death α_h is the destination household-specific fixed effect.

[13] Household fixed effects models are analogous to individual fixed effect models with observations on multiple individuals within a household rather than multiple observations on the same individual over time. See Deaton (1997:106-108) for a discussion on within- estimation techniques.

[14] Unless explicitly stated, the term effect does not imply a causal effect but rather reflects an association.

2004; Evans and Miguel 2007). 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 Appendix 3.1.1) and found that my results were robust with all specifications generating negative estimates of the effect 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 3.4: Coefficient estimates and 95% confidence intervals from regressions of years of completed education on indicators that mother and father are deceased for Africans aged 8-17



Notes to Figure 3.4: 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 3.4 shows the ordinary least squares estimates of β_M and β_F and their associated 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 (Table A3.6 in the appendix presents the coefficients and standard errors). 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 1 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 A3.7 to A3.11 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 3.4.

Starting with the first column I find that for all surveys other than the 1996 and 1998 OHS there is a significant negative association between schooling attainment and maternal death.[15] The point estimates of the 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 0.21. 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 (0.14) is slightly lower than that for a maternal death. As with maternal deaths, there does not appear to be any clear evidence of

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

systematic deterioration or improvement in the deficit that orphans face with respect to educational attainment.

The first column of Figure 3.4 documents that orphans are consistently at risk of lower educational attainment and that this orphan deficit is generally larger for maternal death than paternal death. The next two columns of Figure 3.4 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 0.144 to 0.078) while the results for maternal death are not affected. Around half of the disadvantage associated with paternal death is accounted for by the socioeconomic 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 socioeconomic 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 socioeconomic status to comparing orphans to non-orphans within the same household. Household fixed effect models allow us to examine whether there are intrahousehold differences and avoid empirical problems associated with the mis-measurement of household characteristics. The third column of Figure 3.4 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 0.048) and is statistically significant in only three surveys.

Table 3.3: Educational attainment and the interaction between maternal and paternal death for Africans aged 8-17

Dataset	Dependent variable: Years of completed education					
	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)
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	-0.234	(0.014)**	-0.141	(0.007)**	-0.002	(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)
Panel B - Household controls						
PSLSD1993	-0.115	(0.144)	-0.005	(0.09)	-0.421	(0.304)
OHS1995	-0.112	(0.108)	-0.044	(0.044)	-0.092	(0.152)
CENSUS1996	-0.134	(0.021)**	-0.059	(0.009)**	-0.114	(0.036)**
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	-0.218	(0.015)**	-0.092	(0.007)**	-0.051	(0.026)*
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)
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)
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	-0.196	(0.022)**	-0.046	(0.014)**	-0.093	(0.035)**
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)

Notes to Table 3.3: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

In order to assess whether the effect 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 3.3 presents estimated coefficients and standard errors for maternal and paternal indicators and the interaction between them. 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 effect of parental death on schooling. In contrast, the DHS surveys analysed by Case *et al.* (2004) generally show larger effects for double orphans than for maternal orphans. Only one in four maternal orphans in South Africa in 2005 is living with a father. This is a lower paternal presence rate than is reported for every country other than Namibia studied by Case *et al.* (2004). Father absence may help to explain the differences in relative outcomes for maternal orphans in South Africa and those in other parts of Africa. If father absence turns maternal orphans into 'virtual' double orphans, then one would expect to find maternal orphans with outcomes similar to double orphans. Parental death is relatively rare, which often results in insufficient statistical precision to reliably estimate effects especially when one includes interactions to examine whether effects are homogenous among all orphans. I therefore do not distinguish between paternal, maternal and double orphans but prefer the simpler specification for most of the analyses that follow.

The primary objective of this chapter is to document the extent to which the vulnerability of orphans to poorer educational outcomes is changing over time. Table 3.4 presents estimates analogous to those in Figure 3.4 for 2 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 3.1 and 3.2, rates of orphanhood and particularly 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 1 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 3.4 presents selected coefficients and their standard errors from a single regression model. In the models with only individual level controls (panel A) the disadvantage associated with 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 effects 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 socioeconomic status and the household fixed effects models the effect of paternal deaths, although small, does appear to increase between 1993 and 2005.

Table 3.4: Educational attainment and parental death for Africans aged 8-17: pooled estimates

Dataset	Dependent variable: Years of completed education			
	Mother deceased		Father deceased	
Panel A - No household controls				
1993 to 1998	-0.221	(0.037)**	-0.104	(0.019)**
2001	-0.235	(0.012)**	-0.141	(0.007)**
2002 to 2005	-0.189	(0.025)**	-0.197	(0.019)**
Panel B - Household controls				
1993 to 1998	-0.199	(0.036)**	-0.063	(0.019)**
2001	-0.236	(0.012)**	-0.097	(0.007)**
2002 to 2005	-0.203	(0.025)**	-0.104	(0.018)**
Panel C - Household fixed effects				
1993 to 1998	-0.217	(0.020)**	-0.014	(0.014)
2001	-0.23	(0.017)**	-0.059	(0.013)**
2002 to 2005	-0.246	(0.033)**	-0.071	(0.027)**

Notes to Table 3.4: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

The pooled data are helpful in summarising effects 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 3.4, conclusions about the association between orphanhood and 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.

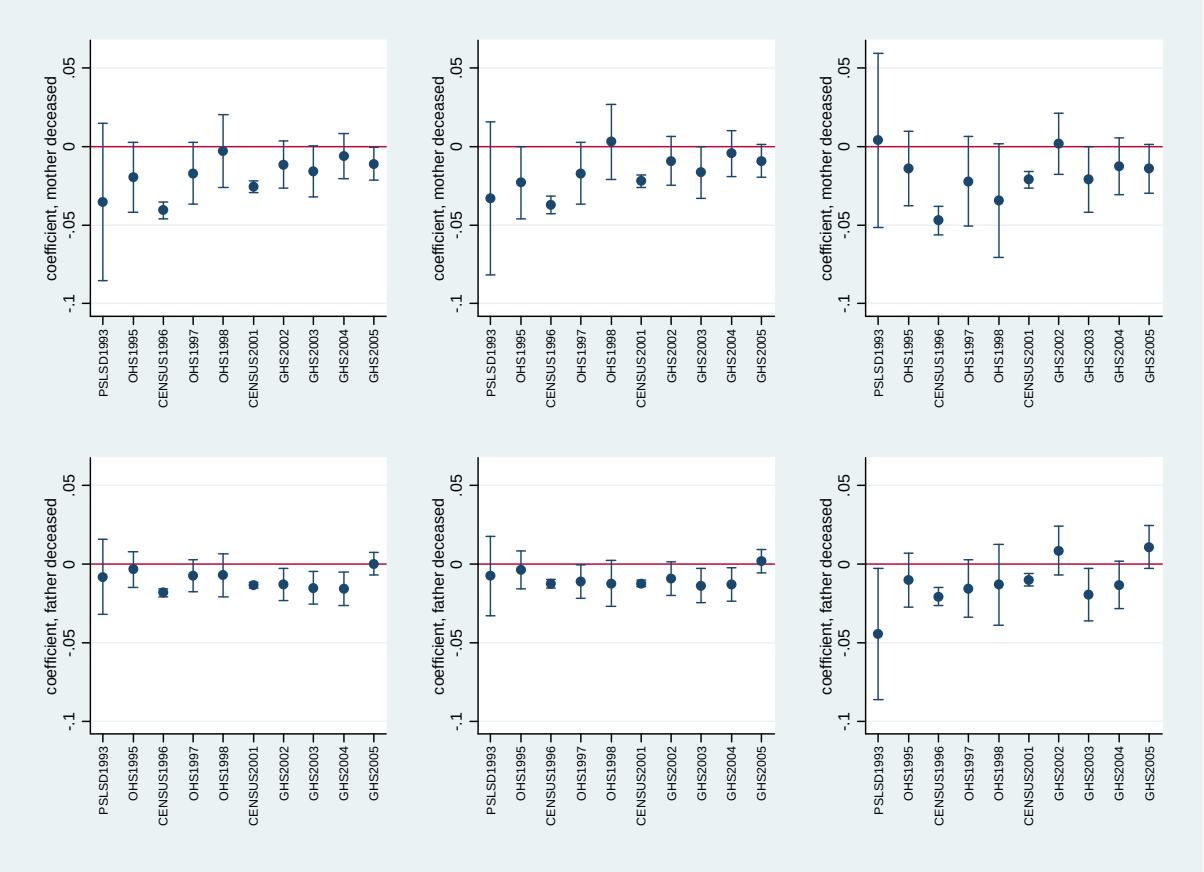
I examine whether the effects are homogenous with respect to the age of the orphans by splitting the sample into younger (8-12) and older (13-17) children. The deficit for younger children is smaller and less precisely measured at least in part because there are fewer orphans in this age group (results in Tables A3.12 and A3.13 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 only to be negatively associated with attainment for older students.

Estimates of the association between parental death and enrolment are shown in Figure 3.5 (Table A3.14 in the appendix presents the coefficients and standard errors).[16] 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

[16] The coefficients shown in Figure 3.5 are estimates from a linear probability model as enrolment is a dichotomous variable. The main purpose is to estimate the marginal effect of parental death on the probability of enrolment rather than generating predicted probabilities. A linear probability model is used as coefficients from a linear probability model are more readily interpretable (Wooldridge 2002:454-457). In order to assess the appropriateness of a linear model the coefficients were compared to the marginal effects from probit regressions (results not shown). The magnitude of the marginal effects and coefficients were similar and there were no differences in substantive conclusions based on the statistical significance of the coefficients. Throughout this thesis whenever a linear probability model is employed, the coefficients are compared to marginal effects from probit regressions to assess whether any substantive conclusions differ.

household fixed effects models. Estimates for maternal and paternal death in models with and without household controls are always negative but only significant in three 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 four of the household fixed effects regressions. Maternal death deficits are only significant for three surveys.

Figure 3.5: Coefficient estimates and 95% confidence intervals from regressions of enrolment on indicators that mother and father are deceased – Africans aged 7 to 15.

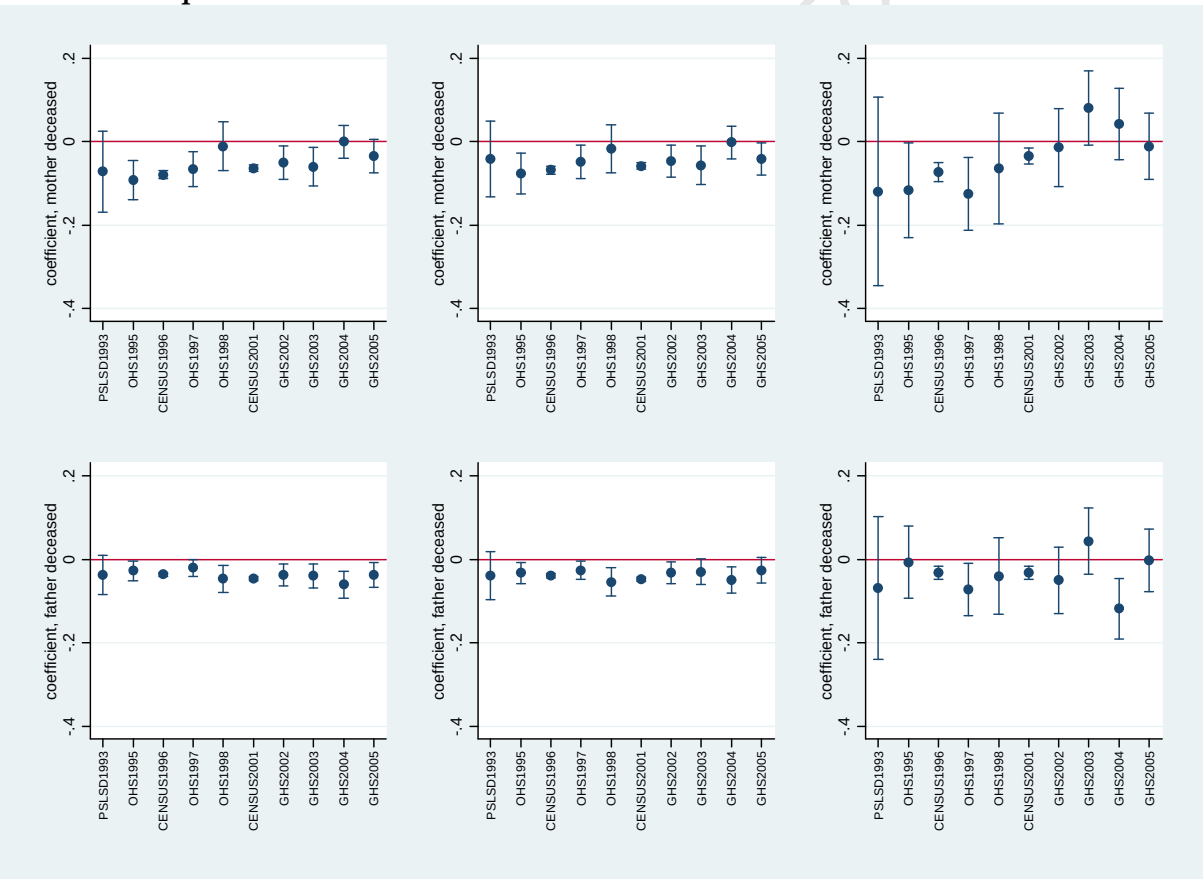


Notes to Figure 3.5: First column controls for child's age and sex, second column also includes household controls, third column estimates household fixed effects. Indicators that parent's vital status is missing are included in all regressions.

Figure 3.6 examines enrolment for children aged 16 to 18 who have not yet completed secondary school (Table A3.15 in the appendix presents the coefficients and standard errors). On average across the data sets only 3.6% of African children aged 16 to 18 have completed Grade 12 so any selection effects are likely to be small. Parental death puts late teens at risk of

dropping out of school before completion of Grade 12. For models with household controls the maternal death coefficients are significantly negative in six out of the 10 surveys and the average deficit is 5.2 percentage points. Paternal death also has significant negative effects in nine of the 10 survey years with an average deficit of 3.9 percentage points. The average estimated deficits do not change in the household fixed effects models but estimates are now significantly different from zero in seven of the surveys for both maternal and paternal death. In contrast to the results for attainment paternal death effects on enrolment do not seem to be explained by household socioeconomic status although the magnitude of the deficits is small.

Figure 3.6: Coefficient estimates and 95% confidence intervals from regressions of enrolment on indicators that mother and father are deceased for Africans aged 16-18 who have not completed Grade 12



Notes to Figure 3.6: 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 are included in all regressions.

Table 3.5 presents coefficient estimates and standard errors for the pooled samples and the 2001 Census for the same regression models shown in Figures 3.5 and 3.6. 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.

Table 3.5: Enrolment and parental death for Africans aged 7-15 and 16-18: pooled estimates

	Africans aged 7 to 15 Dependent variable: Currently enrolled in school			
	Mother deceased		Father deceased	
Panel A - No household controls				
1993 to 1998	-0.023	(0.005)**	-0.009	(0.003)**
2001	-0.026	(0.002)**	-0.014	(0.001)**
2002 to 2005	-0.011	(0.003)**	-0.011	(0.002)**
Panel B - Household controls				
1993 to 1998	-0.022	(0.006)**	-0.01	(0.003)**
2001	-0.022	(0.002)**	-0.012	(0.001)**
2002 to 2005	-0.009	(0.003)**	-0.009	(0.002)**
Panel C - Household fixed effects				
1993 to 1998	-0.025	(0.003)**	-0.019	(0.002)**
2001	-0.021	(0.003)**	-0.01	(0.002)**
2002 to 2005	-0.012	(0.005)*	-0.003	(0.004)
	Africans aged 16 to 18 without Grade 12 **Dependent variable: Currently enrolled in school**			
	Mother deceased		**Father deceased**	
Panel A - No household controls				
1993 to 1998	-0.065	(0.013)**	-0.034	(0.007)**
2001	-0.063	(0.004)**	-0.046	(0.003)**
2002 to 2005	-0.035	(0.011)**	-0.043	(0.007)**
Panel B - Household controls				
1993 to 1998	-0.051	(0.013)**	-0.04	(0.007)**
2001	-0.058	(0.004)**	-0.048	(0.003)**
2002 to 2005	-0.036	(0.010)**	-0.035	(0.008)**
Panel C - Household fixed effects				
1993 to 1998	-0.097	(0.011)**	-0.051	(0.008)**
2001	-0.034	(0.010)**	-0.033	(0.008)**
2002 to 2005	0.026	(0.022)	-0.033	(0.019)

Notes to Table 3.5: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Results for children aged 16 to 18 who have not yet completed Grade 12 are shown in the lower half of Table 3.5. 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 9.7 percentage point to an advantage of 2.6 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 5.1 percentage points in the earliest sample to 3.3 percentage points in the most recent sample.

The effect on orphanhood on other children in the household

The household fixed effects models shown in Figures 3.4 to 3.6 allow us to investigate intrahousehold 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 effect 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 effect 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 effect 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 3.6 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 effect 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. There does not appear to be any systematic change in the effect 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.

Table 3.6: Educational attainment for Africans aged 8-17 in 'blended' and non-'blended' households

Dataset	Dependent variable: Years of completed education											
	Mother deceased – blend		Mother deceased - non blend		Father deceased – blend		Father deceased - non blend		Mother alive - blend		Father alive- blend	
PSLSD1993	0.218	(0.182)	-0.542	(0.176)**	-0.019	(0.162)	-0.025	(0.095)	0.048	(0.129)	0.147	(0.113)
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	-0.213	(0.028)**	-0.149	(0.021)**	-0.088	(0.017)**	-0.07	(0.010)**	-0.004	(0.021)	-0.12	(0.014)**
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	-0.24	(0.018)**	-0.228	(0.016)**	-0.133	(0.013)**	-0.092	(0.008)**	-0.021	(0.015)	-0.086	(0.011)**
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	-0.198		-0.186		-0.117		-0.073		-0.005		-0.077	
1993 to 1998	-0.23	(0.056)**	-0.167	(0.047)**	-0.118	(0.036)**	-0.045	(0.021)*	-0.041	(0.041)	-0.042	(0.028)*
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)**

Notes to Table 3.6: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

3.4 Alternative explanations for orphan deficits

While the above empirical analysis makes clear that parental death, particularly maternal death, is associated with poorer schooling outcomes, it is not clear what mechanisms drive this relationship. Without longitudinal data it is not possible to distinguish empirically between potential mechanisms and 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 parental absence.

Parental death and parental absence

The literature suggests that 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. Investigating the effect 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 effect of parental absence and one would expect this effect to be less than or equal to that of parental death.

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 effect 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 3.7: Parental death, parental absence and educational attainment for Africans aged 8-17

Dataset	Dependent variable: Years of completed education							
	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	-0.284	(0.012)**	-0.174	(0.008)**	-0.131	(0.005)**	-0.064	(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	-0.249		-0.196		-0.144		-0.083	
Panel B - Household controls								
PSLSD1993	-0.263	(0.137)	-0.137	(0.103)*	-0.103	(0.058)	-0.106	(0.063)**
OHS1995	-0.184	(0.078)*	-0.116	(0.049)*	-0.152	(0.043)**	-0.082	(0.044)
CENSUS2001	-0.279	(0.012)**	-0.089	(0.009)**	-0.093	(0.006)**	0.007	(0.007)
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	-0.246		-0.105		-0.116		-0.024	
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	(0.019)**	-0.195	(0.019)**	-0.156	(0.010)**	-0.162	(0.016)**
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		-0.162	

Notes to Table 3.7: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table 3.7 presents coefficients and standard errors of regressions that include indicators that a child's living parent is absent. Each row in Table 3.7 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 socioeconomic status. Children whose mothers are absent are on average between 0.12 and 0.14 years behind children who co-reside with their mothers. In the

fixed effects specification the deficit associated with maternal death is statistically significantly larger than the deficit associated with maternal absence in six of the seven surveys. There is a small deficit associated with an absent father but this is largely explained by the household's socioeconomic status and when household controls are included the effect 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 effects. 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 3.8. Children are divided into five 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 socioeconomic 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 socioeconomic 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.

Table 3.8: Parent's vital status, residency and educational attainment for Africans aged 8-17

Dataset	Dependent variable: Years of completed education							
	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	-0.142	(0.006)**	-0.133	(0.009)**	-0.269	(0.009)**	-0.422	(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	-0.176		-0.144		-0.301		-0.441	
Panel B - Household controls								
PSLSD1993	-0.168	(0.066)*	-0.084	(0.098)	-0.071	(0.135)	-0.588	(0.259)*
OHS1995	-0.127	(0.043)**	0.007	(0.046)	-0.302	(0.083)**	-0.279	(0.104)**
CENSUS2001	-0.072	(0.006)**	-0.078	(0.009)**	-0.198	(0.010)**	-0.388	(0.020)**
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	-0.098		-0.070		-0.208		-0.390	
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)**	-0.04	(0.02)	-0.265	(0.016)**	-0.433	(0.027)**
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		-0.431	

Notes to Table 3.8: 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 are included in all regressions. The reference category is a child with two living parents co-residing with at least one parent. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

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 of 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 effect 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 realise 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 living with either parent are presented in Table 3.9. Findings are robust to ignoring co-residency with parents and using only the relationship between the child and the household head as the measure of relatedness to the household. Once the relationship to the household head is taken into account the coefficients on maternal and paternal death are substantially reduced. The effect of maternal and paternal deaths are reduced on average by around 34% and 39% 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 of the worst schooling outcomes being on average 0.95 of a year behind children living with at least one parent.

Table 3.9: Educational attainment and relationship to the household head for Africans aged 8-17: household fixed effects

Dataset	Dependent variable: Years of completed education									
	Mother deceased		Father deceased		Grandparent head		Other relative head		Non-relative head	
OHS1995	-0.166	(0.098)	-0.018	(0.069)	-0.1	(0.072)	-0.221	(0.089)*	-1.495	(0.266)**
CENSUS2001	-0.135	(0.019)**	-0.038	(0.014)**	-0.132	(0.013)**	-0.288	(0.016)**	-0.94	(0.060)**
GHS2002	-0.2	(0.073)**	-0.017	(0.056)	0.037	(0.056)	-0.264	(0.074)**	-0.455	(0.309)
GHS2003	-0.137	(0.075)	-0.245	(0.058)**	-0.14	(0.058)*	-0.356	(0.076)**	-1.055	(0.272)**
GHS2004	-0.159	(0.069)*	0.047	(0.055)	-0.189	(0.057)**	-0.265	(0.078)**	-1.663	(0.306)**
GHS2005	-0.171	(0.061)**	-0.032	(0.051)	0.004	(0.055)	-0.148	(0.066)*	-0.074	(0.239)
Average	-0.161		-0.051		-0.087		-0.257		-0.947	

Notes to Table 3.9: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table 3.10: Educational attainment and living arrangements for African double orphans and foster children aged 8-17

Dataset	Dependent variable: Years of completed education													
	Double – grandchild		Double – other relative		Double – non-relative		Foster – foster child		Foster – grandparent		Foster – other relative		Foster – non-relative	
OHS1995	-0.13	(0.287)	-0.055	(0.290)	-1.338	(0.674)*	0.243	(0.278)	0.101	(0.250)	-0.169	(0.262)	-0.809	(0.415)
CENSUS2001	0.38	(0.098)**	0.141	(0.100)	-1.005	(0.278)**	0.588	(0.095)**	0.59	(0.094)**	0.398	(0.095)**	-0.078	(0.113)
GHS2002	-0.14	(0.437)	-0.313	(0.464)	-0.278	(0.593)	-0.043	(0.444)	0.16	(0.428)	-0.01	(0.417)	-0.108	(0.508)
GHS2003	0.193	(0.327)	-0.498	(0.357)	-1.369	(0.720)	0.207	(0.372)	0.334	(0.318)	0.193	(0.321)	-0.17	(0.507)
GHS2004	-0.32	(0.310)	-0.589	(0.329)	-1.323	(0.430)**	-0.278	(0.405)	-0.059	(0.298)	-0.306	(0.315)	-1.55	(0.683)*
GHS2005	-0.156	(0.199)	-0.537	(0.208)**	-0.728	(0.386)	-0.262	(0.243)	-0.013	(0.187)	-0.254	(0.187)	-0.859	(0.398)*
Average	-0.029		-0.309		-1.007		0.076		0.186		-0.025		-0.596	

Notes to Table 3.10: Each row presents selected coefficients and standard errors in parentheses from a single regression. Indicators for missing parents' vital status, individual and household controls are included in all regressions. The reference category is a double orphan who is foster/adoptive child of household head. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table 3.11: Educational attainment, parental death and wealth interactions for Africans aged 8-17: household fixed effects.

Dataset	Dependent variable: Years of completed education									
	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	-0.251	(0.064)**	0.07	(0.041)	0.006	(0.01)	-0.007	(0.006)	32.50	0.000	2.09	0.124
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	-0.249	(0.035)**	-0.054	(0.025)*	0.005	(0.008)	-0.001	(0.006)	87.27	0.000	9.92	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

Notes to Table 3.11: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

In addition to investigating how much of orphan disadvantage can be explained by degree of relatedness to the head one can also examine whether there are differential effects of the parent dying depending on whether one lives later with a grandparent, other relative, or non-relative. In results estimated but not shown I included interactions between the indicators for parental death and the indicators for relationship to the household head. In general, the effect of maternal death decreases with the degree of relatedness to the household head.

Relatedness to the household is clearly associated with educational attainment and explains some of the orphan deficit. Table 3.10 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).

Resource constraints

Results in the previous section showed that children whose mother had died had lower educational attainment than children of similar socioeconomic 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 3.4. 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 effect of parental death. Table 3.11 presents coefficients from interactions between parental death and the logarithm of expenditure per capita. There is no evidence to suggest such moderating effects. The interaction terms are

negative in four and six and significant in only one and three surveys for maternal and paternal death respectively.

In South Africa, a non-contributory old age pension is paid to all men and women who reach pension age (60 for women, 65 for men) without a private pension.[17] The pension currently pays R940 per month which is more than twice median per capita African income. Although the pension is means tested almost all Africans qualify. Because pension eligibility is very well predicted by age-eligibility, researchers commonly use age-eligibility as an instrument for take up (see Ardington, Case and Hosegood (forthcoming) for more details). I investigated whether the presence of a pensioner mitigated some of the effect of maternal death by including 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 and 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).

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). If children become care-givers for parents who are ill, one may expect girls would be disproportionately burdened. 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) 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.

[17] In his 2008 budget speech, Finance Minister Trevor Manual announced that the qualifying age for men would be reduced to 63 in 2008, 61 in 2009 and 60 in 2010 (Manuel 2008:9).

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 22 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 were not significantly associated with children's schooling outcomes 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.

3.5 Summary

At every point in time cross-sectional evidence suggests that that orphans are at risk of poorer educational outcomes with maternal deaths generally having stronger negative effects than paternal deaths. Paternal deaths are strongly associated with poorer socioeconomic 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 channelled through socioeconomic status. Among the multiple pathways through which parental death affects a child's schooling the results in this chapter suggest that parental involvement and relatedness to the household are important.

Despite a significant increase in the number of orphans over the last decade I find no evidence of a systematic deterioration in traditional coping strategies at least with respect to orphan's educational outcomes. Analysis of spatial variation in the vulnerability of orphans also suggests that orphans fare no worse in communities with higher concentrations of orphans. 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. Thus, the family safety net has continued to adjust and to cope. However, this in no way diminishes the fact that there has been increased pressure on this safety net and I am not arguing that there is no tipping point. 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.

Without longitudinal data one cannot identify whether there is a causal effect of parental death and we are only ever able to control for concurrent household characteristics. There are no nationally representative longitudinal datasets nor do any national surveys address spatial mobility and family networks in sufficient detail for us to examine which children move following the death of a parent or whether indeed orphans are strategically placed in the better off households within a family network. Although rare, there exist some localised longitudinal datasets. The next two chapters use two geographically and socioeconomically distinct longitudinal datasets to investigate whether the association between parental death and poor schooling outcomes is causal.

CHAPTER 4:

ESTIMATING THE CAUSAL EFFECTS OF PARENTAL DEATH: LONGITUNDINAL EVIDENCE FROM RURAL KWA-ZULU NATAL

4.1 Introduction

While many papers have found an association between parental death and children's wellbeing, estimating whether the loss of a parent has a causal effect on children's outcomes is difficult. In cross-sectional datasets, such as those analysed in the previous chapter, one cannot know the relative wealth of a child's household, or the child's school attainment, prior to the parent's death. Children who have lost a parent may themselves be ill, and may be behind in school because of their own illnesses. Orphans' households may have been systematically poorer than other households prior to parents' deaths, leading to correlations between the death of a parent, household poverty and school attainment. With cross-sectional data, it is generally not possible to rule out such explanations for orphans' poorer outcomes. Longitudinal data -- in which the same children are being followed through time, with parents' deaths recorded as they occur -- allow one to move some distance in evaluating alternative explanations for children's outcomes following the death of a parent. However, large longitudinal datasets are relatively rare in developing countries struggling with the AIDS crisis.

An exception is the database established by the Africa Centre for Health and Population Studies, in Northern KwaZulu-Natal, which has been following 100,000 people in 11,000 households since 2000. Data collected by the Africa Centre allow one to follow children through time, and to examine the extent to which children's outcomes respond to parental death.

In this chapter, I analyse longitudinal data from the Africa Centre, and document the association between parental death and children's educational attainment, enrolment, and the resources devoted to each child's education. Because all children in the field site have been followed through time, I am able to identify whether children were behind in school prior to a

parent's death, or fell behind only after a parent died. In addition, I can analyse the extent to which household poverty precedes parents' deaths, or appears to be the result of this loss.

I find significant differences in the effect of mothers' and fathers' deaths. The loss of a child's mother is a strong predictor of poor schooling outcomes. Children whose mothers have died are significantly less likely to be enrolled in school, and have completed significantly fewer years of schooling, conditional on age, than children whose mothers are alive. Less money is spent on their education on average, conditional on enrolment. While this may simply reflect the fact that children are themselves ill, or are poor students, I find no evidence to support this hypothesis. Children whose mothers were alive when the first data were collected on educational attainment in 2001, but whose mothers subsequently died, were not lagging other children in enrolment or educational attainment in 2001. However, they had fallen behind when observed after their mothers' deaths. Furthermore, children who were enrolled at the time of the first socioeconomic survey, but whose mothers died between the rounds of the socioeconomic survey, were significantly less likely than other children their age to be enrolled, when observed after their mothers had died. My evidence is consistent with mothers' deaths having a causal effect on children's educational outcomes.

The loss of a child's father is a significant predictor of household socioeconomic status. Children whose fathers have died live in significantly poorer households, measured on a number of dimensions. However, households in which fathers died were poor prior to fathers' deaths. The death of a father between waves of the survey has little effect on subsequent household economic status. While the loss of a father is correlated with poorer educational outcomes, this correlation arises because the household is poor. Children whose fathers were alive when the first data were collected on educational attainment in 2001, but whose fathers subsequently died, do not fall behind when observed after their fathers' deaths. In addition, children who were enrolled at the time of the first socioeconomic survey, but whose fathers died between the rounds of the survey, were not significantly less likely than other children their age to be

enrolled, when observed after their fathers had died. The correlation between fathers' deaths and children's schooling outcomes appears to be driven entirely by their common link to household economic status.

I proceed as follows. Section 4.2 introduces the Africa Centre data. Section 4.3 documents the relationship between orphanhood and educational attainment. The timing of parental death relative to the timing of children falling behind in school, is discussed in Section 4.4. Section 4.5 examines whether all children whose mothers have died are at equal risk. Specifically, I explore whether girls are at special disadvantage, and whether the impact of being an orphan is lessened when orphans live with pensioners. The final section summarises the key results of this chapter.

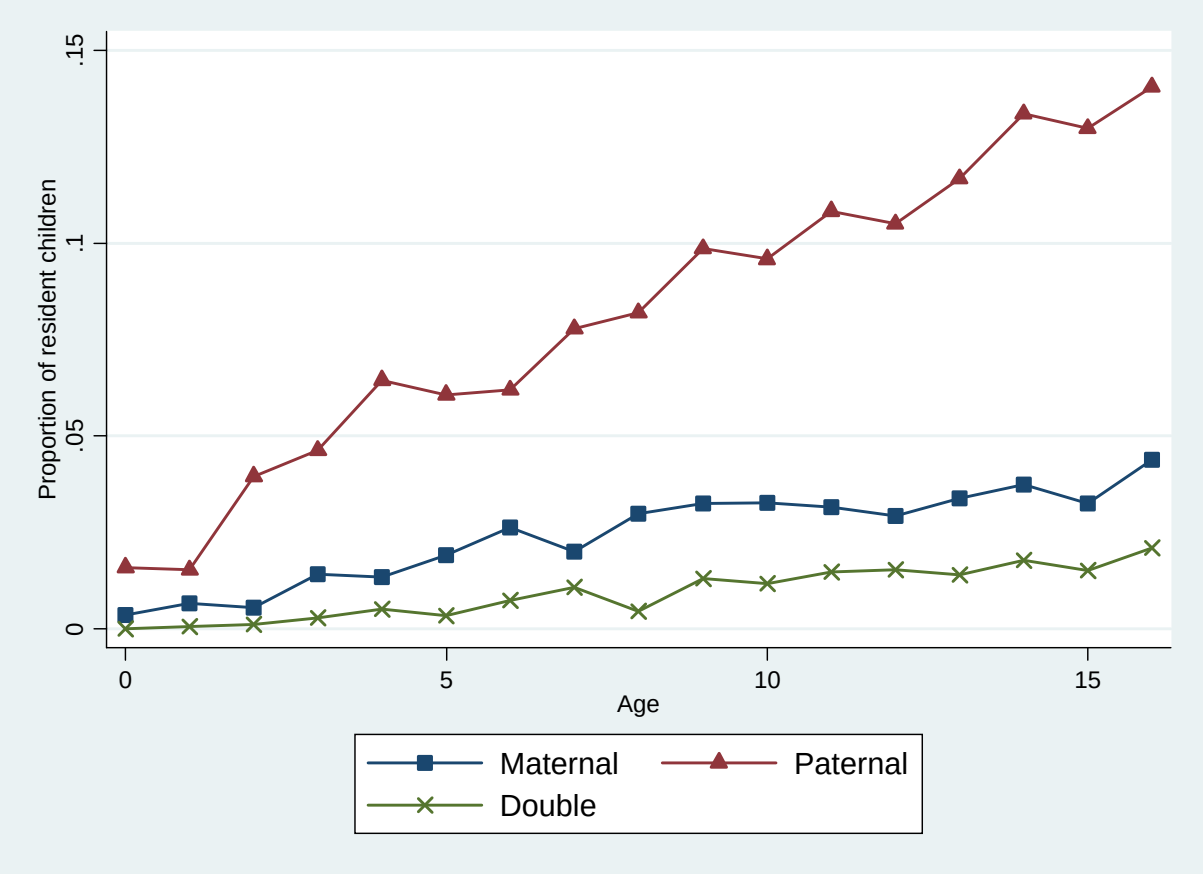
4.2 Data

The Africa Centre is maintaining a database on all individuals who live in, or are members of households that reside in, a demographic surveillance site in the Umkhanyakude District of KwaZulu-Natal. Data on births, deaths, migration, and changes in marital status are collected twice annually for all household members in this demographic surveillance area (DSA). The District is relatively rural and poor, when compared either to South Africa as a whole, or to the rest of KwaZulu-Natal (Case and Ardington 2004). It is struggling with a heavy disease and death burden, the result of the HIV/AIDS pandemic.

My analysis of children's education relies on information collected on children's living arrangements and on their parents' vital status. In addition, I use data on school enrolment and attainment, and on households' economic status, which have been collected in two rounds of the Africa Centre's Household Socioeconomic (HSE) survey. The first round, which I refer to as HSE1, collected data from all households in the DSA in the first half of 2001, and the second round, HSE2, collected socioeconomic data over the 18 month period from January 2003 through June 2004. The later round contained a rich set of questions on household employment, income and expenditures, with detailed questions on educational expenditures for each child. I

will begin by analyzing the data collected in HSE2, and will return to HSE1 data in order to better understand the timing of parents' deaths relative to the point at which children fall behind in school.

Figure 4.1: Orphans as a proportion of resident children in the DSA as at 1 January 2000



The demographic surveillance area is experiencing high rates of death among adults in middle age, largely a result of the AIDS crisis. Death in early and middle adulthood has led to a large and growing number of orphans in the DSA. Figure 4.1 presents rates of orphanhood in the DSA when the first individuals were registered (January 1, 2000). The figure presents the percentages of resident children at each age who had lost their mothers but whose fathers were alive; children who had lost fathers, but whose mothers were alive; and children who had lost both parents. I find the risk of all three types of orphanhood increase with age. By the age of ten, for example, over 3 percent of children had lost their mothers (father was alive), 10 percent had lost fathers (mother was alive), and 1.2 percent had lost both parents. That the crisis is deepening can be seen in Figure 4.2, which presents the percentage of resident children whose mothers

were dead (both maternal and double orphans) at two points in time: January 1, 2000 and January 1, 2004. This percentage increased at every age from 1 to 16 between 2000 and 2004, with rates among 10 years olds more than doubling, from 4.4 percent to 9.6 percent, in this four year period.

Figure 4.2: Children whose mother was deceased as a proportion of resident children as at 2000 and 2004

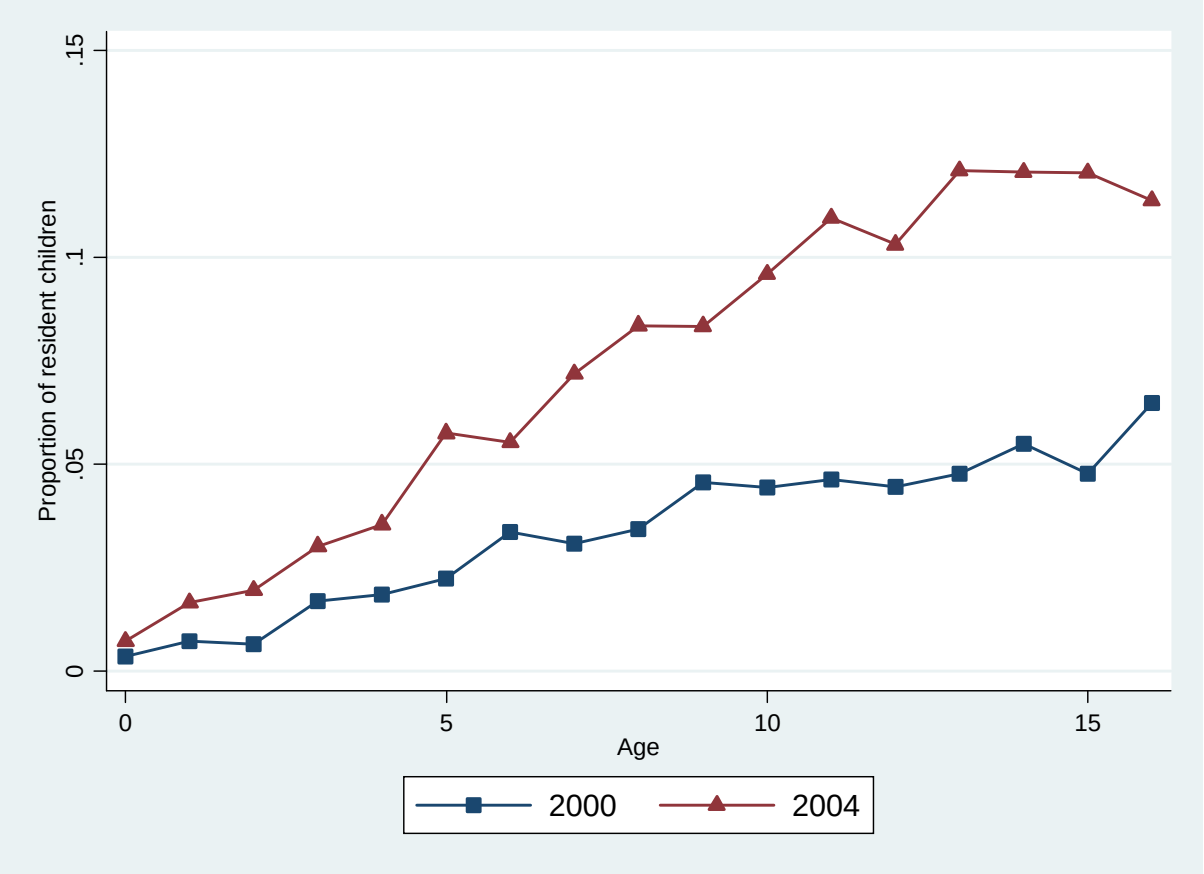


Table 4.1 presents information on the living arrangements of orphans and all other children aged 6 to 16 who were resident in the DSA at the time that data were collected for HSE2. In total, information is available for 19,978 such children. To reflect the living arrangements observed in South Africa, the Africa Centre Demographic Information System (ACDIS) distinguishes between an individual's membership in a household, and his or her residency at a homestead. An individual can be resident at only one place at one time. However, he or she may be a member of several households simultaneously. In every round of ACDIS, a

knowledgeable household member names all individuals currently recognized as 'household members.' Membership does not depend on the number of nights a person sleeps at a homestead, or how often he or she eats from the household pot. Membership is a social construct, and a household is free to name all individuals it recognizes as members. (See Hosegood and Timæus 2005 for details.) A child, for example, may be identified as a member of both his father's household, and his grandmother's household. If the child lived with his father, I would record the father as a 'household member, resident with child.' Alternatively, if the child was living with his grandmother at the time of HSE2, and not with his father, I would record the father as a 'household member, not resident with child.' If, instead, the child's father was never a household member and never resided in the DSA after surveillance began, he would be reported as 'Not followed by ACDIS.' (At the time of HSE2, 4 percent of resident children aged 6 to 16 had multiple household memberships. I assign these children the characteristics of the household in which they were resident at HSE2.)

The first three rows and columns of Table 4.1 report the number of children for whom mothers and fathers were resident members of households in which their child is resident; non-resident members of their child's households; and resident in the DSA but not claimed as members of their child's households. Children in the DSA were substantially more likely to be living with their mothers (60 percent) than with their fathers (24 percent).

Table 4.1: Parental status of resident children aged 6-16 in the DSA at HSE2

	Father's Status:						
Mother's Status:	Household member, resident with child	Household member, not resident with child	Not household member, resident in DSA	Not followed by ACDIS	Dead	Status unknown	Row totals (percentage of mothers)
Household member, resident with child	3928	3030	48	2918	1656	268	11908 (59.6)
Household member, not resident with child	173	222	23	1682	320	98	2538 (12.7)
Not household member, resident in DSA	67	75	60	224	81	30	578 (2.9)
Not followed by ACDIS	274	414	16	1016	287	79	2111 (10.6)
Dead	209	177	19	696	546	199	1859 (9.3)
Status unknown	63	67	9	173	93	110	525 (2.6)
Column totals (Percentage of fathers)	4797 (24.0)	4069 (20.4)	183 (0.9)	6875 (34.4)	3057 (15.3)	803 (4.0)	19978

Notes to Table 4.1: The sample is restricted to children aged 6 to 16 at HSE2 who are resident in the DSA at the time of HSE2. Included in the analysis below and in the column and row totals, but not shown in Table 4.1, are children whose mothers or fathers are known to be alive but whose membership and residency status are unknown, and children whose mothers or fathers are followed by ACDIS but are not household members and not resident in the DSA. In total, these categories account for a 628 children not shown.

For all but a handful of cases, ACDIS has been able to ascertain whether a child's parents are dead or alive, even for those cases where the parent is not followed by ACDIS. Table 4.1 shows that, by the time of the second socioeconomic data collection, 9 percent of children aged 6 to 16 had lost their mothers, and 15 percent had lost their fathers. Thirty-four percent of children's fathers have never lived in the DSA and have never been identified as a member of any household followed in the DSA. Between fathers who were absent or dead at the time of HSE2, more than half of all children could not claim their father as a household member. Moreover, of the 1,859 children whose mothers were dead, only 11 percent were living with their fathers, a point I will return to below when comparing results of maternal orphans and double orphans.

Among all resident children aged 6 to 16, the vital status of parents is missing for 4.1 percent of fathers, and 2.6 percent of mothers. In all regression analysis in this chapter, to avoid sample selection bias, I will include all children in the analysis, regardless of whether they are missing vital status information on a parent. I will include indicator variables that a child's parent's vital status is unknown. (No results reported below would be changed in any meaningful way if I limited our analysis to those children with complete information on parents' vital status.)

Table 4.2 provides information on child and household characteristics for all resident children in the DSA for whom vital status of mothers is known (columns 1 through 3) or that of fathers is known (columns 4 through 6). The first three columns divide children according to whether their mothers were alive at HSE2 (column 1), their mothers died after the start of surveillance (January 2000) but before HSE2, or their mothers were dead at the start of surveillance. The last three columns provide the same information for children, stratified by the vital status of their fathers.

Table 4.2: Sample characteristics for children aged 6-16 who were resident in the DSA at HSE2

	Mother Alive at HSE2	Mother Died between Jan 2000 & HSE2	Mother Died Prior to Jan 2000	Father Alive at HSE2	Father Died between Jan 2000 & HSE2	Father Died Prior to Jan 2000
Child Characteristics						
Age at HSE2	10.9	11.1*	12.1*	10.8	11.2*	11.9*
Child Schooling Outcomes						
Years of completed education	4.18	4.08	4.71*	4.12	4.24	4.83*
Enrolled at HSE2	0.96	0.93*	0.93*	0.96	0.96	0.94*
Monthly expenditure on child's schooling	64.8	43.4*	49.4+	62.8	63.3	61.7
Household Characteristics						
Number of resident members	8.11	8.11	8.15	8.13	7.85+	8.22
Indicator: child lives with a female pensioner	0.30	0.42*	0.43*	0.31	0.29	0.32
Indicator: child lives with a male pensioner	0.09	0.09	0.14*	0.10	0.06*	0.08+
Log(expenditure per member)	4.71	4.66	4.76	4.72	4.65+	4.65+
Household assets	4.74	4.66	4.76	4.77	4.61	4.49*
Number of observation	17594	1139	644	16118	1275	1648

Notes to Table 4.2: The notation in columns 2 and 3 denote that the differences between the results in these columns and those in column 1 are significant at the 5% (*) or 10% (+) level. The notation in columns 5 and 6 denote that the differences between results in these columns and those in column 4 are significant. Monthly spending on a child's schooling is conditional on enrolment. All spending is reported in Rands.

Consistent with the results presented in Figures 4.1 and 4.2, I find that children whose parents have died are significantly older on average than children whose parents are alive. In all that follows, I will control for children's ages, in order to separate the differences in outcomes that are (potentially) attributable to orphanhood from general differences between children that are due to age. Table 4.2 shows, for example, that orphans who lost a parent prior to the beginning of surveillance have completed significantly more years of education than have non-orphans. It will become clear below that this difference is attributable to the fact that orphans are older on average than non-orphans.

Data collected by the Africa Centre allow one to focus on three education variables: highest grade of education completed, school enrolment and school-related expenses reported for each child. Children in South Africa begin school at age 6. If all children were enrolled at age

6, and all advanced one grade every year, I would expect to find the average grade of completed schooling to be five years for this sample of children (whose ages are distributed roughly uniformly from 6 to 16). Instead I find on average that children have completed just over four years of schooling. This is consistent with the national datasets used in the previous chapter in which I find African children gaining only between 0.7 and 0.8 of a grade for each year of age (see Appendix Table A3.5). This is due in part to children not being enrolled in school, and in part to grade repetition. Enrolment rates are high in South Africa, but are significantly lower for children who have lost their mothers (93 percent) than for other children (96 percent).

Sending a child to school generally entails expenses for fees, books and a school uniform. For a smaller fraction of children, families also pay for transport and a school-related allowance. The household socioeconomic module asks a knowledgeable household member to report each of these expenditures (fees, books, uniforms, transport, school allowance) separately, using whatever reporting period is most natural (annual, monthly or weekly). I have translated these to a monthly figure for each scholar. Conditional on school enrolment, school-related expenses (including zeros) on average amount to 30 percent of mean spending per person in the child's household. Table 4.2 shows that significantly less is spent on children's schooling when their mothers are dead. This is true whether a mother died recently, or before surveillance began. In contrast, I find no significant difference in school-related spending when a child's father is dead.

The household socioeconomic survey provides information on variables that may affect children's education, including the household's prosperity -- here represented by total spending per household member and the number of assets owned by the household. As Table 4.2 makes clear, there is no significant difference in socioeconomic status between children whose mothers are alive and those whose mothers have died, measured using either household expenditure per person or household asset ownership. In contrast, children whose fathers are dead live in

households with significantly lower expenditure per resident member, which is true whether the fathers died recently or before surveillance began. Children who have lost a father also live in households with fewer assets, with the difference in asset ownership significant for children whose fathers were dead when surveillance began.

Children in the DSA live in households containing slightly more than eight resident members, on average. While household size is not significantly different for children who have lost a parent, household composition is. Specifically, children whose mothers have died are 12 percentage points more likely to live with a woman receiving an old age pension than are children whose mothers were alive at HSE2. Recent research has suggested that the presence of women pensioners has positive externalities for grandchildren in South Africa (Duflo 2003). In what follows, I will investigate the extent to which co-residence with pensioners is associated with children's schooling outcomes.

The economic well being of children in the DSA is highly correlated with their fathers' vital status. I investigate this in results presented in Table 4.3, where each row presents results from two regressions, both of which pertain to the same measure of economic status (log expenditure per member in row 1, total assets owned in row 2, and ownership of various assets individually in subsequent rows). The left two columns report estimates from ordinary least squares (OLS) regressions of household expenditure or asset ownership at HSE2 on indicators that mother and father are dead at HSE2. If vital status is missing for a parent, the relevant vital status indicator is assigned a value of zero, and an additional indicator variable is included to denote that parent's vital status is missing. Estimates in columns 3 and 4 are from first-difference regressions of change in asset ownership on change in parent's vital status between HSE1 and HSE2. Specifically, I include indicator variables that a child's mother (father) died between the rounds of the household socioeconomic survey. Again, when change in parent's vital status is missing, it is assigned a value of zero, and an indicator is included to denote that the change in

status has been assigned. Robust standard errors are presented, where correlation has been allowed between unobservables for children who live in the same household. Estimates marked with an asterisk (*) are significant at the 5 percent level, and those marked with a plus sign (+) are significant at the 10 percent level.

Both log expenditure per member and total assets owned are negatively and significantly associated with fathers' deaths. Children whose fathers are dead at HSE2 are living in households where spending per person is 8 percent lower on average, and in households owning 0.29 fewer assets on average. I find no significant association between assets owned or household expenditures and mothers' deaths. These results echo those in Table 3.2 of the previous chapter and those of Case *et al.* (2004) who find, using 19 Demographic and Health Surveys from sub-Saharan Africa, that on average paternal orphans are living in significantly poorer households, while maternal orphans are not.

Without additional information, I would not be able to tell whether households in which prime aged males (here, fathers) have died are poorer because the households lost important contributors to household economic wellbeing, or whether the correlation exists because household poverty contributed to the men's deaths or is correlated with something that did. I can address this question using data available through the Africa Centre, in which I have measures of household asset holdings at two points in time. The ability to follow changes in asset holdings is an important contribution of these data. Demographic and Health Surveys rely on asset holding as their measure of socioeconomic status but, because these are cross-sectional surveys, they do not allow researchers to look at changes in assets for a given household over time. The national surveys used in the previous chapter have a richer set of measures of socioeconomic status than the Demographic and Health Surveys, but they too are cross-sectional surveys and do not allow an analysis of changes in socioeconomic status over time.

Table 4.3: Asset ownership and parental death: cross sectional and panel estimates

	Dependent variable: Household owned this asset at HSE2		Dependent variable: Change in household ownership of this asset between HSE1 and HSE2		Number of obs for regressions in the row
	Indicator: Mother was dead at HSE2	Indicator: Father was dead at HSE2	Indicator: Mother died between HSE1 and HSE2	Indicator: Father died between HSE1 and HSE2	
Log(expenditure per resident household member)	0.010 (0.034)	–0.083* (0.032)	n.a.	n.a.	15892
Total assets owned	–0.079 (0.103)	–0.293* (0.082)	0.081 (0.121)	–0.162 (0.121)	16089
Block maker	–0.011 (0.013)	–0.019+ (0.011)	0.016 (0.023)	0.001 (0.022)	16568
Car	0.003 (0.013)	–0.060* (0.010)	0.039* (0.018)	–0.023 (0.019)	16572
Electric cooker	0.025+ (0.015)	–0.010 (0.012)	0.033+ (0.019)	–0.015 (0.020)	16569
Refrigerator	0.000 (0.019)	–0.013 (0.016)	–0.014 (0.023)	0.049+ (0.028)	16556
Gas cooker	–0.048* (0.018)	–0.014 (0.016)	–0.023 (0.030)	–0.003 (0.033)	16565
Kombi/Lorry/ Tractor	–0.014* (0.006)	–0.004 (0.007)	0.017 (0.011)	–0.011 (0.014)	16575
Radio	–0.008 (0.017)	–0.019 (0.014)	–0.009 (0.030)	0.003 (0.033)	16575
Sewing machine	–0.026+ (0.013)	–0.015 (0.011)	0.007 (0.021)	0.021 (0.024)	16559
Land line telephone	–0.006 (0.009)	–0.031* (0.007)	0.019 (0.016)	–0.027 (0.021)	16568
Cell phone	–0.015 (0.019)	–0.042* (0.016)	–0.016 (0.032)	–0.084* (0.034)	16564
Television	–0.019 (0.018)	–0.044* (0.015)	–0.002 (0.025)	–0.065* (0.026)	16569
VCR	0.003 (0.010)	–0.017* (0.008)	0.023 (0.016)	0.005 (0.013)	16567

Notes to Table 4.3: Each row presents results from two regressions. The left two columns report estimates from ordinary least squares (OLS) regressions of household expenditure or asset ownership at HSE2 on indicators that mother and father are dead at HSE2. If vital status is missing for a parent, the relevant vital status indicator is assigned a value of zero, and an additional indicator variable is included to denote that parent's vital status is missing. Estimates in columns 3 and 4 are from first-difference regressions of change in asset ownership on change in parent's vital status. Again, if change in parent's vital status is missing it is assigned a value of zero, and an indicator is included to denote that the change in status has been assigned. Results for ownership of an electric hot plate, an electric kettle and household furnishings are not shown in Table 4.3, but are similar to those for ownership of an electric cooker. Observations for the log expenditure equation (row 1) are restricted to individuals who have asset information at HSE1 and HSE2, in order to make results comparable with the asset results in later rows. Expenditure per member was not collected at HSE1, and first difference estimates for expenditure are not available. Robust standard errors are presented, where correlation has been allowed between unobservables for children who live in the same household. Estimates marked with one asterisk (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Household expenditure reported at HSE2 is highly correlated with ownership of the assets presented in Table 4.3. A household-level regression of log total expenditure per member on these 12 assets plus electric hot plates, kettles and household furnishings reveals large and highly significant positive coefficients for cars; electric cookers, hot plates and kettles; household furnishings; refrigerators; gas cookers; radios; land-line and cell phones; televisions and VCRSs. Together, the 15 assets yield an R-squared of 0.21 in the log expenditure regression.

The strong correlation between household asset ownership and household expenditure per member suggests that assets and expenditure provide similar information on household economic wellbeing. Columns 3 and 4 of Table 4.3 present results on change in asset ownership between HSE1 and HSE2, given change in parents' vital status between the survey rounds. (Household expenditure was not collected at HSE1, and for that reason I cannot look at change in expenditure over this period.) In the cross-section, fathers' deaths are negatively and significantly associated with total assets owned, and with the ownership of several household goods, including cars – ownership of which is 6 percent less likely for children whose fathers have died – blockmakers (2 percent), land-line telephones (3 percent), cell phones (4 percent), televisions (4 percent), and VCRs (2 percent). However, when I examine change in asset ownership, I find no significant association between a father's death between survey rounds and change in total assets owned, or the ownership of cars, blockmakers, land-line telephones or VCRs.

In summary, I find that children whose fathers have died are living in poorer households, which is not true of children whose mothers have died. However, using first-difference analyses, I find no evidence that a parent's death causes households to become poorer: death of either parent between rounds of the survey is not associated with lower asset holding when observed at HSE2. It is possible that these first-difference estimates understate the change in assets in response to parental death if assets were drawn down before the death, during illness.

In the following sections, as I examine the extent to which the loss of a parent lowers educational investment and attainment, I will control for household socioeconomic status, in order not to attribute to parents' deaths poorer outcomes that are due to lower household economic wellbeing. This issue never arises when examining mothers' deaths: I find no significant negative relationship between expenditure per member, or total asset ownership, or change in total assets owned and mothers' deaths. However, when analyzing fathers' deaths, it will be important to include socioeconomic status (SES) measures, to separate children's schooling outcomes that can be attributed to socioeconomic status from those that can be attributed to orphanhood.

4.3 Parents' vital status and children's educational outcomes

Table 4.4 presents a first look at the relationship between parents' vital status and children's educational outcomes. Each column of the table reports results from a separate regression of the form shown in equation 3.1, with robust standard errors presented in parentheses. Included in all regressions are a complete set of age indicators, an indicator that the child is female, and indicators that mother's vital status, father's vital status or that of both parents is missing. Indicators for a child's month of birth, and interactions between month of birth and survey round, and interactions between a child's age and survey round are also included in all regressions, to control for differences in the time of year a household was interviewed. Household characteristics that may affect educational investments and attainment are included in the second column for each outcome. These include the log of total expenditure per resident member, total number of assets owned at HSE2, the log of the number of resident members, the fraction of resident members under age 14, and indicators that the household has at least one female pensioner (age 60 and above), and at least one male pensioner (age 65 and above).

Table 4.4 shows that paternal orphans are disadvantaged in school attainment and school-related expenditures, but that this disadvantage is accounted for by their household

socioeconomic status, discussed in Section 4.2. Once I control for total expenditure per member and household assets, I find no significant association between fathers' deaths and children's schooling outcomes. Results on asset ownership in Table 4.3 showed that households in which fathers died were poorer prior to the men's deaths. Those results, together with estimates presented in Table 4.4, suggest that fathers' deaths are associated with worse schooling outcomes because the event of a father's death is a marker that the household is poor.

Table 4.4: Parents' vital status and educational outcomes for children aged 6-16 who were resident in the DSA at HSE2

	Dependent variable:					
	Years of completed education		Indicator: child is currently enrolled		Log(monthly educational expenses)	
Maternal orphan: mother is dead, father is alive	–0.258*	–0.241*	–0.019*	–0.017*	–0.191*	–0.117*
	(0.056)	(0.055)	(0.008)	(0.008)	(0.048)	(0.041)
Paternal orphan: father is dead, mother is alive	–0.074+	–0.043	–0.007	–0.005	–0.076*	–0.002
	(0.040)	(0.039)	(0.005)	(0.005)	(0.038)	(0.030)
Double orphan: both parents are dead	–0.267*	–0.282*	–0.026+	–0.027+	–0.189*	–0.221*
	(0.079)	(0.078)	(0.012)	(0.012)	(0.066)	(0.060)
F-test: maternal orphan= double orphan (p-value)	0.01	0.19	0.34	0.60	0.00	2.31
	(0.9181)	(0.6600)	(0.5601)	(0.4389)	(0.9753)	(0.1285)
F-test: paternal orphan= double orphan (p-value)	4.98	7.94	2.42	3.16	2.38	11.50
	(0.0256)	(0.0049)	(0.1197)	(0.0754)	(0.1232)	(0.0007)
Controls for household characteristics?	No	Yes	No	Yes	No	Yes
Number of observations	18568	18568	18670	18670	17431	17431

Notes to Table 4.4: Ordinary least square regression coefficients are presented. Standard errors that allow for correlation between unobservables from the same household are presented in parentheses. The sample includes all resident children for whom household socioeconomic information is available at HSE2. A complete set of age indicators, an indicator that the child is female, and indicators that mother's vital status, father's vital status and the vital status of both parents are missing are included in all regressions. Indicators for a child's month of birth, and interactions between month of birth and survey round, and interactions between a child's age and survey round are also included in all regressions, to control for differences in the time of year a household was interviewed. Household characteristics included in columns 2, 4, and 6 are the log of total expenditure per resident member, total number of assets owned by this household (assets presented in Table 3 plus ownership of an electric kettle, hot plate, and household furnishings), the log of the number of resident members, the fraction of resident members under the age of 14, and indicators for the presence of at least one female pensioner (aged 60 or above) and at least one male pensioner (aged 65 or above) in the household. Estimates marked with one asterisk (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table 4.4, in contrast, shows a large and significant association between schooling outcomes and mothers' deaths. Maternal and double orphans are at significant disadvantage with respect to their schooling, with or without controls for household characteristics. Specifically, children who have lost mothers have fallen, on average, a quarter of a year behind other children in years of education completed. They are 2 percentage points less likely to be enrolled in school, and have 15 to 20 percent less spent on their education-related expenses, relative to other

children. Unlike the results for fathers, I find no evidence that the poorer educational results of children whose mothers have died are attributable to their economic status.

For each regression I test whether the associations between schooling outcomes and the loss of one's mother when one's father is known to be alive (maternal orphans), and those between schooling outcomes and the loss of one's father when one's mother is known to be alive (paternal orphans), are significantly different from those found when both parents have died (double orphans). While losing one's mother is significantly related to all three outcomes – attainment, enrolment, and school-related expenditures – I find no significant difference between losing one's mother alone, and losing both parents. In contrast, controlling for household socioeconomic status, double orphans fare significantly worse than paternal orphans with respect to years of schooling completed, school enrolment, and monthly expenditure on schooling.

As can be calculated from the numbers presented in Table 4.1, 54 percent of children whose fathers have died live with their mothers, but only 11 percent of children whose mothers have died are living with their fathers, rendering children whose mother has died virtual double orphans. This is a lower paternal presence rate than is reported for South Africa as a whole (see Table 3.1) or in other parts of Southern Africa that rely heavily on migrant work (see Case *et al.* 2004).

Sixty-four percent of children in the DSA who have lost their mothers live with children of school-going age whose mothers are alive, and a similarly large percentage (50 percent) of children who have lost fathers live with children who have not. Table 4.5 compares educational outcomes for orphans and non-orphans living in the same household. The latter provide a natural comparison group for many reasons: the number of adults present, the wealth of the household, the distance to town, and (often) the distance to school and school fees, will be identical for these children.

The top panel of Table 4.5 presents results in which schooling outcomes are regressed on indicators that the child's mother is dead, and the child's father is dead, controlling for age, sex, timing of the survey, and missing vital status information for parents, as discussed above. The first column for each outcome presents results from OLS regressions that include household-level socioeconomic variables. These results are indistinguishable from those in Table 4.4: when mothers are dead, children are 0.24 years behind in school on average; they are 2 percentage points less likely to be enrolled; and they have almost 15 percent less spent on their schooling.

To compare orphan's outcomes with those of children with whom they live, I add to these regressions indicators for each household, and present these fixed effect results in the second column of the upper panel. Identification of the coefficients on mothers being dead, in these fixed effect estimates, comes solely from comparing children whose mothers have died with children in the same household whose mothers are alive, with similar identification for the coefficient on fathers being dead. Relative to the non-orphans with whom they live, children whose mothers have died are on average 0.12 years behind in their schooling, and have 7 percent less spent on their education. Coefficients from the OLS and fixed effect specifications for fathers are small and, with the exception of years of completed schooling in the OLS specification, are insignificantly different from zero.

For maternal deaths, the fixed effect point estimates for all three educational outcomes are substantially lower than are the OLS estimates in the first column for each outcome. This may be true for at least two reasons. Living in blended families (that is, with children's whose mothers are alive) may protect orphans' schooling. Alternatively, non-orphaned children living with orphans may themselves be educationally disadvantaged.

Table 4.5: Educational outcomes of orphans relative to non-orphans with whom they live: Children aged 6-16 who were resident in the DSA at HSE2

	Dependent variable:					
	Years of completed education		Indicator: child is currently enrolled		Log(monthly educational expenses)	
	PANEL A: OLS and fixed effect regressions					
Indicator: Mother is dead	–0.236* (0.046)	–0.120* (0.053)	–0.015* (0.006)	–0.009 (0.008)	–0.142* (0.034)	–0.073* (0.031)
Indicator: Father is dead	–0.060+ (0.035)	–0.046 (0.047)	–0.007 (0.005)	0.001 (0.007)	–0.023 (0.028)	–0.038 (0.028)
Household characteristics included?	Yes	No	Yes	No	Yes	No
Household fixed effects included?	No	Yes	No	Yes	No	Yes
	PANEL B: OLS regressions					
Mother is dead, child lives with at least one child whose mother is alive (blended household)	–0.202* (0.055)		–0.013 (0.008)		–0.185* (0.045)	
Mother is dead, child lives only with other children whose mothers are dead (non-blended household)	–0.289* (0.082)		–0.018+ (0.010)		–0.090 (0.057)	
Mother is alive, child lives in blended household	–0.053 (0.045)		–0.001 (0.006)		–0.075+ (0.043)	
F-test: Mother is dead, blended= Mother is dead, non- blended (*p*-value)	0.81 (.3695)		0.20 (.6525)		1.89 (.1693)	
F-test: Mother is dead, blended= Mother is not dead, blended (*p*-value)	6.06 (0.0139)		1.69 (.1942)		7.60 (.0059)	
Controls for household characteristics?	Yes		Yes		Yes	
Number of observations	18568	18568	18670	18670	17431	17431

Notes to Table 4.5: Ordinary least square regression coefficients are presented are presented in rows 1, 3 and 5. Household-level fixed effect estimates are presented in columns 2, 4 and 6. Standard errors are presented in parentheses. Those for OLS regressions allow for correlation between unobservables from the same households. (Estimated variance-covariance matrixes for the fixed effect estimates were not positive definite when robust standard errors were estimated with clustering at the household-level.) The sample includes all resident children for whom household socioeconomic information is available at HSE2. A complete set of age indicators, an indicator that the child is female, and indicators that mother's vital status, father's vital status and the vital status of both parents are missing are included in all regressions. Indicators for a child's month of birth, and interactions between month of birth and survey round, and interactions between a child's age and survey round are also included in all regressions, to control for differences in the time of year a household was interviewed. Household characteristics included in columns 1, 3, and 5 are the log of total expenditure per resident member, total number of assets owned by this household (assets presented in Table 4.3 plus ownership of an electric kettle, hot plate, and household furnishings), the log of the number of resident members, the fraction of resident members under the age of 14, and indicators for the presence of at least one female pensioner (aged 60 or above) and at least one male pensioner (aged 65 or above) in the household. Estimates marked with one asterisk (*) are significant at the 5 percent level, and those marked with a plus sign (+) are significant at a ten percent level.

I examine this systematically in the lower panel of Table 4.5, where I present results from OLS regressions in which I include a set of indicators: that a child has lost their mother and is living in a 'blended' household (that is, with children whose mothers are alive); that a child has lost their mother and is not living with children whose mothers are alive; and that a child has not lost his or her mother, but is living with at least one child who has. The omitted (benchmark) category is children whose mothers are alive who are not living with children whose mothers have died. In these regressions, I include a complete set of age, sex, timing of survey, fathers' vital status, missing parental vital status indicators and household characteristics. I find, for years of completed schooling, and children's enrolment, that orphans who are not living in blended households fare worse than those who are. The educational shortfall for orphans in non-blended households is 50 percent larger than that for orphans in blended households, measured in terms of grades completed and school enrolment, although the differences in outcomes between orphans in blended and non-blended households are not statistically significant. At the same time, with respect to school spending, I find that non-orphaned children living with children whose mothers have died are significantly disadvantaged in terms of school spending. On average, almost 8 percent less is spent on their schooling than on the schooling of non-orphans living in non-blended households, suggesting that the burden of kin dying and caring for orphans may affect outcomes for other household members.

In summary, I find children whose mothers have died are behind in school, relative both to children in the DSA at large, and to non-orphans with whom they live. They are less likely to be enrolled than other children in the DSA, and spending on their school related expenses is significantly lower.

The next section will focus on whether mothers' deaths cause children to fall behind in school. In all regression analysis that follows, I include indicators that fathers are dead, and that father's vital status is not known. With the exception of tests for causality, I generally will not

highlight fathers' results, because the relationship between fathers' deaths and children's education outcomes tend to be small and insignificant.

4.4 Estimating the causal effects of mothers' deaths

Many explanations exist for the schooling deficit observed for children whose mothers have died. Some of these suggest that mothers' deaths have a causal effect on children's education. Orphans may have fallen behind in school because they were caring for their mothers and their families after their mothers fell ill. Children may have been scarred by the death of their mothers, causing them to be less "school ready" than they had been previously. A non-competing explanation is that mothers are the gatekeepers for their children's education and, when mothers are gone, no other care-giver is as vigilant in ensuring that children get to school or that money for school fees and uniforms is found.

Other explanations suggest the correlation I find between mothers' deaths and children's schooling is spurious. There may be any number of omitted family characteristics that make a child less likely to go to school and his or her mother more likely to die. Mothers' deaths may simply be a signal that children themselves are ill.[18] Children whose mothers die may be those who would have found it difficult to learn under any circumstances. Such children may have always been less prepared for school, and may have lagged behind in school, even if their mothers did not die.

I can rule out some of these hypotheses by looking at school enrolment and attainment of children who were not orphans when the first socioeconomic data were collected in 2001, but who subsequently lost a mother before the second round of data were collected in 2003/4. Results for this analysis are presented in Table 4.6, where I regress completed education at HSE1

[18]I find no evidence that maternal orphans fall behind because they themselves are ill with HIV or AIDS. For very young children (ages 0 to 4), mothers' deaths predict children's deaths from AIDS. However, by the time children reach school-going age (6 and above), deaths from AIDS are rare. Less that 0.2% of all children resident on January 1, 2001 died in that year (26 children), and less than a third of those died of AIDS (8 children). Of the 1,527 school-aged children whose mothers were dead on January 1, 2001, three died that year from AIDS.

on an indicator that mother is dead at HSE1, and an indicator that mother will be dead before data are collected at HSE2. These regressions include controls for the child's age, sex, and household socioeconomic status. Similar to the results above, I find that mother's death before HSE1 is associated with 0.23 fewer years of completed education. However, mother's *future* death has no significant effect on a child's schooling at HSE1. I find no evidence that a mother's death is simply a signal that a child has always been less prepared for school, or was living in a worse environment for education and would have lagged behind in school, even if his or her mother did not die. If this were the explanation, I would expect mother's future death would predict the child lagging in school when school data were first recorded at HSE1.

Table 4.6: The causal effect of parental death on educational attainment

	Dependent variable: Years of completed education at HSE1	
Indicator: Mother was dead at HSE1	–0.234*	–0.166+
	(0.063)	(0.091)
Indicator: Mother was dead at HSE2		–0.074
		(0.069)
Indicator: Father was dead at HSE1	–0.037	–0.044
	(0.041)	(0.075)
Indicator: Father was dead at HSE2		0.007
		(0.067)
Number of observations	17074	17074

Notes to Table 4.6: Standard errors are presented in parentheses. These allow for correlation between unobservables for children in the same household at HSE1. The sample includes all children aged 6 to 16 at HSE1 who were resident in the DSA, for whom information on educational attainment as of HSE1 was collected. All regressions include indicators for age and sex, indicators for month of birth and for the timing of the surveys, and asset holdings at HSE1. Estimates marked with one asterisk (*) are significant at the 5 percent level, and those marked with a plus sign (+) are significant at a ten percent level

Further evidence on the causal link between mothers' deaths and children's outcomes is provided in Table 4.7. The longitudinal nature of the ACDIS data allow for the addition of a time subscript, t, to equation 3.1 and the unobservable component can now be written

$$\varepsilon_{iht} = \alpha_{iht} + u_{iht}, \tag{4.1}$$

where α_{iht} is an individual-specific fixed effect. This effect will absorb all time invariant individual (and therefore household) level unobservable or unmeasured characteristics. The fixed effects models are estimated from ordinary least squares regressions of changes in schooling

outcomes on changes in parents' vital status and changes in characteristics that may vary between the two waves:

$$Y_{iht} - Y_{ih,t-1} = \beta_m (M_{iht} - M_{ih,t-1}) + \beta_F (F_{iht} - F_{ih,t-1}) + \gamma (X_{iht} - X_{ih,t-1}) + \varphi (W_{ht} - W_{h,t-1}) + (u_{iht} - u_{ih,t-1}). \quad (4.2)$$

Differencing removes α_{iht}, and elements of X and W that are constant across time from the equation.[19]

Table 4.7: The causal effect of parental death on educational attainment and school enrolment

	Dependent variable:			
	Change in years of completed education HSE2 -HSE1		Change in enrolment between HSE1 and HSE2 conditional on enrolment at HSE1	
	All Children observed at HSE1 & HSE2	Mother is alive or had died before Jan 2000	All Children observed at HSE1 & HSE2	Mother is alive or had died before Jan 2000
Indicator: Mother died between HSE1 & HSE2	–0.056+		–0.017*	
	(0.034)		(0.009)	
Indicator: Father died between HSE1 & HSE2	–0.027		–0.003	
	(0.034)		(0.008)	
Indicator: Mother died before January 1, 2000		–0.138*		–0.032*
		(0.034)		(0.009)
Number of observations	17951	16327	17223	15693

Notes to Table 4.7: Standard errors are presented in parentheses, with correlation between unobservables from the same households. The sample in column 1 includes all children resident at HSE1 and HSE2, aged 6 to 16 at HSE1, with valid educational attainment data for both HSE1 and HSE2. The sample in column 2 is restricted to the sub-sample of children in column 1 whose mothers were either alive at HSE2 or had died before January 1, 2000. Results in columns 3 and 4 are from probit regressions. Reported are changes in the probability of staying in school between HSE1 and HSE2, given the death of each parent between HSE1 and HSE2. The sample includes all children ages 6 to 16 at HSE1 who were enrolled in school at HSE1. The sample in column 4 is restricted to the sub-sample of children in column 3 whose mothers were either alive at HSE2 or had died before January 1, 2000. All regressions include a complete set of indicators for the child's age, and the change in the child's age and the change in household asset holdings between HSE1 and HSE2, and indicators for month of birth and for the timing of the surveys. Estimates marked with one asterisk (*) are significant at the 5%t level, and those marked with a plus sign (+) are significant at the 10% level.

In Table 4.7 I examine the impact of parental death dying between the survey rounds on the change observed in years of completed schooling (columns 1 and 2), and on the change observed in children's enrolment between the survey rounds (columns 3 and 4). Because I am interested in the change in schooling outcomes between HSE1 and HSE2, I restrict the sample to children who were old enough to be enrolled in school at HSE1. In particular, I restrict attention to children aged 6 to 16 at HSE1 (although the results are robust to other age cut-offs.)

Results in column 1 of Table 4.7 show that children whose mothers died between rounds of the survey had significantly lower increases in their educational attainment over this period

[19] See Deaton (1997:106-108) for a discussion on difference- estimation techniques with panel data.

than did other children of the same age. Results in column 1 also make clear that the change in educational attainment for children whose fathers died between the rounds is not significantly different from that of other children of the same age.

Although children whose mothers have died in the recent past may fall behind in school, it is possible that this phenomenon is short-lived, and that these orphans' educational outcomes improve with time. To test this, I took the sub-sample of children in column 1 whose mothers were either alive at HSE2, or whose mothers had died prior to January 2000, and compared changes in school attainment between HSE1 and HSE2. The change in attainment is measured starting at a point when the orphans' mothers had been dead for at least one year and, in many cases, for substantially longer. Column 2 shows that the change in these children's educational attainment between HSE1 and HSE2 is significantly lower than that of children whose mothers were alive at HSE2. These children are not showing signs of either 'bouncing back' from their loss, or of being moved into circumstances where their schooling is protected.

The second set of columns in Table 4.7 examines school enrolment. Analyzing changes in enrolment in these data is more difficult than analyzing changes in attainment, because of the way school enrolment questions were asked in HSE1. In the first socioeconomic survey, the household respondent was first asked how many grades of education a child had completed. If the answer was "none," then questions on enrolment were skipped. The data show that enrolment information is missing for half of all 6 year olds, and almost a quarter of all 7 year olds, many of whom may have been enrolled at HSE1 but may not yet have completed any years of schooling. For this reason, I focus my attention only on those children who were reported to be enrolled at HSE1 (for whom measurement error in enrolment at HSE1 will be lower), and analyse which of these children continued to be enrolled when they were observed at HSE2. This may be a select sample of children – those whose families care more about education, for example. If this is the case, it may bias one against finding any effect of becoming an orphan on being enrolled in school. I find instead, among children enrolled at HSE1, that children whose

mothers died between survey rounds were significantly less likely to be enrolled at HSE2 than were other children their age. I find no similar effect for children whose fathers had died. In addition, children whose mothers have been dead for some time (for example those whose mothers were dead when surveillance began), were 3 percentage points less likely to stay enrolled than were children their age whose mothers were alive at HSE2. I find no evidence that children's schooling recovers with length of time since orphanhood.

With these data, I cannot rule out that children's enrolment and attainment suffer because of the scarring caused by mother's death. Children may have been on track in school until their mothers died, and the trauma of mothers' deaths may have made the children less 'school ready'. However, I take the evidence in Tables 4.6 and 4.7 to rule out explanations based on innate child 'quality'. Regardless of whether I find the mechanism at work is scarring, or is instead the loss of mother as gatekeeper, my results are consistent with mother's death having a causal effect on children's schooling outcomes.

4.5 Interaction effects

Sections 4.3 and 4.4 made clear that, when mothers die, children fall behind in school and have fewer resources devoted to their schooling. To better understand the risks these children face, I examine whether outcomes for orphans vary according to their characteristics and those of the households in which they reside.

Table 4.8: Interaction effects: Children aged 6-16 who were resident in the DSA at HSE2

	Dependent variable:								
	Years of completed education			Indicator: child is currently enrolled			Log(monthly educational expenses)		
Indicator: Mother is dead at HSE2	–0.154*	–0.244*	–0.330*	–0.016*	–0.017*	–0.027*	–0.124*	–0.147*	–0.159*
	(0.055)	(0.062)	(0.061)	(0.008)	(0.009)	(0.009)	(0.042)	(0.044)	(0.046)
Indicator: Mother is dead on January 1, 2000	–0.224*			–0.001			–0.033		
	(0.922)			(0.013)			(0.067)		
Interaction: Mother is dead × orphan is female		0.015			0.004			0.011	
		(0.079)			(0.012)			(0.056)	
Interaction: Mother is dead × female pensioner household			0.289*			0.033*			0.058
			(0.091)			(0.013)			(0.067)
Interaction: Mother is dead × male pensioner household			–0.235+			–0.015			–0.067
			(0.137)			(0.019)			(0.112)
F-test: Mother coefficients (*p*-value)	14.89	13.50	12.63	3.08	2.86	3.72	7.79	8.73	5.98
	(.0000)	(.0000)	(.0000)	(.0459)	(.0571)	(.0109)	(.0004)	(.0002)	(.0005)
Number of observations	18432	18568	18568	18533	18670	18670	17303	17431	17431

Notes to Table 4.8: Ordinary least square regression coefficients are presented. Standard errors that allow for correlation between unobservables from the same household are presented in parentheses. The sample includes all resident children for whom household socioeconomic information is available at HSE2. A complete set of age indicators, an indicator that the child is female, and indicators that mother's vital status, father's vital status and the vital status of both parents are missing are included in all regressions. Indicators for a child's month of birth, and interactions between month of birth and survey round, and interactions between a child's age and survey round are also included in all regressions, to control for differences in the time of year a household was interviewed. Household characteristics described in Table 4.4 are included in all regressions. Estimates marked with one asterisk (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table 4.8 examines whether educational outcomes depend on how long a child's mother has been dead. I add to my analysis, which already includes an indicator that mother is dead at HSE2, an indicator that a child's mother died before January 1, 2000. The coefficients for these two indicators of death track differences in outcomes based on the time since mother's death. I find that mothers' deaths appear to have a cumulative effect on years of completed education. For children whose mothers have been dead since 2000, the cumulative effect of her death is the sum of the coefficient on the indicator that mother was dead in 2000 (–0.224) and the coefficient on the indicator that mother was dead at HSE2 (–0.154), for a total education deficit of –0.378 (since she is still dead at HSE2). In sum, children whose mothers died prior to 2000 have fallen significantly farther behind in school relative to children whose mothers died between 2000 and the HSE2 survey.

In contrast, although an indicator that mother is dead affects enrolment and spending on schooling, an indicator that the child's mother has been dead since 2000 has no significant effect on enrolment or spending. These results suggest that the length of time a child has been an orphan has different effects on a child's educational 'stock' (years of completed education) and educational 'flow' (enrolment and current spending on children's schooling). These findings are consistent with a model in which, over time, the reduced probability of being enrolled cumulates as an ever larger deficit in educational attainment.

In spite of warnings from researchers and some international agencies I found no evidence in the nationally representative datasets employed in the previous chapter that female orphans are especially disadvantaged. I also examine this phenomenon in Table 4.8 by including an interaction term between the indicator of mother's death and the indicator that the child is female. These interaction terms are small and insignificantly different from zero for enrolment, attainment, and school spending providing no evidence that female orphans are at particular risk.

The last column for each outcome in Table 4.8 examines whether proximity to a pensioner protects the schooling of orphans. I include separate interaction terms for orphans living with at least one woman of pensionable age, and at least one man of pensionable age. (Main effects of living with female and male pensioners are included in all regressions. Their coefficients are not shown in Table 4.8.) I find that living with a female pensioner offsets the negative effect of being an orphan, with respect to both educational attainment and school enrolment, but has no effect on school spending for orphans. Living with a male pensioner is not associated with better schooling outcomes. Indeed the association between living with a male pensioner and educational attainment is negative and significant, and the signs for enrolment and expenditures are negative as well. More work on this important topic is needed: with the longitudinal data available through the Africa Centre it should be possible to more fully understand the dynamics of living arrangements and children's schooling. However, this is beyond the scope of this thesis.

Orphans may lag behind in educational attainment because they are sent to schools of lesser quality with lower fees. Case and Deaton (1999) show a strong association in South Africa between school quality and children's progression through school. To investigate whether orphans' relative disadvantage is primarily driven by school choice, I examine how orphans fare relative to other children in the same school. In results estimated but not shown, I added school fixed effects to my analysis. In this way, the impact of being an orphan is identified by comparing outcomes for orphans relative to other children of the same age in the same school. Children whose mothers have died fall behind in school, in part, because they are less likely to be enrolled. However, of orphans who are enrolled in school, I find school choice explains some of the deficit in their schooling: the gap in educational attainment falls from −0.27 to −0.19 years, and the estimated shortfall in school spending falls from 15 to 12 percent. The differences

between children who have lost their mother and other children continue to be significant; even relative to other children in the same school, orphans are disadvantaged.

The results in this chapter illustrate the impact of parental loss on education for those children living in one demographic surveillance site in northern KwaZulu-Natal. To estimate the extent to which these results might generalize, I re-examine the results for the 10% sample of the 2001 Census from the previous chapter. For ease of comparison, results analogous to those presented in Figures 3.4 and 3.5 but with specifications closer to the regressions in this chapter and for African children aged 6 to 16 are presented in Table 4.9 for South Africa as a whole and the KwaZulu-Natal province.

Table 4.9: Parental death and children's schooling: South Africa and KwaZulu-Natal, African children aged 6-16 in the 2001 Census

	Dependent variable: Years of completed education				Dependent variable: Child is currently attending school			
	All South Africa		KwaZulu-Natal		All South Africa		KwaZulu-Natal	
Indicator: Mother is dead	-0.193	-0.2	-0.17	-0.238	-0.027	-0.025	-0.03	-0.025
	(0.012)*	(0.017)*	(0.023)*	(0.031)*	(0.002)*	(0.003)*	(0.004)*	(0.005)*
Indicator: Father is dead	-0.04	-0.053	-0.055	-0.064	-0.008	-0.014	-0.011	-0.012
	(0.007)*	(0.013)*	(0.014)*	(0.023)*	(0.001)*	(0.002)*	(0.002)*	(0.004)*
Controls for Household Fixed Effects?	No	Yes	No	Yes	No	Yes	No	Yes
Number of Observations	550665	550665	124309	124309	606167	606167	135972	135972

Notes to Table 4.9: Ordinary least square regression coefficients are presented. Standard errors that allow for correlation between unobservables from the same household are presented in parentheses. The sample is restricted to children from whom mother's and father's vital status is known. Included in all regressions is a complete set of indicators for child's age and sex. Household characteristics included are the log of the number of resident members, the number of assets owned by the household, indicators for whether the household has access to any toilet facilities and to piped water, and indicators for 12 household income categories and nine provinces. Estimates marked with one asterisk (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Results in Table 4.9 are markedly similar to those presented earlier in this chapter. As was true in the Africa Centre data, census results show that mothers' deaths are associated with schooling deficits that are three to four times larger than those observed for fathers' deaths. In both the Africa Centre data and the South African Census, whether we compare orphans to all other children their age or to non-orphaned children with whom they live (i.e., without or with household fixed effects), the loss of a child's mother is associated with two-tenths of a year less

completed schooling, and with a 2 to 3 percentage point reduction in the probability of enrolment.

4.6 Summary

Longitudinal data from a demographic surveillance area in KwaZulu-Natal provide an opportunity to add to the national evidence of the preceding chapter and to investigate whether a causal interpretation of the association between parental death and schooling outcomes is appropriate. I find significant differences in the impact of mothers' and fathers' deaths. The loss of a child's mother is a strong predictor of poor schooling outcomes. Maternal orphans are significantly less likely to be enrolled in school, and have completed significantly fewer years of schooling, conditional on age, than children whose mothers are alive. Less money is spent on their education on average, conditional on enrolment. Moreover, children whose mothers have died appear to be at an educational disadvantage when compared to non-orphaned children with whom they live. The timing of mothers' deaths relative to children's educational shortfalls is consistent with mothers' deaths have a causal effect on children's education. Children whose mothers died between rounds of the socioeconomic survey were not lagging other children at the time of the first socioeconomic survey. However, they had fallen behind when observed after their mother's deaths in the second socioeconomic survey. Furthermore, of the children who were enrolled at the time of the first socioeconomic survey, those who lost their mother between rounds of the survey were less likely to be enrolled at the second survey than those whose mother was still alive. The loss of a child's father is a significant predictor of household socioeconomic status. Children whose fathers have died live in significantly poorer households, measured on a number of dimensions. However, households in which fathers died were poor prior to fathers' deaths. The death of a father between waves of the survey has no significant effect on subsequent household economic status. While the loss of a father is correlated with

poorer educational outcomes, this correlation arises because a father's death is a marker that the household is poor.

The consistency of evidence from this chapter and the previous chapter suggests that the estimated effects of maternal deaths on children's school attendance and attainment in the Africa Centre DSA reflect the reality for orphans throughout South Africa. One does, however, need to be cautious in drawing general conclusions from a geographically localised population. In the next chapter I employ another longitudinal dataset from an urban area in another province to add to the evidence on the causal relationship between parental death and schooling.

CHAPTER 5:

FURTHER LONGITUDINAL EVIDENCE ON THE CAUSAL EFFECTS OF PARENTAL DEATH FROM METROPOLITAN CAPE TOWN

5.1 Introduction

While longitudinal studies allow some insight into the causal impact of parental death they are usually localised so the generalisability of findings is not clear. The estimates of the impact of parental death on schooling from the Africa Centre data in Chapter 4 are entirely consistent with and of a similar magnitude to the nationally representative cross-sectional results from Chapter 3. The consistency of these results suggest that the findings from Chapter 4 may be generalizable beyond the rural field site and that the biases introduced by comparing African orphans to children with whom they currently live in Chapter 3 may not be substantial. Nevertheless, the population in the Africa Centre demographic surveillance site is Zulu and relatively rural and poor compared to South Africa as a whole. The Cape Area Panel Study (CAPS), a longitudinal study of youth and their families in metropolitan Cape Town, allows an investigation of the extent to which the findings of the previous chapter may generalize to an urban population in another province. Longitudinal results from two geographically and socioeconomically distinct areas allow for a more comprehensive empirical body of evidence of the causal impact of parental loss on children's schooling. The CAPS data also lend themselves to slightly different methodological approaches permitting additional insights into parental death effects.

Due to apartheid settlement policies Cape Town is the only major city in South Africa to have substantial numbers of white, coloured and African residents.[20] The CAPS data therefore

[20] The distribution of populations groups in Cape Town in the 2001 census was 48% coloured, 32% African, and 19% white. See footnote 7 for a discussion of the classification of South Africans into these population groups under apartheid.

also provide a unique opportunity to study racial differences in outcomes following parental death.

It is important from a policy perspective to understand if the negative impact of parental death on children's schooling is a temporary setback with orphans 'bouncing back' or whether orphans continue to fall behind. If the latter is true it implies that parental loss in childhood will have serious consequences for the ultimate human capital attainment of the child. While a number of studies document that orphans are vulnerable to poorer schooling outcomes there is very little evidence that orphanhood matters in the long-run for education, or indeed health or other economic, outcomes (see Beegle *et al.* 2006 for an exception). Investigating the consequences in adulthood of parental loss in childhood is difficult as cross-sectional datasets typically do not identify adults who were orphaned in childhood and lack adequate controls for childhood circumstances. Longitudinal datasets that span a sufficient time frame to observe both parental loss in childhood and adult outcomes are rare. In addition these longitudinal studies suffer from attrition which is frequently correlated with educational status, particularly in areas where work related migration is prevalent (Ardington *et al.* forthcoming).

The CAPS offers a unique opportunity to investigate the longer-run impact of parental loss on education in two complimentary ways. Firstly, the base wave of the CAPS data included a life history calendar from which one can create a retrospective panel for every year since birth. This allows an investigation into whether orphans begin to recover at some point following a parent's death or whether they continue to lag behind. Secondly, the CAPS sample were all 18 years of age or older by the fourth wave allowing a direct examination of schooling outcomes in early adulthood for individuals who experienced parental loss in childhood.

Empirical work in this chapter contributes to our understanding of the impact of parental death on children's schooling in a number of ways. Firstly, evidence from the CAPS supports the interpretation of the previous chapter that mother's deaths have a causal impact on

children's schooling outcomes. Also consistent with the previous chapter, I find no evidence of a causal effect of paternal loss on schooling for African children. The loss of a father has a significant negative impact on the education of coloured children but it is not clear how much of this association is driven by socioeconomic status. Secondly, I find no evidence of orphan recovery in the period following their parent's death and results suggest that negative impacts increase with the time since the parent died. The longer-run impact of parental death in childhood is also evident in an analysis of the completion of secondary schooling by early adulthood. Young adults who lost parents in childhood are significantly less likely to have completed secondary school. Finally, I document interesting differences in the impact of parental death between African and coloured children. These racial differences are not accounted for by father-child co-residency patterns.

This chapter is organized as follows. The next section introduces the CAPS data. Section 5.3 documents racial differences in schooling outcomes measured on a number of dimensions. The following section examines rates of orphanhood by population group. Section 5.5 presents evidence on the association between parental death and various schooling outcomes, with a particular focus on the completion of secondary school by early adulthood. Section 5.6 proceeds to estimate the causal impact of parental death on a child's schooling. The following section investigates the impact of the timing of a parent's death. Section 5.8 considers child-parent co-residency patterns and parental roles as an explanation for racial differences in the impact of parental death on schooling. The final section summarises the key results.

5.2 Data

The first wave of the CAPS, collected in 2002, included 4,752 young people aged 14-22.[21] Details about the CAPS, a collaborative project of the University of Cape Town, the University

[21] Following terminology used by the CAPS project I will refer to CAPS respondents as young adults. I will refer to these young adults as children when analysing sub-samples of CAPS respondents who are under 18 year of age.

of Michigan and Princeton University, are available in Lam, Seekings, and Sparks (2006).[22] Areas classified as predominantly African and white were oversampled with the aim of producing a sample with equal numbers of African and coloured young adults and half as many white young adults. Typical of South African household surveys, household response rates in the first wave were high in African and coloured areas and low in white areas. Household response rates were 89% in African areas, 83% in coloured areas, and 46% in white areas. Conditional on participation of the household, young adult response rates were fairly high, even in white areas. Young adult response rates were 93% in African areas, 88% in coloured areas, and 86% in white areas (Lam *et al.* 2006).

A young adult questionnaire was administered to up to three residents aged 14-22 in each sampled household, covering a wide range of issues including schooling, employment, and fertility. The questionnaire also included a life history calendar that recorded residential movements, marriage and partnerships, pregnancies, schooling outcomes, employment and whether the young adult lived with their mother, father, maternal and paternal grandparents every year since birth.[23] The first wave also included a self-administered written literacy and numeracy evaluation. The test took 20 minutes to complete and was available in English or Afrikaans, the two official languages of instruction in all secondary schools. The vast majority (99%) of Xhosa speaking respondents chose to take the test in English. In comparing the results it should therefore be borne in mind that coloured and white young adults completed the test in their first language, while Africans took the test in a second language.

[22] Additional detail and technical documentation are available on the CAPS web site, www.caps.uct.ac.za.

[23] Life history calendars are used as a tool to improve the quality of retrospective data "by increasing the respondent's ability to place different activities within the same time frame (Freedman *et al.* 1988: 39)." Freedman *et al.* (1988) employed a life history calendar in a later wave of a panel and found that data collected retrospectively corresponded highly with the data collected at the time of the event in an earlier wave of the panel. They found that the correspondence was particularly high for variables such as education where there was a low degree of volatility in the activity patterns.

Table 5.1: Sample size by population group and age in 2002 and attrition between CAPS Waves 1 and 4

Age	Wave 1				Wave 4				Rate of attrition			
	African	Coloured	White	Total	African	Coloured	White	Total	African	Coloured	White	Total
14	204	217	69	490	170	185	37	392	17%	15%	46%	20%
15	221	245	80	546	183	214	39	436	17%	13%	51%	20%
16	239	253	63	555	180	215	39	434	25%	15%	38%	22%
17	238	284	82	604	190	240	38	468	20%	15%	54%	23%
18	259	246	72	577	187	184	31	402	28%	25%	57%	30%
19	292	216	68	576	200	162	27	389	32%	25%	60%	32%
20	249	200	51	500	161	147	15	323	35%	27%	71%	35%
21	218	194	59	471	156	138	15	309	28%	29%	75%	34%
22	231	150	52	433	169	109	8	286	27%	27%	85%	34%
Total	2151	2005	596	4752	1596	1594	249	3439	26%	20%	58%	28%

Notes to Table 5.1: Own calculations using Cape Area Panel Study

Table 5.2: CAPS sample size, potential sample size and rate of attrition by population group and age

	Sample size				Potential sample				Rate of attrition			
Age at 1 January	**African**	**Coloured**	**White**	**Total**	**African**	**Coloured**	**White**	**Total**	**African**	**Coloured**	**White**	**Total**
13	2151	2005	596	4752	2151	2005	596	4752	0%	0%	0%	0%
14	2144	2003	589	4736	2151	2005	596	4752	0%	0%	1%	0%
15	2132	1997	584	4713	2151	2005	596	4752	1%	0%	2%	1%
16	2105	1985	566	4656	2151	2005	596	4752	2%	1%	5%	2%
17	2064	1952	537	4553	2151	2004	595	4750	4%	3%	10%	4%
18	1885	1770	461	4116	1993	1840	540	4373	5%	4%	15%	6%
19	1636	1503	380	3519	1776	1588	464	3828	8%	5%	18%	8%
20	1380	1247	300	2927	1545	1349	399	3293	11%	8%	25%	11%
21	1099	941	212	2252	1308	1069	309	2686	16%	12%	31%	16%
22	841	701	131	1673	1053	827	243	2123	20%	15%	46%	21%
23	598	480	77	1155	768	587	170	1525	22%	18%	55%	24%
24	381	297	37	715	496	382	118	996	23%	22%	69%	28%
25	213	137	12	362	278	185	60	523	23%	26%	80%	31%

Notes to Table 5.2: The first four columns show the number of African, coloured and white CAPS respondents who were observed (either retrospectively through the wave 1 and/or wave 3 life history calendars or prospectively through waves 1 to 4) at each age from 13 to 25. The fifth to eighth columns show the potential sample that could have been observed at each age based on their date of birth and the age that they would have reached by the 1st January 2006 - the year that the fourth wave of interviews took place. The final four columns show the attrition rate by age. All respondents were observed for every age below 13.

Youth respondents were interviewed a second time in either 2003 or 2004, a third time in 2005 and a fourth time in 2006. In the third wave respondents completed a second residential and schooling history calendar. A detailed history of the outcome of each school year is available through a combination of the Wave 1 and Wave 3 calendars and the schooling questions asked in every wave. The CAPS Waves 1, 3 and 4 included a household questionnaire providing data on all household members and details on the relationship of each household member to the young adult. A household roster was also included in the young adult questionnaire for Wave 2.

Table 5.1 shows sample sizes and attrition rates by age and population group for Waves 1 and 4. The African attrition rate between Wave 1 and Wave 4 is 26%, with most attrition due to migration back to the rural Eastern Cape province that is the main sending region for Africans living in Cape Town. The coloured population has its roots primarily in Cape Town, a factor contributing to its lower 20% attrition rate. In addition to the initial low response rates for whites, attrition for this group has been high with 58% of the Wave 1 sample not re-interviewed in Wave 4. There is a clear relationship between age and attrition with the attrition rate for the full sample remaining below 23% for respondents under 18 years of age at Wave 1 and then increasing to the 30-35% range for the older sample.

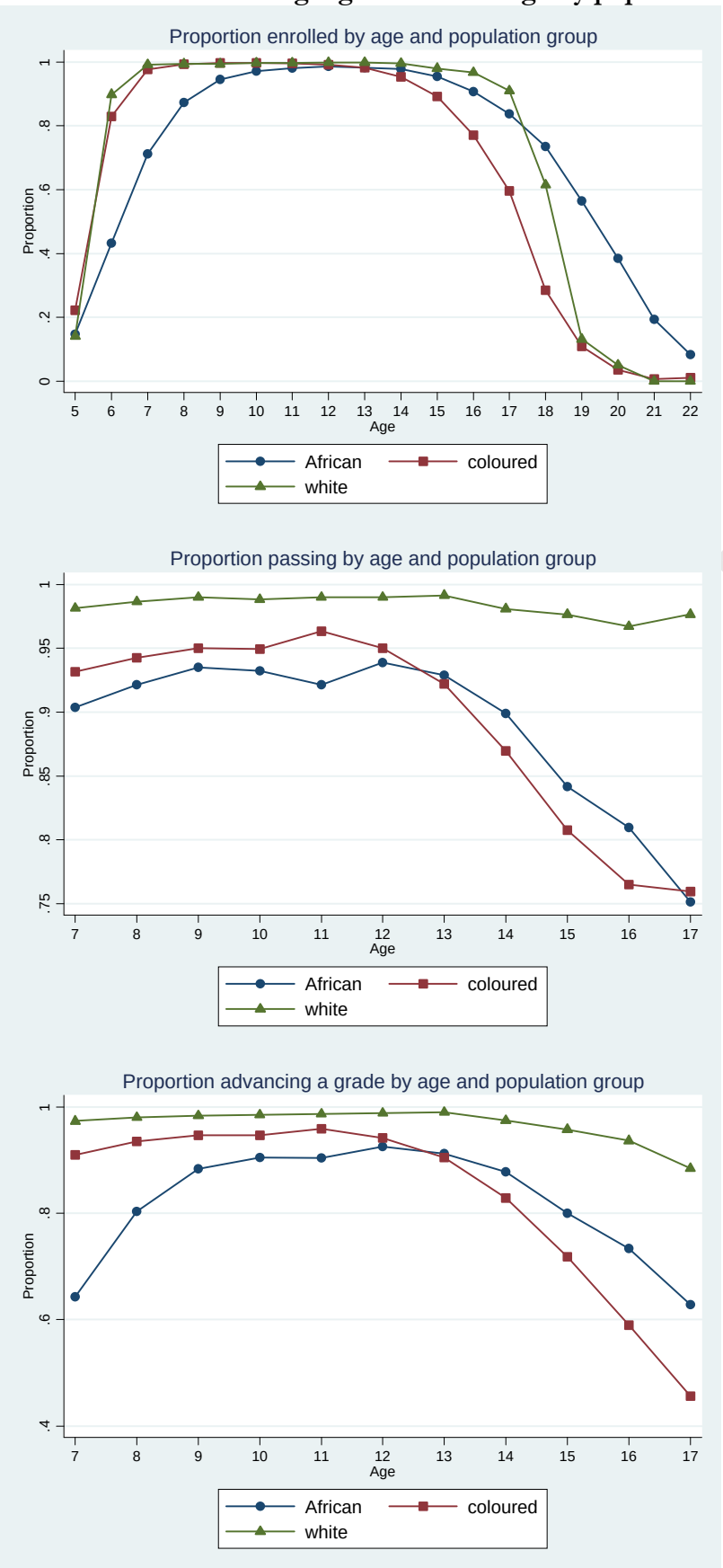
The CAPS questionnaires in Waves 2 to 4 were designed to collect information on a range of outcomes such as schooling and employment relative to when the young adult was last interviewed. For many analyses information about an outcome in a particular year could be sourced from different waves for different young adults. This questionnaire design together with the life history calendar collected in Wave 1 enables one to observe a range of outcomes at each age. In the empirical work to follow I will use this data to create a panel dataset spanning every age from 0 to 17. The first four columns of Table 5.2 show the number of respondents who were observed (either retrospectively through the Wave 1 life history calendar and/or through the data collected in Waves 1 to 4) at each age from 13 to 25 where age is calculated at the 1st of January. The fifth to eight columns show the potential sample that could have been observed at

each age based on their date of birth and the age that they would have reached by 1 January 2006, the year that the fourth wave of interviews took place. For example a respondent who was 15 years old when we first interviewed her and who was seen again in Waves 2 and 3 but lost to follow up in Wave 4 would be observed at every age up till age 18 but could have potentially been observed up till age 19. The final four columns show the attrition rate by Wave 4 by age and population group. By design all young adults were observed for every year up to the age of 13. Attrition is initially very low with observations on more than 90% of the sample all the way up to the age of 20. Beyond 21 the sample size diminishes rapidly both due to the fact that increasing numbers of young adults would not yet have reached that age by January 2006 and increasing attrition.

5.3 Racial inequities in schooling outcomes

More than a decade after the end of apartheid racial inequities in educational outcomes still persist with high rates of grade repetition and many African students never completing secondary school (Anderson *et al.* 2001; Lam *et al.* 2007). This section provides an important background for the investigation of the impact of parental death on schooling to follow by documenting racial differences in schooling outcomes for the CAPS young adults. A child progressing through school at the correct pace should have enrolled by the age of 6, completed primary school (grade 7) by the age of 13 and completed secondary school (grade 12) by the age of 18.

Figure 5.1: Proportion of CAPS respondents enrolled in school, passing conditional on enrolment and advancing a grade at each age by population group



Notes to Figure 5.1: Data from waves 1 through 4 and from retrospective schooling histories collected in waves 1 and 3.

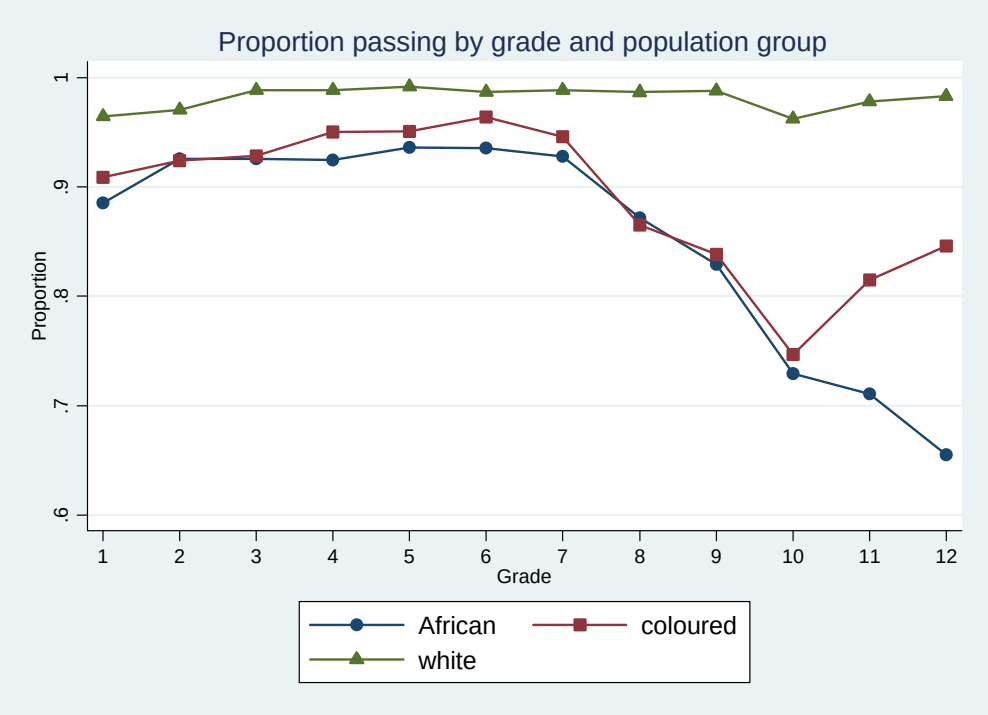
Using data from the life history calendars and data collected in each of the four waves, Figure 5.1 shows a range of schooling outcomes at each age by population group.[24] The first panel of Figure 5.1 shows the proportion of young adults enrolled in school at each age from 5 to 22. A substantial portion of African children have a delayed start to their schooling but from the age of 9 till the age of 15 there is almost universal enrolment for all population groups. From age 15 onwards coloured children begin to drop out of school. There is a sharp drop in white enrolment after the age of 17 as these children complete their schooling at the correct pace. African young adults continue to be enrolled in school in substantial numbers beyond the age of 18. The second panel of Figure 5.1 shows the proportion of children who pass their grade at each age conditional on being enrolled in school. The probability of passing clearly decreases with age with the proportion of African and coloured children passing diminishing steadily from age 13. Similar to enrolment there are stark racial differences with the proportion of white children passing close to one. At every age African and coloured children are significantly more likely to fail or withdraw and the gap increases with age. At ages 16 and 17 white children are around 20 percentage points more likely to pass than African or coloured children. The final panel of Figure 5.1 combines the first two panels by showing the proportion of children at each age who advance a grade at that age. This panel includes those children who are not enrolled as not advancing. The patterns by age are similar to the second panel but the effects of delayed initial enrolment for African children and high dropout rates in the teens for coloured children are now also apparent.

Figure 5.2 shows the probability of passing each grade by population group. Pass rates for all population groups are fairly high until grade 7 although there is consistently a more than 5 percentage point differential between white children and their African counterparts in the same grade. Once students enter into secondary school, pass rates begin to decline steadily for African and coloured children. The increase in coloured pass rates after grade 10 is probably explained by

[24] Note that the scale of the vertical axis for each of the panels in Figure 5.1 is different.

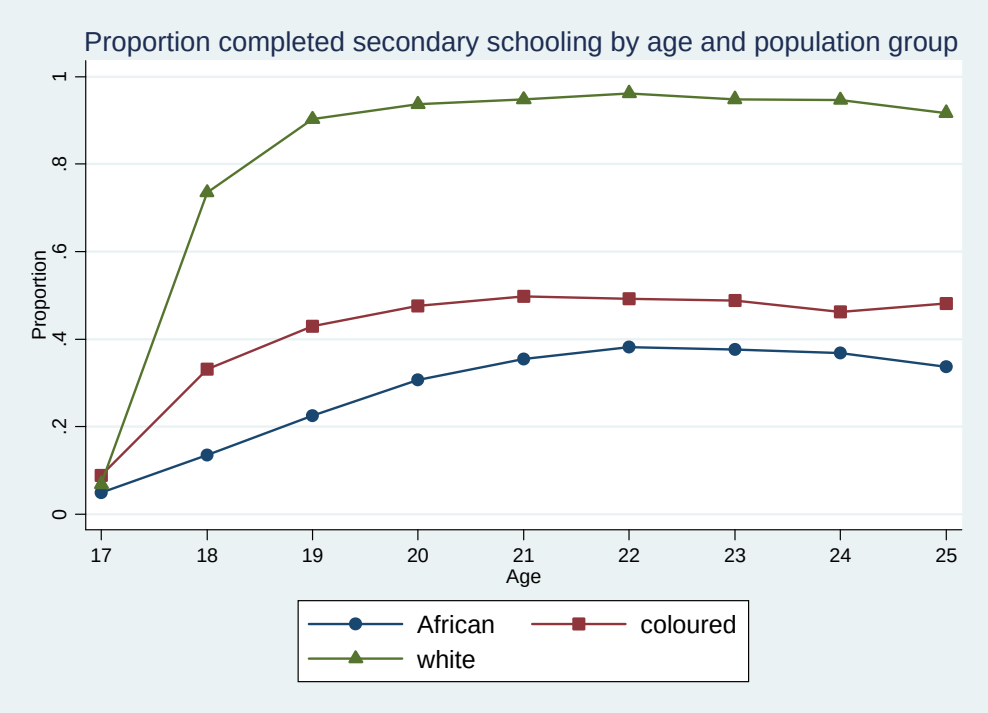
the higher dropout rate amongst coloureds with better students selecting to stay in school. For white children pass rates remain high throughout secondary school.

Figure 5.2: Proportion of CAPS respondents passing each grade by population group



Notes to Figure 5.2: Data from waves 1 through 4 and from retrospective schooling histories collected in waves 1 and 3.

Figure 5.3: Proportion of CAPS respondents who had successfully completed grade 12 by age at 1 January



Notes to Figure 5.3: Data from waves 1 through 4 and from retrospective schooling histories collected in waves 1 and 3.

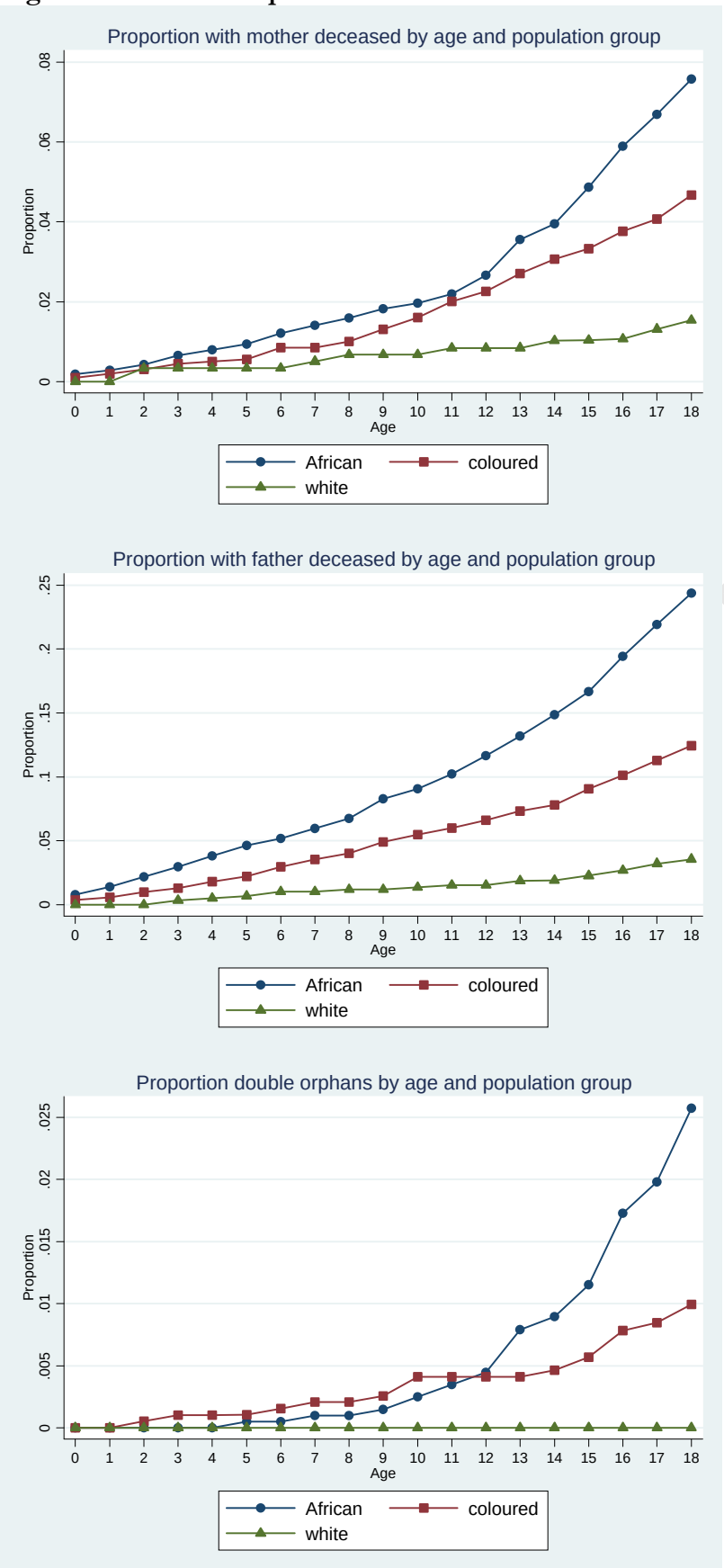
That these racial differences in enrolment and failure at younger ages translate into educational disparities in early adulthood is clear from Figure 5.3. This figure shows the fraction of young adults who have successfully completed secondary school by age and population group. Over 90% of white young adults have completed secondary school by the January in which they are 19 years old. In sharp contrast only 23% of African and 43% of coloured 19 year olds have completed secondary school. Secondary school completion rates continue to increase for coloured and Africans into the early twenties but flatten out by 22 with only 38% of Africans and 49% of coloureds completing secondary school by that age.

This section has provided an important background of South African schooling outcomes, particularly the racial inequities that persist more than a decade after the end of apartheid. It is within this general milieu that I will assess the impact of parental death. I begin by looking at rates of orphanhood.

5.4 Rates of parental death

Figure 5.4 shows rates of parental death by age and population group from age 0 to age 17. The scales of the vertical axes are not the same for maternal deaths, paternal deaths and double orphans as there is significant variation in the prevalence of these three outcomes. African young adults are significantly more likely than coloureds who in turn are significantly more likely than whites to have experienced parental loss before the age of 18 – 6.3% of Africans, 4.2% of coloureds and 1.5% of whites had lost their mother before the age of 18 and 21.1% of Africans, 11.1% of coloureds and 3.5% of whites had lost their father before the age of 18.

Figure 5.4: Rates of orphanhood in the CAPS



Notes to Figure 5.4: Data from waves 1 through 4 and from retrospective life history calendar collected in Wave 1.

Parent's vital status at any particular age can be missing either because their vital status is unknown or because the exact timing of the death is unknown. In the first wave if respondents said a parent was deceased they were asked for either the year the parent died or how old they were when their parent died. In the fourth wave respondents were asked for either the year that the parent died or how many years ago the death occurred. Depending on the response given it is not always possible to know for certain on the 1st of January each year whether the parent was alive or dead. If the respondent gave the parent's year of death then I assume that the parent was alive on the 1st January of the year in which they died. But if they gave their age when their parent died I am unable to assign a year of death. For example if a respondent says that their mother died when they were 12, I do not know whether the mother was dead on the 1st of January in the year that the young adult was 12. I do know that the mother was alive on the 1st of January when they were 11 and dead on the 1st of January when they were 13. The exact year of their mother's death is unknown for 26 (1.2%) Africans and 38 (1.9%) coloureds. Father's exact year of death is unknown for 85 Africans (4.0%) and 131 coloureds (6.5%).

In addition to cases where one cannot pinpoint the exact year of death there are cases where I only know that a parent died more than 10 years ago, cases where I don't know when they died but know their vital status at each wave of the panel and cases where their vital status at every point is unknown. The percentage of respondents with unknown parent's vital status for every age from 0 to 17 are 0.3%, 0.2%, 3.8% and 1.4% for African mothers, coloured mothers, African fathers and coloured fathers respectively. The number of cases where the vital status is unknown for more than one year but not every year from 0 to 17 is small with 0.5%, 0.6%, 3.2% and 1.9% of respondents in that category for African mothers, coloured mothers, African fathers and coloured fathers respectively. In Figure 5.4 and the analyses that follow, data are included for every age at which an individual has non-missing information on parent's vital status.

Data from different waves can also be contradictory with parents who were deceased in an earlier wave being reported as alive in a later wave or where the year of death in a later wave

conflicts with information about vital status in an earlier wave. For example, a mother may be reported as alive in the first wave (2002) and dead in the fourth wave (2006) with her date of death being before 2002. Alternatively she may be reported as deceased in 2002 but her date of death in the fourth wave is after 2002. There are also a few cases where the dates of death in the first and the fourth wave disagree (mostly by one year) but where the date from the fourth wave does not contradict the parent's vital status in the first wave. In the cases of conflicting information between waves of the survey I assumed that the information from the first wave was correct. In order to assess the impact of this assumption I created the same variables assuming that the data from the fourth wave were correct. The percentage of respondents whose information differed depending on whether Wave 1 or Wave 4 information was assumed to be correct are 0.74%, 0.65%, 5.67% and 5.49% for African mothers, coloured mothers, African fathers and coloured fathers respectively.[25] The higher percentage of differences for father's deaths is a reflection of both the higher rates of paternal death and the greater uncertainty around father's vital status. For all the analyses that follow regressions were re-run assuming information from the fourth wave was correct (see Table A5.1 in the appendix for the analogous results to Table 5.7 when the data from the fourth wave are assumed to be correct. Analogous results for other tables are not shown but are available on request). The choice of correct wave in the case of conflicts makes no substantive difference to any of the results that follow.

Figures 5.1 to 5.4 clearly show that both the risk of poor schooling outcomes and the risk of orphanhood increase with age making it essential to adequately control for age in any analyses of the impact of parental death on schooling. Double orphanhood in childhood is fairly rare (1.2% of the sample lost both parents before the age of 18) so in the analyses that follow I will estimate effects separately for maternal and paternal deaths but will not include indicators

[25] For these respondents the parental death variables would not necessarily be different for every age from 0 to17. For example if the mother's year of death differed by one year in Wave 1 and Wave 4 then the mother deceased variable would only differ for two ages between 0 and 17 for this respondent. The percentage of observations that differ depending on which wave is taken as correct are 0.3%, 0.4%, 3.5% and 3.5% for African mothers, coloured mothers, African fathers and coloured fathers respectively.

that both parents are deceased. The figures in the previous section highlighted racial differences in schooling outcomes and in all that follows I will estimate results separately for each population group in order to not confound the effect of higher prevalence of parental death with race. The white sample is excluded from the analyses that follow for two reasons. Primarily, parental death in childhood is too rare in the white sample to allow an examination of the impact of parental loss on schooling outcomes. Secondly, the low initial response rate and subsequent high rate of attrition amongst white households and young adults may introduce bias into the analyses.

5.5 Orphan schooling deficits

The CAPS data allow us to view the young adult sample either at a particular point in time or at a particular age. For example one can consider schooling outcomes at the time of the first interview in the base wave (2002) or at the age of 18. In the latter case data could be drawn from the life history calendar or any of the four waves. This section begins with an examination of how parental death impacts on schooling outcomes at particular ages for the full sample and then considers schooling outcomes at Wave 1 for a subsample of young adults who should have been enrolled in school at the time. The results in this section are based on regressions of the following form:

$$Y_{it} = \beta_m M_{it} + \beta_F F_{it} + \gamma X_{it} + \varepsilon_{it}. \quad (5.1)$$

Y_{it} is a schooling outcome for individual i at time t where t can either be a particular age or a survey wave. The schooling outcomes are modelled as a function of the mother's vital status ($M_{it} = 1$ if a child's mother is deceased at time t; = 0 otherwise) and father's vital status ($F_{it} = 1$ if a child's father is deceased at time t; = 0 otherwise). Also included in equation 5.1 are a set of household and individual level controls X which will vary depending on whether I am estimating 5.1 at a particular age or at a particular time.

Table 5.3 presents regression results of the association between parental death and three outcome variables - an indicator that they were enrolled in school at age 16, the number of grades successfully completed by age 18 and an indicator that they had successfully completed secondary school (grade 12) by the age of 20. Ordinary least squares estimates of β_M and β_F for each of the three outcomes are shown in columns 1 to 3 respectively. With respect to the outcome variables, age (t) refers to age of the young adult on the 1st of January. Samples for columns 1, 2 and 3 are all young adults who were observed until they were at least 16, 18 and 20 respectively. In the event that parents' vital status was unknown the parental death indicator was coded as a zero and the regressions include indicators that parents' vital status was unknown. The regressions also include dummies for year of birth, an indicator that the young adult was born before July and an indicator that they are female. [26] In column 1 the mother deceased and father deceased variables indicate that the respondent's parent was deceased on the 1st of January in the year that they were 16 years of age. In columns 2 and 3 the mother deceased and father deceased variables indicate that the respondent's parent died before the respondent was 18 years of age. Regressions were run separately for Africans and coloureds. Standard errors that allow for correlation in the unobservables of individuals who are members of the same sampling cluster are presented in parentheses below the coefficients and weights are used to adjust for sample design and non-response.

Consistent with the national and Africa Centre results presented in Chapters 3 and 4, the results presented in Table 5.3 suggest that the loss of a mother in childhood is significantly associated with poorer schooling outcomes for African young adults. African young adults who experienced maternal loss are 10 percentage points less likely to be enrolled in school at 16, have completed 0.69 fewer grades at age 18 and are 11 percentage points less likely to have completed secondary school by age 20. The loss of a father in childhood is only significantly associated with

[26] Before the Education Laws Amendment Act (Act 50 of 2002) set the age of admission to Grade 1 as the year in which the child turns 7, the age of admission policy was to accept children into Grade 1 if they turned 6 before the 30th of June in their Grade 1 year. Children born in the first half of the year should therefore be one grade ahead of those born in the second half of the year.

the number of grades completed by the age of 18 for African young adults and the magnitude of this effect is less than a third of the maternal death effect.

In contrast coloured young adults who have lost a father are significantly disadvantaged relative to those whose father is still alive. They are 10 percentage points less likely to enrolled at age 16, 0.93 grades behind by age 18 and 17 percentage points less likely to have completed secondary school by age 20 than those who did not experience paternal loss. Although the point estimates for the impact of maternal death on the probability of completing secondary school by age 20 are almost identical for African and coloured young adults, the standard errors render the coloured coefficient insignificant. The maternal death coefficients for enrolment at age 16 and grades completed at age 18 are negative but small and not significant for Coloured young adults. The lower prevalence of maternal death for coloureds results in the coefficients being imprecisely measured.[27]

From Table 5.3 it is clear that respondents who have lost parents have on average poorer schooling outcomes than other adolescents and young adults of the same age and gender. The regressions take no account, however, of the socioeconomic status of the young adults' households and how this may differ by parents' vital status. Using the CAPS data Lam *et al.* (2007) find a strong effect of household income on the probability of progressing through school at the correct pace. In order to assess how the association between parental death and schooling is mediated by socioeconomic status I consider a sub-sample of CAPS respondents for whom there are various measures of household well-being and structure at a time when they were of school going age.

[27] The number of African young adults whose mother is deceased is 123, 119 and 77 for columns 1 to 3 respectively. For coloured young adults 74, 74 and 47 have deceased mothers in columns 1 to 3 respectively. There are 385, 398 and 277 African young adults whose father is deceased in columns 1 to 3 respectively. The number of coloured young adults whose father is deceased is 195, 196, 138 for columns 1 to 3 respectively.

Table 5.3: Parental death and schooling outcomes for CAPS respondents at various ages

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Enrolled at age 16	Highest grade completed at age 18	Grade 12 completed by age 20	Enrolled at age 16	Highest grade completed at age 18	Grade 12 completed by age 20
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.101	-0.685	-0.109	-0.017	-0.311	-0.091
	(0.037)**	(0.210)**	(0.048)*	(0.058)	(0.266)	(0.070)
Father deceased	-0.009	-0.188	-0.019	-0.102	-0.931	-0.165
	(0.017)	(0.114)	(0.033)	(0.035)**	(0.202)**	(0.048)**
Observations	2072	1874	1372	1963	1766	1244

Notes to Table 5.3: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. Age refers to the age of the respondent on 1 January. In column 1 the mother deceased and father deceased variables indicate that the respondent's parent was deceased on 1 January when they were 16 years of age. In columns 2 and 3 the mother deceased and father deceased variables indicate that the respondent's parent died before the respondent was 18 years of age. Samples for columns 1, 2 and 3 are all young adults who were observed until they were at least 16, 18 and 20 years of age respectively. Estimates marked with two asterisks (**) are significant at the 1 percent level, those marked with one (*) are significant at the 5 percent level, and those marked with a plus sign (+) are significant at the 10% level.

Table 5.4: Sample characteristics for CAPS respondents born between 1985 and 1987 (aged 14 to 16 on 1 January 2002)

	African			Coloured			
	Obs.	Mean	Std Err.	Obs.	Mean	Std Err.	
Characteristics at Wave 1 (2002)							
Highest grade completed	684	7.71	0.06	771	8.38	0.05	**
Enrolled in school	684	0.934	0.009	770	0.856	0.013	**
Mother deceased	685	0.073	0.010	771	0.048	0.008	*
Father deceased	685	0.210	0.016	771	0.109	0.011	**
Mother's vital status unknown	685	0.001	0.001	771	0.001	0.001	
Father's vital status unknown	685	0.020	0.005	771	0.010	0.004	
Female	685	0.584	0.019	771	0.532	0.018	*
Number of assets	684	4.73	0.10	770	8.42	0.11	**
Per capita household income	684	369	21	770	890	33	**
Household size	684	6.05	0.11	770	5.98	0.09	
Fraction of household under age 14	684	0.236	0.006	770	0.230	0.006	
At least one pension-eligible female in household	684	0.136	0.013	770	0.173	0.014	+
At least one pension-eligible male in household	684	0.032	0.007	770	0.066	0.009	**
Grades completed by age 12	685	4.96	0.05	771	5.70	0.03	**
Standardized literacy and numeracy evaluation score	676	-0.574	0.032	764	0.020	0.030	**
Mother is co-resident	685	0.688	0.018	771	0.809	0.014	**
Father is co-resident	685	0.378	0.019	771	0.536	0.018	**
Both parents co-resident	685	0.318	0.018	771	0.489	0.018	**
Neither parent co-resident	685	0.253	0.017	771	0.144	0.013	**
Lives with mother only	685	0.369	0.018	771	0.320	0.017	*
Lives with father only	685	0.060	0.009	771	0.047	0.008	

Notes to Table 5.4: The notation in the final column denotes that differences between African and coloured respondents are significant at the 1% (**), 5% (*) or 10% (+) level.

The household characteristics included in any regression model would ideally reflect living conditions at a time when the respondent was of school going age. This is not always going to be possible with this data. In the first wave of the CAPS respondents were aged 14 to 22. Many of the older respondents were no longer living in the households where they resided in the period when they would or should have been enrolled in school. The characteristics of their Wave 1 household may have been quite dissimilar to their childhood home. Household characteristics may also have changed in the period since they left school for those older respondents who were still living in their childhood home. To address these concerns the sample for the next set of regressions is restricted to those respondents born between 1985 and 1987

who would have been aged 14 to 16 on the 1st of January 2002 as these respondents are unlikely to be living independently. Table 5.4 provides descriptive statistics for this sample. Significant differences between African and coloured children are marked with + at the 10% level, * at the 5% level and ** at the 1% level. On average these African children live in households with significantly fewer assets and less than half the per capita income of these coloured children.

The first four columns of Table 5.5 examine the impact of parental death on enrolment and grade attainment for children aged 14 to 16 years old in 2002. For each outcome ordinary least squares regressions were first run without any household level controls and then household controls were introduced. The first column of Table 5.5 presents estimates of the impact of parental death on enrolment in 2002. African children who have lost a mother are 12 percentage points less likely to be enrolled while there is no disadvantage associated with the loss of a father. In contrast, for coloured children the loss of a mother appears to have no effect on enrolment whereas the loss of a father decreases the probability of enrolment by 13 percentage points. The regression in the second column includes the logarithm of household per capita income, number of household assets, logarithm of household size, fraction of household residents under the age of 14, an indicator that there is at least one resident female of pension-eligible age and an indicator that there is at least one resident male of pension-eligible age. Including measures of household well-being and household structure has no effect on the maternal death coefficient for African children but the paternal death coefficient for coloured children is substantially reduced.

The third and fourth columns show the estimated impact of parental death on the highest grade completed by 2002 without and with household controls respectively. African children whose mothers have died are almost a third of a year behind those whose mother is alive although the estimate is only significant once household controls are included. Those African children whose fathers have died are not significantly behind. The loss of a father has a significant and substantial effect on grade attainment for coloured children. Introducing

household controls substantially reduces the paternal death coefficient for coloured children from 0.77 to 0.53 of a year. The coefficient estimates for maternal death for coloured children are negative but imprecisely measured due to the small numbers of coloured children who had lost a mother.

The fifth and sixth columns of Table 5.5 show the estimated impact of parental death on the standardized score from the literacy and numeracy evaluation (LNE) conducted in Wave 1. Performance on the test reflects a combination of many factors, including innate ability, home environment, and the quantity and quality of schooling to that point and can be thought of as a measure of cumulative learning at the time of the 2002 interview. Interestingly, although African children who have lost their mothers are less likely to be enrolled and are behind in school for their age they do not have significantly lower test scores. Both African and coloured children whose fathers have died score lower on the test but the coefficients lose significance once household controls are included in the regressions. Coloured children who have experienced maternal death score 0.24 standard deviations lower on the test. To the extent that the test captures prior learning and ability these results suggest that although African children whose mothers have died are behind in school they are not significantly less able than children who have not lost their parents.

Table 5.5: Parental death and schooling outcomes in 2002 for CAPS respondents born between 1985 and 1987

	African						Coloured					
	Dependent variable:						Dependent variable:					
	Enrolled 2002		Highest grade 2002		LNE score 2002		Enrolled 2002		Highest grade 2002		LNE score 2002	
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Mother deceased	-0.121	-0.123	-0.299	-0.307	-0.007	-0.019	0.039	0.032	-0.259	-0.274	-0.244	-0.249
	(0.068)+	(0.065)+	(0.186)	(0.178)+	(0.129)	(0.103)	(0.046)	(0.044)	(0.324)	(0.321)	(0.160)	(0.143)+
Father deceased	-0.042	-0.036	-0.102	-0.059	-0.154	-0.114	-0.125	-0.083	-0.766	-0.526	-0.292	-0.131
	(0.030)	(0.030)	(0.168)	(0.157)	(0.090)+	(0.083)	(0.045)**	(0.044)+	(0.219)**	(0.207)*	(0.099)**	(0.089)
Log of per capita household income		-0.007		0.05		0.074		0.055		0.286		0.186
		(0.014)		(0.063)		(0.046)		(0.020)**		(0.059)**		(0.051)**
Number of assets		0.017		0.138		0.076		0.017		0.108		0.074
		(0.004)**		(0.021)**		(0.014)**		(0.006)**		(0.019)**		(0.013)**
Logarithm of household size		-0.002		-0.385		-0.159		0.002		-0.125		-0.109
		(0.033)		(0.133)**		(0.084)+		(0.035)		(0.130)		(0.104)
Fraction of household under age 14		0.032		0.332		0.197		0.017		0.747		0.2
		(0.068)		(0.393)		(0.233)		(0.083)		(0.282)**		(0.223)
Pension age-eligible female		0.029		0.258		-0.014		-0.008		0.193		0.136
		(0.025)		(0.176)		(0.100)		(0.036)		(0.122)		(0.075)+
Pension age-eligible male		-0.019		-0.084		0.362		0.091		0.16		0.008
		(0.051)		(0.334)		(0.194)+		(0.044)*		(0.169)		(0.092)
Observations	684	684	684	683	676	675	770	769	771	770	764	763

Notes to Table 5.5: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

The analysis in Chapter 3 provides a national picture of the relationship between orphan status and schooling for African children only. To investigate the extent to which the results for coloured children in metropolitan Cape Town might generalise to the national level, I estimated the same regressions shown in Figure 3.4 for coloured children using the 1996 and 2001 Censuses (results in Table A5.2 in the appendix). The large sample sizes in the Censuses also allow for a more precise estimate of the impact of maternal death. The national results for coloureds are very similar to those for Africans nationally and for Africans in Cape Town. Coloured children whose mothers have died are significantly behind in school and although the effect is somewhat diminished, but still highly significant, when household controls are included in the regression and when household fixed effect models are estimated. The paternal death effect with no household controls is significant but substantially smaller than the maternal death effect. The paternal death effect seems to be largely explained by socioeconomic status. In these national datasets racial differences in paternal death effects are less apparent than in the CAPS data.

Parental death and longer-run schooling outcomes

Results for the full sample in Table 5.3 showed that parental death in childhood significantly affected the likelihood of completing secondary school by the age of 20 for African young adults who lost a mother and coloured young adults who lost a father. All young adults born between 1985 and 1987 should have been enrolled in school in 2002 and should have completed secondary school by the time they were re-interviewed in 2006. Restricting the sample in this way allows us to observe outcomes in young adulthood (18 to 20 years of age) and to control for household characteristics at the time when these young adults should have been enrolled in school.[28] Table 5.6 shows the estimated impact of parental loss before the age of 18

[28] Attrition in this age group is lower than for the full sample. The African attrition rate amongst this cohort is 20% and the coloured attrition rate is 14%. Respondents who were not interviewed in Wave 4 are significantly different on a range of dimensions – they are 7 percentage points less likely to be enrolled, have completed 0.27 fewer grades,

on the probability of completing secondary school by 2006. The loss of a mother in childhood reduces the probability of completing secondary school by around 15 and 12 percentage points for African and coloured young adults respectively and this effect is not diminished by including controls for household socioeconomic status in 2002. The loss of a father has no effect for African young adults but significantly reduces the probability of completing secondary school for coloured young adults. Once controls for socioeconomic status are included coloured young adults who lost a father in childhood are no longer at a significant disadvantage.[29]

Table 5.6: Parental death and completion of secondary schooling for CAPS respondents born between 1985 and 1987 and re-interviewed in 2006

	African		Coloured	
	Dependent variable: Completed Grade 12 by 2006		Dependent variable: Completed Grade 12 by 2006	
	(1)	(2)	(1)	(2)
Mother deceased before 18	-0.158	-0.152	-0.101	-0.119
	(0.054)**	(0.053)**	(0.076)	(0.069)+
Father deceased before 18	0.042	0.055	-0.149	-0.032
	(0.048)	(0.047)	(0.056)**	(0.054)
Logarithm of per capita household income		0.024		0.131
		(0.025)		(0.028)**
Number of assets		0.028		0.035
		(0.008)**		(0.007)**
Logarithm of household size		-0.043		-0.125
		(0.057)		(0.063)*
Fraction of household under age 14		-0.043		0.231
		(0.158)		(0.138)+
Pension age-eligible female		0.077		0.099
		(0.064)		(0.050)+
Pension age-eligible male		-0.018		0.092
		(0.105)		(0.074)
Observations	549	549	661	660

Notes to Table 5.6: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

have a 6 percentage point higher risk of losing their mother and it is more likely that their mother and father's vital status is unknown. Attritors are not significantly different to those re-interviewed in terms of any of the other characteristics shown in Table 5.4.

[29] In regressions run, but not shown, I included the literacy and numeracy test score and grades successfully completed by age 13 as a measure of how far behind the young adult was by the age when they should they should have completed primary school. The results are not included in Table 5.6 due to the potential endogeneity of these variables. Including these variables reduces the maternal death effect but African young adults who lost their mothers in childhood are still 10 percentage points less likely to have completed secondary school by 2006. The inclusion of these variables results in the paternal death effect for coloured children becoming positive.

It is apparent from Figure 5.1 that a number of respondents born between 1985 and 1987 would have been so far behind in their schooling that there was no chance of them completing secondary school by 2006. I considered the probability of completing secondary school *or* successfully passing four grades as an alternative outcome. Results for both African and coloured young adults are very similar to those for the probability of completing secondary school (see Table A5.3 in the appendix for results).

Consistent with the results of the previous two chapters it appears that the association between maternal death and poor schooling outcomes is not exclusively or even predominately channelled through socioeconomic status. African and coloured children who have lost a mother do not live in households that are systematically richer or poorer than those of children whose mother is alive (see columns 1 and 2 in Table A5.4 in the appendix) and the maternal death effects are not reduced when I add controls for household socioeconomic status to the regressions. In contrast, African and coloured children who have lost a father live in households with significantly lower per capita incomes and the paternal death effects for coloured children are substantially reduced when controls for household socioeconomic status are included in the regressions. This suggests that part of the paternal orphan deficit for coloured children is explained by socioeconomic status although the paternal death effect remains significant and large when household controls are included. Parental loss in childhood appears to have long-run implications for the human capital attainment of the child with schooling disparities between orphans and non-orphans persisting into early adulthood. The next section focuses on whether parental death causes children to fall behind in their schooling.

5.6 The causal effect of parental death

Due to the age of respondents in the first wave, the sample size and the infrequency of parental death, the CAPS data do not lend themselves to an analysis of the impact of parental death *between* waves on changes in schooling outcomes. One is, however, able to observe a range

of schooling outcomes at each age either retrospectively using the life history calendar collected in Wave 1 or prospectively using information from each of the four waves. Information about the timing of parental deaths from Wave 1 and Wave 4 allows one to determine parent's vital status at each age. Using these data I constructed a panel containing schooling outcomes (enrolment, grade enrolled in, result of schooling, highest grade completed) and parent's vital status for every age from 7 to 17 with ages measured at the 1st of January. This panel dataset spanning 11 ages allows one to compare the same individual before and after a parental death and go some way towards establishing whether parental death has a causal effect on children's schooling. With data available for each age from 7 to 17, I can modify equation 5.1 to allow for individual fixed effects. That is, the unobservable component of 5.1 can be written

$$\varepsilon_{it} = \alpha_i + u_{it}, \tag{5.2}$$

where α_i is an individual-specific fixed effect. This effect will absorb all time invariant individual level unobservable or unmeasured characteristics. The fixed effects models are estimated from ordinary least squares regressions of the following form:

$$Y_{it} - \bar{Y}_{i.} = \beta_m(M_{it} - \bar{M}_{i.}) + \beta_F(F_{it} - \bar{F}_{i.}) + \gamma(X_{it} - \bar{X}_{i.}) + (u_{it} - \bar{u}_{i.}), \tag{5.3}$$

where $\bar{Y}_{i.}$ is the average value of Y across all time periods t for individual i. Subtracting the individual means removes α_i from the equation.[30]

By sample design every respondent is 'observed' at every age from 0 to 14. After the age of 14 some children are lost through attrition but 96% of original Wave 1 respondents are 'observed' until they are at least 17 years old. Missing data on schooling outcomes are relatively rare. For example information on enrolment is missing for 0.26% of the potential observations.[31] Section 5.4 provided a detailed discussion on missing data on parent's vital status. Information

[30] See Deaton (1997:106-108) for a discussion on within- estimation techniques with panel data.
[31] Information on enrolment is missing for one of the ages for 1.95% of Africans and 1.10% of coloureds. A smaller percentage (0.61% of Africans and 0.70% of coloureds) are missing data for more than one of the ages. There are no cases where enrolment data is missing for every year.

on parent's vital status is missing for 0.54%, 0.64%, 5.67% and 2.72% of the potential observations for African mothers, coloured mothers, African fathers and coloured fathers respectively.

In the analyses that follow, data are included for every age at which an individual has non-missing information on parent's vital status and the relevant schooling outcome. I experimented with various approaches to missing data on parent's vital status. Firstly I excluded all individuals with any missing information from the analyses. Secondly, I excluded any individuals whose parents' vital status was missing for more than one year (i.e. I kept those to whom I was not able to assign an exact year of death). Thirdly, I replaced the parental death indicators with a zero where they were missing and created dummy variables indicating that the parent's vital status was missing. These dummy variables were then included in the regressions. Finally, I replaced the parental death indicators with zero and included dummies for missing information when the exact year of death was unknown and parent's vital status was only missing for one age. Results presented below were not substantively affected by the way in which I dealt with missing data on parent's vital status (see Tables A5.5 to A5.8 for the analogous results to Table 5.7 for the various approaches to missing data).

Parental death effects are identified from the observations for respondents who lose a parent in the period covered by the panel.[32] Between the ages of 7 and 17, 111 African respondents and 60 coloured respondents lost a mother and 275 African respondents and 125 coloured respondents lost a father.

Table 5.7 presents coefficient estimates and standard errors from linear regressions with child fixed effects of indicators that a child's mother and father were deceased on three schooling outcomes - an indicator that they advanced a grade at that age, an indicator that they

[32] Some children had already lost a parent by the age of 7 (31 Africans had lost a mother, 17 coloureds had lost a mother, 119 Africans had lost a father and 69 coloureds had lost a father).

were enrolled in school at that age and an indicator that they passed conditional on being in school. The first outcome incorporates both enrolment and passing (or drop outs and failure). As before I use robust standard errors that allow for correlation in the unobservables of individuals who are members of the same sampling cluster. These standard errors are presented in parentheses below the coefficients. These child fixed effect models allow one to compare schooling outcomes in periods after a parental death with periods before a parental death. The child is necessarily older in the post death period and Figure 5.1 clearly shows that schooling outcomes deteriorate with age so it is very important to adequately control for age. All regressions include a full set of dummies for age.

Table 5.7: Parental death and schooling outcomes at ages 7-17: child fixed effects

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.077	-0.078	-0.022	-0.065	-0.018	-0.057
	(0.037)*	(0.030)*	(0.031)	(0.036)+	(0.032)	(0.034)+
Father deceased	0.012	-0.002	0.009	-0.098	-0.064	-0.067
	(0.024)	(0.019)	(0.017)	(0.033)**	(0.028)*	(0.025)**
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21545	21876	19860	20814	21065	19353
Number of children	2060	2060	2052	1975	1975	1967

Notes to Table 5.7: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Maternal death has a significant negative effect on grade advancement and enrolment for African children – respondents are 8 percentage points less likely to advance a grade and 8 percentage points less likely to be enrolled post their mother's death than prior to her death. The maternal death effect on the probability of passing conditional on being enrolled is negative although not significant. Coloured children are also significantly less likely to advance a grade and pass conditional on enrolment in the period post their mother's death than prior to her

death. They are not significantly less likely to be enrolled in periods post their mother's death. These results suggest that impact of a mother's death for African children operates primarily through a greater likelihood of dropping out after her death. For coloured children the effect operates primarily through performance in school with children more likely to fail after their mother's death. The relatively high dropout rate amongst all coloured teenagers evident in Figure 5.1 may partly explain why the differences in enrolment between coloured children who have and have not lost their mothers are not significant.

Paternal death appears to have no impact on grade advancement, enrolment or passing for African children. In contrast, for coloured children schooling outcomes are significantly adversely affected by father's death with coloured children being 10 percentage points less likely to advance a grade, 6 percentage points less likely to enrolled and 7 percentage points less likely to pass post their father's death than prior to his death.

These individual fixed effect models allow one to control for all time-invariant individual level unobservable or unmeasured characteristics. A causal interpretation of the parental death coefficients assumes that there are no unobserved time-varying factors that affect both parental death and schooling outcomes. The most plausible problem factor is arguably changes in household socioeconomic status. Aggregate socioeconomic status between the ages of 7 and 17 and socioeconomic status at baseline (age 7) will be absorbed into the individual fixed effect but changes in socioeconomic status between these ages are omitted from the models in Table 5.7. Whether omission of changes in socioeconomic status threatens the validity of a causal interpretation of the parental death effects in Table 5.7 depends on whether changes in socioeconomic status are correlated with the probability of parental death. In the event that there is such a correlation the temporal ordering of the changes is important.

The aim of the empirical work in this thesis is to estimate the reduced form effect of parental death via a range of possible pathways. Therefore, a scenario where parental death

results in a negative change in socioeconomic status which in turn has a negative impact on a child's schooling would not threaten a causal interpretation. In this case I would argue that parental death has a causal effect on children's schooling but that this effect is both direct and indirect with the indirect effect operating through the negative impact of parental death on socioeconomic status. If, on the other hand, the causality ran the other way with a change in socioeconomic status increasing the probability that a parent died then one cannot argue for a causal interpretation of the coefficients presented in Table 5.7 as the correlation between parental death and poor schooling outcomes is merely spurious.

The life history calendar did not include any information on socioeconomic status and, therefore, I am unable to directly address concerns about time-varying socioeconomic status. Although each wave of the CAPS collected a rich set of socioeconomic information, there are insufficient parental deaths between waves to allow any within-child estimation of parental death impacts. Among African young adults, 80 lost their mother and 144 lost their father between Wave 1 and Wave 4. Thirty four (34) coloured young adults lost a mother and 60 lost a father. Around half of these young adults were already aged 18 or older at Wave 1 and they all would have been 18 or older at Wave 4. Less than 16% of the parental deaths occurred before the young adults were 18 years old. The characteristics of older respondent's Wave 1 and Wave 4 households may also be quite dissimilar to their household when they were of school-going age especially if they had moved away from their childhood home. This sample clearly does not lend itself to an analysis of the impact of parental death between waves on a change in schooling outcomes controlling for changes in socioeconomic status. Nevertheless an examination of their Wave 1 household characteristics does suggest an association between future paternal death and current socioeconomic status. African and coloured respondents whose fathers die between Wave 1 and Wave 4 live in households in Wave 1 with significantly lower household per capita

incomes. Respondents whose mothers died between waves did not live in significantly poorer or richer households (see columns 3 and 4 of Table A5.4 in the appendix).

Lam *et al.* (2007) in their analysis of progression through school in the CAPS found that the association between grade advancement and many variables typically included in an education production function, such as income and parents' education, is weaker for African children than for coloured children. The cross-sectional results in Tables 5.5 and 5.6 are similar in that the logarithm of per capita household income had no predictive power for African children. Including household controls also had no impact on the maternal death coefficients for both African and coloured children. This cross-sectional evidence from the CAPS together with the evidence from the previous two chapters suggests that there is no systematic relationship between maternal death and socioeconomic status. The association between maternal death and poor schooling outcomes appears to be direct rather than channelled through socioeconomic status. Paternal deaths, on the other hand, are associated with poorer socioeconomic status and in cross-sectional work much of the deficit experienced by children who have lost a father is explained by the relative poverty of their current household. I would argue that empirical evidence supports a causal interpretation of the maternal death coefficients in Table 5.7 and that the results from the previous chapter are therefore generalizable beyond the rural field site. It is less clear how much of a causal interpretation can be placed on the coloured paternal death coefficients.

5.7 Timing and parental death effects

Longitudinal datasets seldom span a sufficient time frame to allow us a more nuanced view of the exact timing of when children start to fall behind in relation to the parental death and whether they begin to recover at some point. The number of time periods (or ages) in the panel allows an investigation into the timing of parental death effects in the fixed effects framework that was not possible with the Africa Centre data in the previous chapter. The fixed effects

models in Table 5.7 assume that parental death effects are constant in the period following the parent's death. This assumption is relaxed in Table 5.8 in two ways. Firstly, I include interaction terms between the length of time since the parent's death and the parental death indicators in the fixed effects specification shown in equation 5.3. Secondly, I estimate a fixed effects model with indicator variables for specific periods pre and post the parental death.

The first column of Table 5.8 shows results from regressions similar to those presented in Table 5.7 with interaction terms between the length of time (in years) since the parent's death and the parental death indicators included. Specifically, I estimate individual fixed effect regressions of the following form:

$$Y_{it} = \beta_m M_{it} + \beta_F F_{it} + \pi_m M_{it} \times T_{it} + \pi_F F_{it} \times S_{it} + \gamma X_{it} + \varepsilon_{it}, \qquad (5.4)$$

where T_{it} is the time in years since the mother's death when the child is observed at age t and S_{it} is the time in years since the father's death. If children suffer developmental delays when parents die, I would expect the coefficient on the indicator that a parent is dead to be negative ($\beta < 0$). If developmental delays are cumulative, we would expect the coefficient on time since death to be negative also ($\pi < 0$). However if children recover from the loss, time since death would bring children back toward where they may have been before the parent's death: $\beta < 0, \pi > 0.$

All observations for individuals who are missing parent's vital status for more than one year are excluded from the analysis. For the small number of cases where the exact year of a parent's death is unknown it is assumed that the first year in which we know the parent is dead is the first year since death. Results are very similar if we omit these individuals from the analysis. For African children the impact of maternal death on the probability of advancing a grade increases with the length of time that the mother has been deceased. The magnitude of the disadvantage doubles for every additional four years since the mother's death. Findings are

similar for paternal deaths for coloured children with the impact increasing with time since the death although the magnitude of the disadvantage only doubles for each additional seven years since the father's death. Interestingly the impact of maternal death for coloured children does not appear to increase with time since the death.

Table 5.8: Time since parental death and progress through school at ages 7-17: child fixed effects

	African		Coloured	
	Dependent variable: Advanced a grade		Dependent variable: Advanced a grade	
	(1)	(2)	(1)	(2)
Mother deceased	-0.032		-0.096	
	(0.043)		(0.042)*	
Mother deceased x years since mother died	-0.018		0.008	
	(0.009)+		(0.009)	
Father deceased	0.021		-0.07	
	(0.024)		(0.033)*	
Father deceased x years since father died	-0.005		-0.011	
	(0.004)		(0.005)*	
One and two years before mother died		-0.04		-0.072
		(0.037)		(0.036)*
Mother died this year		-0.064		-0.12
		(0.046)		(0.051)*
One and two years after mother died		-0.075		-0.097
		(0.046)		(0.048)*
Three plus years after mother died		-0.171		-0.097
		(0.057)**		(0.055)+
One and two years before father died		0.005		-0.036
		(0.022)		(0.034)
Father died this year		-0.001		-0.143
		(0.030)		(0.040)**
One and two years after father died		0.019		-0.089
		(0.031)		(0.044)*
Three plus years after father died		0.016		-0.131
		(0.037)		(0.049)**
Child fixed effects	Yes	Yes	Yes	Yes
Observations	21147	21221	20563	20662
Number of children	1988	1988	1929	1929

Notes to Table 5.8: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Regressions exclude individuals whose parents' vital status information is missing for more than one age. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Following Evans and Miguel (2007), the second column of Table 5.8 presents coefficients and standard errors from child fixed effects models that include a combined indicator for the two years prior to the death, an indicator for the year of the death, a combined indicator for the two years following the death and another combined indicator for the period three or more years after the death. For African children there do not appear to be any significant pre-death effects for mother's deaths and the impact of maternal death increases with the length of time since the death. Paternal death appears to have the greatest impact on grade advancement for coloured children in the year of the death and in the period three years or more after the death. Maternal death has a significant negative effect on grade advancement for coloured children in the two years before the mother dies and in all periods thereafter.[33] Similarly to Evans and Miguel (2007), these preliminary results provide no evidence of orphan recovery after parental death. The evidence presented here together with the earlier cross sectional findings in this chapter suggest that orphan schooling deficits in childhood will result in long run deficits in the ultimate human capital that these orphans acquire. There is no evidence that orphans begin to bounce back or that the gap between orphans and non-orphans diminishes as the time since the death increases.

Table 5.9 investigates whether the impact of parental death increases or decreases with the age of the respondent. The first column shows results from regressions that separate the maternal and paternal death indicators into two indicators each – one for ages at which the parent was deceased and the child was younger than 13 years of age and another for ages at which the parent was deceased and the child was older than 13 years of age. For African children whose mothers have died the impact of her death is greater the older they are. Indeed there

[33] Not all children whose parents die are observed 3 or more years after their parent's death. The panel is constructed in such a way that children whose parents die when they are 15 or older are never observed 3 or more years after their parent's death. The coefficient on the indicator for the period of 3 or more years after the parent's death is therefore estimated off a group of children whose parents died before they were 15 years old. The average age of the child when their mother or father died is between 4 to 5 years younger for those who are observed 3 or more years after the death compared to those who are not observed that far after the death. It is therefore not clear if the indicator for 3 or more years after the death is capturing length since parental death or is an indicator that the parent died when the child was younger. If I restrict the sample to those children who were observed at least 3 years after the death the coefficient on the indicator for 3 or more years after the death is very similar.

appears to be no maternal death effect before the age of 13. For coloured children the impact of maternal death does not differ significantly by the age of the respondent while paternal death impacts are significantly greater for children aged 13 and older than children under the age of 13. Regressions were also run including interaction terms between the parental death indicators and the age of the child (results shown in Table A5.9 in the appendix). For African children the predicted maternal death effect is only negative from age 12 onwards. For coloured children the interaction term is insignificant for maternal death. The predicted paternal death effect for coloured children is negative from age 7 onwards and increases with age. Although the positive correlation between the age of the respondent and the length of time since the parent has been deceased is not strong (the correlation coefficients are 0.07, 0.20, 0.19 and 0.28 for African mothers, coloured mothers, African fathers and coloured fathers respectively) it does make it difficult to distinguish greater impacts as the time since the parent's death increases and greater impacts as children age.

The second column of Table 5.9 shows results from regressions that investigate whether the parental death effect varies with the age of the child when the death occurred. Regressions are run with separate indicators for parental death before the child was 13 years old and parental death after the child was 13 years or older. Interestingly although outcomes tend to be worse the longer the parent has been deceased, the death of a mother in one's teenage years appears to have a greater impact than a death in the pre-teen years. For both African and coloured children it seems that the loss of a mother in one's teens has a more adverse affect on schooling outcomes than losing her before one turns 13 years old, although the difference between the coefficients is only significant for coloured children. For coloured children the impact of paternal death does not differ significantly by the age of the respondent when their father died.

Table 5.9: Age at parental death and progress through school at ages 7-17: child fixed effects

	African		Coloured	
	Dependent variable: Advanced a grade		Dependent variable: Advanced a grade	
	(1)	(2)	(1)	(2)
Mother deceased x age less than 13	0.038		-0.097	
	(0.055)		(0.040)*	
Mother deceased x age 13 or older	-0.085		-0.055	
	(0.038)*		(0.037)	
Father deceased x age less than 13	0.053		-0.046	
	(0.025)*		(0.034)	
Father deceased x age 13 or older	0.001		-0.111	
	(0.025)		(0.034)**	
Mother deceased when child less than age 13		-0.041		-0.014
		(0.068)		(0.044)
Mother deceased when child aged 13 or older		-0.082		-0.136
		(0.045)+		(0.062)*
Father deceased when child less than age 13		0.039		-0.083
		(0.037)		(0.049)+
Father deceased when child aged 13 or older		-0.021		-0.115
		(0.033)		(0.051)*
Child fixed effects	Yes	Yes	Yes	Yes
Observations	21538	21064	20807	20453
Number of children	2060	1981	1975	1918

Notes to Table 5.9: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Although it is difficult to separate out the effects of the age of the child and the length of time since the parent died the results in Tables 5.8 and 5.9 show no evidence of orphans 'bouncing back' and suggest the negative impacts of losing a parent in childhood are likely to have lasting effects on the ultimate human capital accumulation of these children. This interpretation is supported by the direct examination on the impact of parental loss in childhood on the probability of completing high school by early adulthood in the previous section.

The next section uses the rich set of data collected in the first wave of the CAPS to try and understand why effects are different for maternal and paternal deaths and why there are racial differences in the impact of paternal death on a child's schooling outcomes.

5.8 Parental presence, characteristics and roles and children's schooling

The cross-sectional and longitudinal results presented earlier show that the impact of parental death differs by the gender of the parent and these gender differences are not uniform across population groups. The loss of a mother has a negative impact that is not associated with socioeconomic status on the schooling of African and coloured children. In contrast, paternal deaths only have a negative impact on the schooling of coloured children and this negative impact is partly explained by socioeconomic status. The CAPS data allow some insight into the different roles of mothers and fathers particularly with respect to their children's education and how these roles differ by population group. This section begins with an examination of racial and gender differences in child-parent co-residency patterns and the association between these co-residency patterns and schooling outcomes. I then present some descriptive evidence on racial differences in parental characteristics and roles.

Anderson *et al.* (2001) use the 1995 OHS and find that children who do not reside with both genetic parents are at risk for poorer educational outcomes. It is possible that much of the difference between maternal and paternal death for African children and between coloured and African children for paternal death is explained by differences in parent-child co-residency patterns. Table 5.4 includes summary measures of parent-child co-residency patterns by population group. Both African and coloured children are significantly more likely to live with their mothers than their fathers but African children are much less likely to live with either parent than coloured children. One in five African children lives with neither parent as opposed to one in eight coloured children. Thirty five percent (35%) of African children live with both parents as opposed to 52% of coloured children.

It is not clear to what extent the racial differences in parent-child co-residency patterns seen in Table 5.4 explain the racial differences in the impact of parental death on schooling outcomes. It is plausible that the physical absence of a father for the majority African children explains the lack of a paternal death effect. However the difference between the percentage of

coloured children who live with their mother and with their father is also substantial and there are significant negative effects of paternal death for these children. Table 5.10 presents results from regressions that explore the association between parent-child co-residency patterns and progress through school for the same sample as that used in Table 5.6. The first column presents estimates of the impact of the proportion of one's life up to the age of 14 lived with your mother and your father on the probability of passing grade 12 by 2006. For African children there is positive but insignificant effect of living with your mother and a significant negative effect of living with your father. Taken literally the coefficients imply that children who always lived with their father are 9 percentage points less likely to matriculate than those that never lived with their father. This effect is unchanged by adding household controls. For coloured children the proportion of life up to the age of 14 that one has lived with their mother has no significant effect on completing secondary school while more time spent co-residing with their father has a large positive effect. Much of the positive effect of living with a father is explained by household socioeconomic status and the coefficient in the second column where household controls are added to the regression is substantially reduced. For coloured children household per capita income at Wave 1 is significantly lower if their father is not resident (see column 5 of Table A5.4 in the appendix). There are no significant differences in household per capita income between African children whose fathers are co-resident and those whose fathers are absent.

Table 5.10: Parental co-residence and the completion of secondary school for CAPS respondents born between 1985 and 1987 and re-interviewed in 2006

	African				Coloured			
	Dependent variable: Completed Grade 12 by 2006				Dependent variable: Completed Grade 12 by 2006			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Proportion of life up to age 14 lived with mother	0.097	0.102			-0.008	0.075		
	(0.062)	(0.058)+			(0.077)	(0.065)		
Proportion of life up to age 14 lived with father	-0.089	-0.079			0.198	0.087		
	(0.047)+	(0.049)			(0.048)**	(0.044)*		
Mother is co-resident (2002)			0.065	0.085			-0.003	0.072
			(0.040)	(0.040)*			(0.051)	(0.048)
Father is co-resident (2002)			-0.063	-0.054			0.209	0.112
			(0.039)	(0.040)			(0.040)**	(0.038)**
Includes household controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	549	549	549	549	661	660	661	660

Notes to Table 5.10: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1 percent level, those marked with one (*) are significant at the 5 percent level, and those marked with a plus sign (+) are significant at the 10% level.

The third and fourth columns show estimates of the impact of co-residence with one's parents at the first wave of the CAPS in 2002. Results are very similar to those for the proportion of one's life up to the age of 14 that one lived with one's parents. The evidence from Table 5.10 makes it clear that we cannot attribute the racial differences in the impact of paternal death to the fact that coloured fathers are more likely to be co-resident. The impact of paternal presence appears to differ markedly by race and the relationship between father's co-residence and socioeconomic status is also very different. Results in Table 5.10 also suggest that the loss of maternal presence only explains a portion of the negative effect of maternal death.

Table 5.11 attempts to shed some light on to why the impact of paternal presence differs for African and coloured children by looking at parental characteristics. Information about mother's and father's level of education and employment status is available from the household roster for co-resident parents and from the young adult questionnaire for non-resident parents. Young adults were also asked a number of questions about their parent's involvement and influence in their education. Table 5.11 presents parental characteristics for respondents of school going age (younger than age 18) at Wave 1. The sample is restricted to children whose parents are known to be alive as there are differential rates of parental mortality by population group. Characteristics are presented separately for co-resident mothers, absent (but alive) mothers, co-resident fathers and absent fathers.

Table 5.11: Parental characteristics and roles for CAPS respondents under the age of 18 years at Wave 1 (2002)

	African			Coloured		
	Obs.	**Mean**	**Std Err**	**Obs.**	**Mean**	**Std Err.**
Mother is co-resident						
Mother helped with homework in the last 12 months	625	0.214	0.016	818	0.257	0.015
Mother had most important influence on how you performed in school	624	0.768	0.017	818	0.687	0.016
Mother's education	614	8.13	0.12	805	8.56	0.10
Mother is employed	596	0.589	0.020	784	0.642	0.017
Mother is absent but alive						
Mother helped with homework in the last 12 months	209	0.048	0.015	136	0.066	0.021
Mother had most important influence on how you performed in school	208	0.438	0.034	136	0.257	0.038
Mother's education	152	8.65	0.23	86	8.65	0.31
Mother is employed	188	0.378	0.035	117	0.556	0.046
Mother lives in Cape Town	205	0.390	0.034	133	0.887	0.028
Father is co-resident						
Father helped with homework in the last 12 months	346	0.101	0.016	525	0.190	0.017
Father had most important influence on how you performed in school	346	0.240	0.023	525	0.234	0.019
Father's education	334	6.85	0.19	509	8.76	0.14
Father is employed	330	0.745	0.024	509	0.827	0.017
Father is absent but alive						
Father helped with homework in the last 12 months	359	0.003	0.003	355	0.048	0.011
Father had most important influence on how you performed in school	359	0.033	0.009	355	0.014	0.006
Father's education	138	8.20	0.35	125	8.90	0.29
Father is employed	256	0.570	0.031	229	0.721	0.030
Father lives in Cape Town	332	0.428	0.027	330	0.827	0.021

Over three quarters (77%) of African children and 69% of coloured children who co-resided with their mothers reported their mother as the person who had the most important influence on how well they performed in school. In contrast just under a quarter of African and coloured children who live with their fathers mention their father as the person who had the most important influence. Amongst children who were not living with their mothers at Wave 1, 44% of Africans and 26% of coloureds mentioned their mother as having the most influence. Absent fathers were almost never mentioned as having the most important influence on their child's educational performance. Responses to a question about who gave the child the most encouragement towards achieving their personal goals were very similar. Children were asked who helped them with their homework in the last 12 months. Multiple mentions were allowed with mothers and fathers in the list of possible responses that were read out. Mothers were significantly more likely than fathers to help with homework in the last 12 months with similar percentages helping African (21%) and coloured (26%) children who lived with their mothers. Only 10% of African children who lived with their fathers reported that their fathers helped with their homework as opposed to 19% of coloured children who lived with their fathers. A small percentage (5%) of absent fathers helped coloured children and no absent fathers were reported to help African children.

Unfortunately there are a high percentage of don't know responses for the education and employment status of absent parents and it is unlikely that parents for whom information is missing are a random sample. It is therefore difficult to say anything about differences in the characteristics of resident and absent parents. In terms of co-resident parents' characteristics, racial differences between mothers are less pronounced than those between fathers. Co-resident mothers of African children have completed on average 8 years of education as opposed to mothers of coloured children who have completed 8.6 years of education. Co-resident fathers of coloured children have on average completed almost two more years of schooling than co-resident fathers of African children. Interestingly there is very little difference between mothers'

and fathers' education for coloured children. For African children co-resident fathers have completed about 1.2 years less education than co-resident mothers. Turning to employment, there are stark racial and gender differences. Fifty nine percent (59%) of co-resident mothers of African children are employed as opposed to 64% of co-resident mothers of coloured children. Eighty three percent (83%) of co-resident fathers of coloured children are employed as opposed to 75% of co-resident fathers of African children.

Non co-resident parents of coloured children are much more likely to live in Cape Town than non co-resident parents of African children. Fifty one percent (51%) of absent mothers and 35% of absent fathers of African children live in the Eastern Cape. One might expect outcomes for children with co-resident and absent parents to differ less if the absent parent lives close by. If this were the case, the proximity of these absent parents to their children would imply smaller effects of co-residence for coloured children which is not borne out in the data.

Amongst all living parents, African fathers are the least likely to co-reside with their children of school-going age. In stark contrast to coloured children, living with a father does not seem to be associated with better schooling outcomes for African children. Amongst all co-resident parents, African fathers are the least likely to help with homework and have the lowest levels of education. Their employment levels are lower than coloured fathers but considerably higher than that of African and coloured mothers. The evidence presented in this section is descriptive and largely suggestive. Further research is needed to understand the mechanisms through which parental death affects a child's schooling, and the racial differences in the impact of paternal presence on schooling outcomes.

5.9 Summary

African and coloured children in metropolitan Cape Town who have experienced parental loss are at risk for poorer schooling outcomes and these educational deficits persist into early adulthood. Longitudinal evidence from the CAPS supports the interpretation of the previous chapter that mother's deaths have a causal impact on children's schooling outcomes.

African and coloured children are 7 to 8 percentage points less likely to advance a grade in the years following a mother's death than in the years prior to her death. Also consistent with the previous chapter, I find no evidence of a causal effect of paternal loss on schooling for African children. For coloured children, however, the loss of a father has a significant and material negative effect on their education in both the cross-section and the panel. In the cross-section a substantial portion of the paternal death effect for coloured children is explained by socioeconomic status. This makes a causal interpretation of the longitudinal results for coloured paternal death somewhat less clear cut than those for maternal deaths.

I find no evidence of orphan recovery in the period following their parent's death and results suggest that negative impacts increase with the time since the parent died. The longer-run impact of parental death in childhood is also evident in an analysis of the completion of secondary schooling by early adulthood. Young adults who lost parents in childhood are significantly less likely to have completed secondary school. Together these results suggest that parental death will reduce the ultimate human capital attainment of the child.

A full synthesis of the results from Chapters 3 to 5 is provided in the beginning of the next chapter. I then document the South African government's response to the growing number of orphaned and non-orphaned children affected by HIV/AIDS and consider the appropriateness of the proposed and existing policies in light of the empirical evidence presented in Chapters 3 to 5.

CHAPTER 6:

SUMMARY OF FINDINGS, GOVERNMENT RESPONSE, POLICY IMPLICATIONS AND FUTURE WORK

6.1 Introduction

One of the lasting effects of the HIV/AIDS crisis will be the impact it has on the education of the generation of children now of school going age. Throughout sub-Saharan Africa, the crisis is reducing educational attainment, a result that can be expected in turn to dampen economic growth and the health and general well-being of Africans.

Policy makers are currently grappling with the selection of policies to deal with the crisis, and disagreement abounds. Some policy makers are currently arguing for free universal state education as the fairest way of dealing with the gathering storm (Giese *et al.* 2003). Some researchers-cum-policymakers in South Africa argue that it would be unfair to provide special services to orphans (Meintjes *et al.* 2003). They note that there are many poor children in South Africa whose parents are alive, who are also at risk for poor schooling outcomes. Meintjes *et al.* (2003:22) ask "why, in the context of widespread poverty, [should] children in the care of relatives require special grants different from children living with biological parents?" The evidence provided here speaks directly to this question, showing that, in both poor and wealthy households, children who have lost mothers are at risk of poor outcomes, relative to the children with whom they live.

This chapter begins with a synthesis of the empirical findings of the preceding three chapters. The following section documents the government's response to the rapid growth in the number of orphans and children made vulnerable by HIV/AIDS. I then consider the appropriateness of such policies given the empirical evidence in this thesis. I conclude with recommendations for further research.

6.2 Synthesis of empirical findings

The primary objective of this thesis was to provide as comprehensive and insightful a body of empirical evidence on the impact of parental death on schooling in South Africa as possible with available data. The series of 11 nationally representative datasets were employed to present a picture of orphan vulnerabilities for South Africa as a whole and of changes in these vulnerabilities over time as the AIDS crisis deepened. Localised longitudinal data provided an opportunity to add to this national evidence and establish whether a causal interpretation of the statistical associations between parental death and schooling was appropriate. Together, the ACDIS and the CAPS data allowed for a more comprehensive investigation into the causal impact of parental death. Not only are these two populations geographically and ethnically distinct, there is substantial variation in socioeconomic status between and within the two field sites. Average per capita household income for African children in metropolitan Cape Town is more than three times that of children in the Africa Centre demographic surveillance site and less than half that of coloured children in metropolitan Cape Town. The consistency of results across all of these datasets suggest that findings from the ACDIS and the CAPS may be generalizable beyond the rural and urban field sites and that the biases introduced by comparing African children to children with whom they currently live in the cross-sectional analyses may not be substantial. The triangulation of results from Chapters 3 to 5 point to a number of empirical regularities about the impact of parental death on schooling.

First, for African children mothers' deaths are associated with schooling deficits that are substantially larger than those observed for fathers' deaths. Whether I compare orphans to all other children their age, to children with similar socioeconomic status, or to non-orphaned children with whom they live, the loss of a child's mother is associated with lower grade attainment and lower enrolment. In the cross-section maternal deaths appear to be directly associated with poorer schooling outcomes rather than channelled through socioeconomic status.

Second, the evidence presented here is consistent mother's deaths having a causal effect on the schooling outcomes of African children. Aside from differences between the ACDIS and CAPS populations, the CAPS data enabled a slightly different methodological approach to that adopted with the ACDIS. In Chapter 4 I estimated the causal impact of maternal death in two ways. I first examined the impact of future deaths and then employed a difference in difference estimation strategy to investigate the impact of a death between the two waves of the household socioeconomic surveys on changes in grade attainment and enrolment. In Chapter 5 I constructed a panel dataset spanning 11 ages in order to apply within-child estimators to compare schooling outcomes in periods post the parent's death to outcomes in periods prior to the parent's death. Evidence from both the CAPS and ACDIS supports the interpretation that mother's deaths have a causal impact on African children's schooling outcomes.

Third, controlling for socioeconomic status in the cross-sectional analyses either significantly reduces or eliminates altogether the negative effect of paternal death for African children. Adding to this, I find no evidence of a causal effect of paternal loss on schooling in either the CAPS or the ACDIS data. Evidence from ACDIS shows that households in which father's died were poor prior to the father's deaths and that the death of a father between waves of the survey has no significant effect on future asset ownership. The correlation between fathers' deaths and children's schooling outcomes appears to be driven entirely by their common link to household economic status.

Fourth, orphans' educational outcomes do not appear to improve as the time since their parent's death increases. Results from ACDIS suggest that children do not 'bounce back' as time since their mother's death increases. The CAPS data allowed for a more detailed exploration of the effects of parental death over time than the ACDIS data. In the CAPS I find no evidence of orphan recovery in the period following their parent's death and results suggest that negative impacts increase with the time since the parent died. The longer-run impact of parental death in childhood is also evident in an analysis of the completion of secondary schooling by early

adulthood. African and coloured young adults who lost mothers and coloured young adults who lost fathers in childhood are significantly less likely to have completed secondary school. Together these results suggest that parental death will reduce the ultimate human capital attainment of the child.

Fifth, the magnitude of enrolment deficits relative to gaps in educational attainment suggest that enrolment is less of an issue than performance at school, particularly for younger children. Enrolment is not synonymous with attendance but attendance data is unfortunately not collected in any of the surveys used in this thesis. In general, data and methodological limitations prevent one from identifying the underlying pathways through which orphans perform poorly in school.

Sixth, increasing resources do not appear to close the gap between orphaned and non-orphaned children. In both poor and wealthy households, children who have lost mothers are at risk of poor outcomes, relative to the children with whom they live. This together with the lack of association between mother's deaths and household socioeconomic status suggest that changes in the household budget constraint is not the primary pathway through which maternal death affects schooling outcomes.

In addition to these insights that were common and triangulate across Chapters 3 to 5, there are a number of chapter specific findings that enhance our understanding of the impact of parental death on schooling.

Despite a significant increase in the number of orphans over the last decade I find no evidence of a systematic deterioration over time in traditional coping strategies with respect to orphan's educational outcomes. Patterns of care giving for orphans appear to be shifting 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. These patterns of care giving are important for educational outcomes. Orphans who live with grandparents fare better

than those living with more distant family or non-relatives. Parental absence is associated with schooling deficits but these deficits are substantially smaller than those observed for parental death. This suggests that loss of parental involvement is one of the pathways through which parental death affects schooling outcomes.

The CAPS data provided a unique opportunity to explore racial differences in the impact of parental death. The loss of a mother has a similar negative impact for both African and coloured children. There are marked racial differences in the impact of paternal death. The loss of a father has an insignificant impact of the education of African children and a significant and substantial negative effect on the education of coloured children although some of this effect is explained by socioeconomic status. This is the only evidence of any paternal death effect independent of socioeconomic status in all the datasets employed in this thesis. These racial differences are not accounted for by differences in father-child co-residency patterns with the association between schooling and co-residence with a father also differing markedly by race.

While data and methodological limitations prevented me from revealing underlying pathways, the evidence here has enhanced our understanding of the impact of parental death on schooling in a number of critical ways. The next section documents the government's response to the growing number of children affected by HIV/AIDS. This provides the necessary context for the discussion in section 6.4 on the policy implications of the empirical findings of this thesis.

6.3 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 (sic) 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 the 2005 GHS 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 is payable to all children under 14 years of age whose primary caregiver passes a means test and is currently R210 a month. The Foster Care Grant (FCG) is available to children under 18 who have been placed in the care of foster parents by the Children's Court and is substantially larger (R650) 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 R940 per month (Leatt 2006; South African Social Security Agency 2008).

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 (Meintjes *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. In the Africa Centre DSA, only 9 percent of double orphans received grants of any kind and less than 2 percent received a foster care grant at the time of HSE2. Meintjes *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, Rosa and Hall (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 encountered 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.[34] 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 the 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

[34] Using the 2003 GHS to estimate the eligible population and the DSD records of child grant recipients, Budlender *et al.* (2005:24) calculate a take up rate of around 78%. If one uses the reports of receipt from the GHS, take up is estimated to be around 50%. While there is clearly under-reporting of grant receipt in the GHS, there is no reason to believe that children whose mothers have died are more likely to under-report grant receipt than those whose mothers are still alive. Even if maternal orphans were more likely to under-report grant receipt, the magnitude of the discrepancy in take up is so large that it is unlikely be entirely attributable to a bias in under-reporting.

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 up to the age of 18.

Research findings suggest that the CSG has a positive impact on nutrition and school enrolment. Using data from the KwaZulu-Natal Income Dynamics Study, Woolard, Carter and Aguero (2005) find that receipt of the CSG in early childhood resulted in significant gains in height. Case, Hosegood and Lund (2005) find in the Africa Centre DSA that children receiving the grant are significantly more likely to be enrolled in school than equally poor children of the same age. Using the 2003, 2004 and 2005 GHSs I conducted a similar analysis on the association between grant receipt and enrolment amongst 6 to 8 year olds (see detailed discussion and Table A6.1 in the Appendix). 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 therefore the interaction between maternal death and grant receipt is imprecisely measured. These national results are merely suggestive but accord with those of Case *et al.* (2005) in showing a positive association between grant receipt and school enrolment.

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 10 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. However, in practice the fee exemption policy has not been implemented. In the 2005 GHS for example, less than 1 percent of learners report paying no school fees. In the Africa Centre DSA, only 1 percent of resident children aged 6 to 16 who were enrolled in school were reported to have had paid no school fees in HSE2. 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.

6.4 Policy challenges

The empirical evidence of this thesis clearly shows that in both poor and wealthy households, children who have lost mothers are at risk of poor outcomes relative to the children with whom they live. Documenting that orphans are vulnerable, however, does not provide sufficient grounds for recommending policies that target orphans. Targeted policies bring with them a host of problems. It is often difficult to find an effective screening device that does not screen out the very people one is trying to target. The previous section documented the problems orphans face in accessing the FCG and the resultant low take up rates. Maternal and double orphans are also more likely to be screened out of non-targeted assistance through the CSG. Even if one agreed with Meintjes *et al.* (2003) that it is unfair to provide special services to

orphans in the face of widespread poverty, targeted intervention is required to ensure that maternal and double orphans are not denied access to general assistance for poor children. Aside from the difficulties with implementing targeted policies, I remain unconvinced that special grants are the best policy response to the risks that orphans face with respect to their schooling. My results in Chapters 3 and 4 suggest that cash transfers to orphans' caregivers are unlikely to close the gap in school attainment. Orphans suffer relative to the non-orphaned children with whom they live, and orphans in wealthier households are also at risk for education deficits.

In-kind educational transfers to orphans (such as waiving school fees and subsidizing uniforms) merit consideration. To date, such transfers have not been evaluated for their effectiveness (Subbarao and Coury 2004), and in South Africa, in-kind transfers targeted at poor children's education through fee exemptions have not proved successful with very few poor children reporting paying no fees. The new no-fee schools policy may prove more effective.

Social assistance through cash grants and fee exemptions are more likely to have a direct affect on enrolment than attainment. However, the empirical evidence in Chapters 3 to 5 shows the magnitude of enrolment deficits to be small relative to gaps in educational attainment for those below the age of 15. This suggests that enrolment is less of an issue than performance at school. Performance could be affected by low attendance rates amongst those who enrolled but unfortunately there are no measures of attendance in available datasets. For older children parental loss has a larger impact on enrolment but these children are excluded from the two most important policies discussed above, namely the CSG and the no-fees schools.

Whether these or other policies are to be recommended depends on the extent to which orphans are behind because they lost their education champion when their mother died, and the extent to which orphans are behind because they were scarred through the process of losing a mother. It seems clear then that in the South African context appropriate policies to address orphan deficits depend importantly on the mechanisms through which orphanhood affects performance in school.

6.5 Areas for future research

Ginther and Pollak (2004:672) argued that "honest policy debates rest on beliefs about structural relationships, not on stylized facts or descriptive regressions." To date, methodological and data limitations have prevented the estimation of structural parameters. More research is needed to understand the multiple pathways through which parental death affects a child in school. Knowing the relative importance of these pathways will assist in the prioritisation of government policies that effectively target orphans and reduce their risk of poor schooling outcomes. One could go some way towards identifying these pathways by following a cohort of children through time, assessing (perhaps annually) their cognitive, physical and emotional development together with more detailed schooling outcomes (such as attendance) than collected previously. This would allow one to describe changes in children's functioning when they became orphans and differences in their developmental paths relative to non-orphans. Demographic surveillance sites would provide ideal settings for such research.

This thesis has focussed on only one aspect of human capital attainment, namely schooling. Orphans may well be vulnerable in a range of other dimensions that interact with schooling to determine the long run impact of parental death. Orphans' sexual behaviour, fertility and health outcomes have received much less attention in the literature than orphans' educational outcomes. This would be a useful direction for future empirical research.

The evidence provided in this thesis suggests that losing a parent in childhood will have long run consequences for the socioeconomic well being of the child. There is very little direct evidence on how orphanhood affects adult outcomes such as labour market behaviour and fertility choices. Cross-sectional datasets that identify adults orphaned in childhood and longitudinal datasets that span sufficient time for one to observe orphans as adults will advance our understanding of long run consequences of orphan's poor schooling outcomes in childhood.

The triangulation of results from the two longitudinal datasets and the series of national cross-sectional datasets suggest that findings from the Umkhanyakude district and metropolitan

Cape Town are generalizable beyond the respective field sites. Nevertheless, the completion of the second wave of the National Income Dynamics Study will provide a unique opportunity to analyse longitudinal data at the national level.

APPENDICES

A2.1 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.

A3.1 Details on the creation and comparability of specific variables used in the analyses

A3.1.1 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 Chapter 3 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 A3.1 presents the question in each survey about parents' vital status.

Table A3.1: 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?

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 3.1 there does not seem to be any clear indication that those surveys produced under-estimates of rates of orphanhood.

Table A3.2 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. I recoded all these 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.

Table A3.2: Percentage of parent's vital status unknown for children aged 7-14

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%

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) included indicators that a child's orphan status was 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 A3.1 and A3.2 present alternative treatments of missing data to Figure 3.4. 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 A3.1 children with missing vital status for either parent are excluded from the analysis. Figure A3.2 shows estimates when parents with missing vital status are considered to be deceased. In Figure 3.4 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 Chapter 3 adopt the approach represented in Figure 3.4.

A3.1.2 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 0 to 14 whose parent is living but not co-resident are shown in Figures A3.3 and A3.4 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.

A3.1.3 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 A3.3 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 seems plausible.

Table A3.3: Percentage of children aged 7-14 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 A3.4: Fraction of children aged 7-14 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 A3.4 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 A3.3 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 (Department of Education 2004).

For ease of interpretation Chapter 3 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 A3.5 and A3.6 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 A3.5. 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.

Table A3.5: 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

A3.1.4 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)."

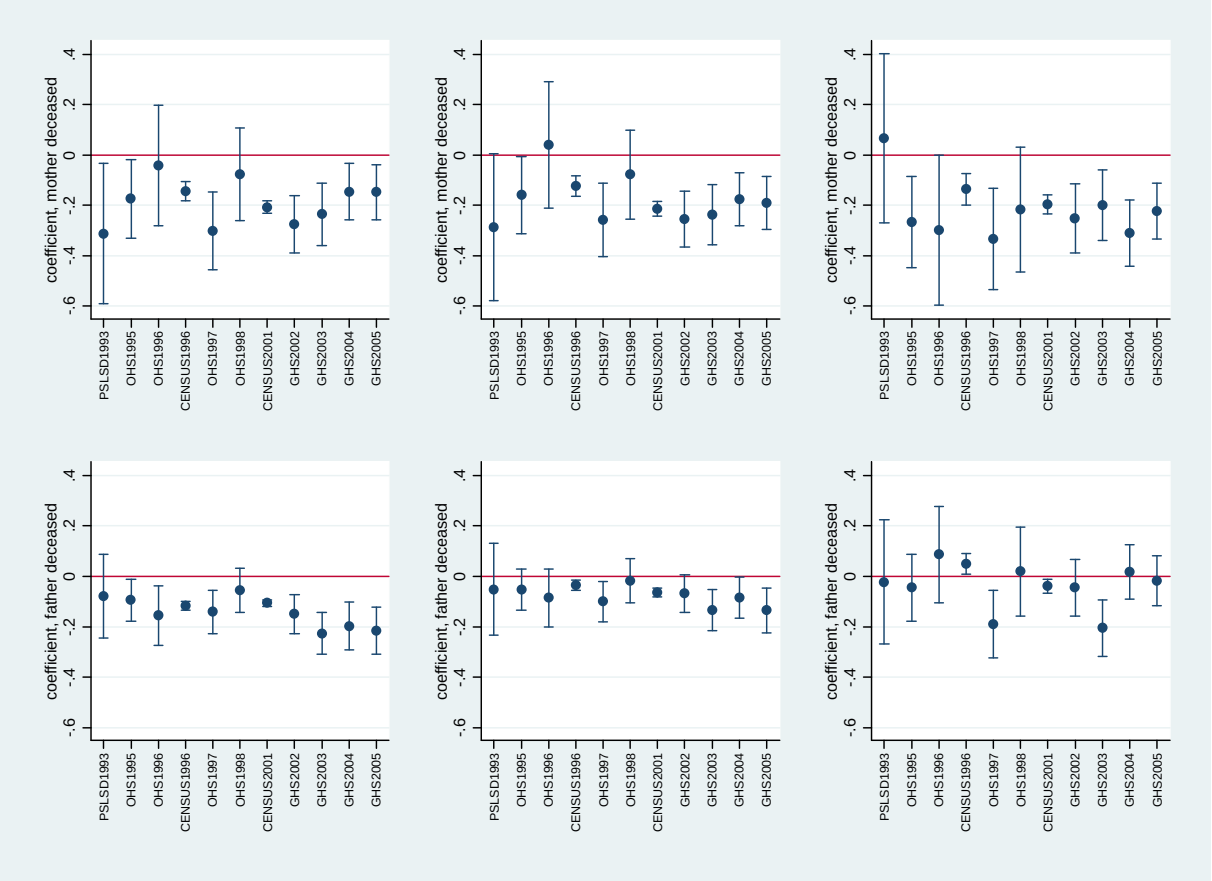
A3.1.5 Hygienic toilet

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.

A3.1.6 Expenditure

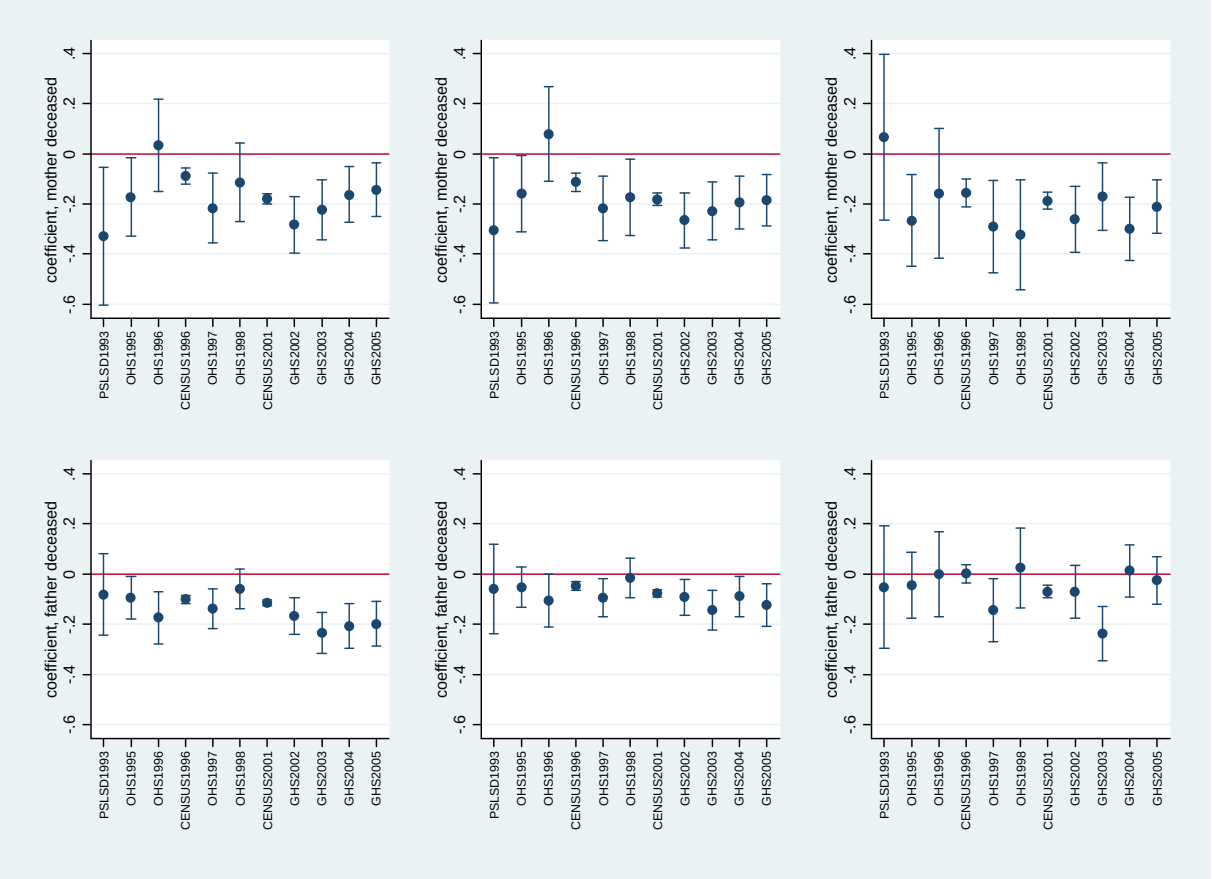
Household expenditure was expressed in bands in the 1996, 1997 and 1998 OHS and all the GHSs. The mid-point of each band was used as an estimate of expenditure in these surveys. Expenditure was not collected in the 1996 and 2001 Census so income was used instead. The 1995 OHS was merged with the 1995 Income and Expenditure Survey and the total expenditure variable was taken from the latter.

Figure A3.1: Coefficient estimates and 95% confidence intervals from regressions of years of completed education on indicators that mother and father are deceased for Africans aged 8-17



Notes to Figure A3.1: 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 A3.2: Coefficient estimates and 95% confidence intervals from regressions of years of completed education on indicators that mother and father are deceased for Africans aged 8-17



Notes to Figure A3.2: 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 A3.3: Proportion of children aged 0-14 whose mothers are alive but not co-resident

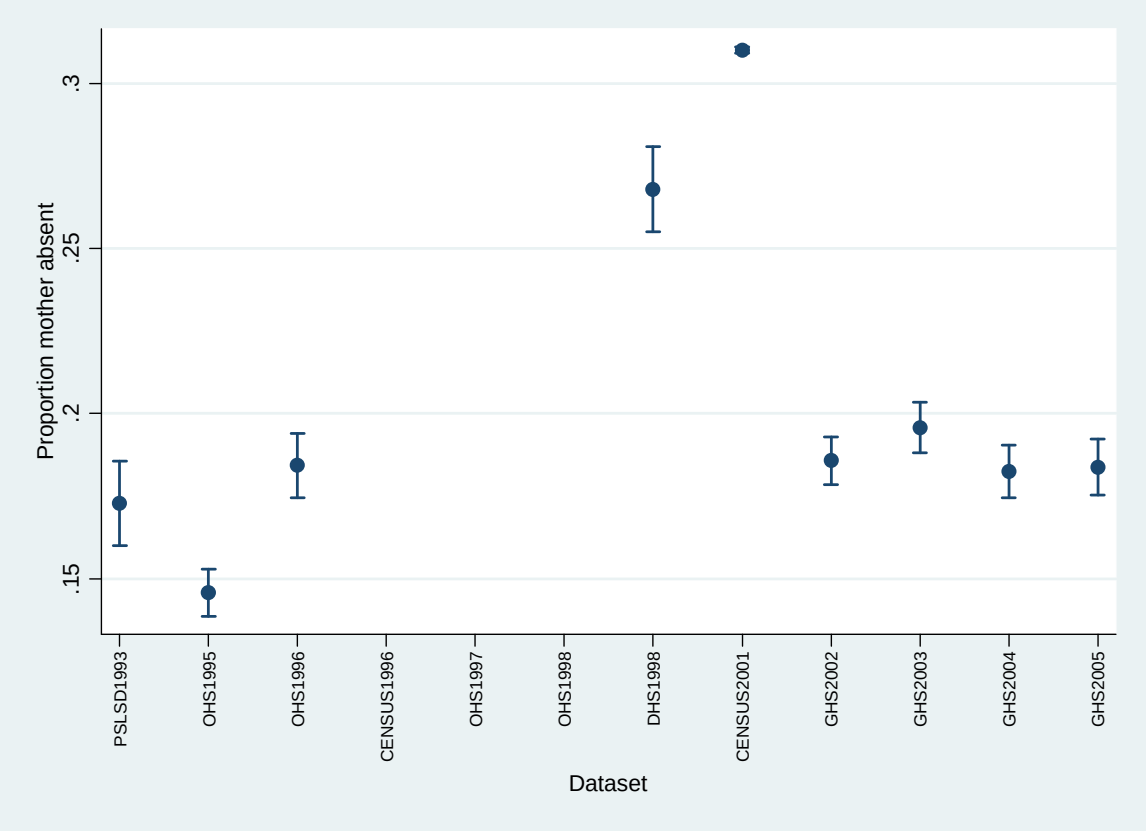


Figure A3.4: Proportion of children aged 0-14 whose fathers are alive but not co-resident

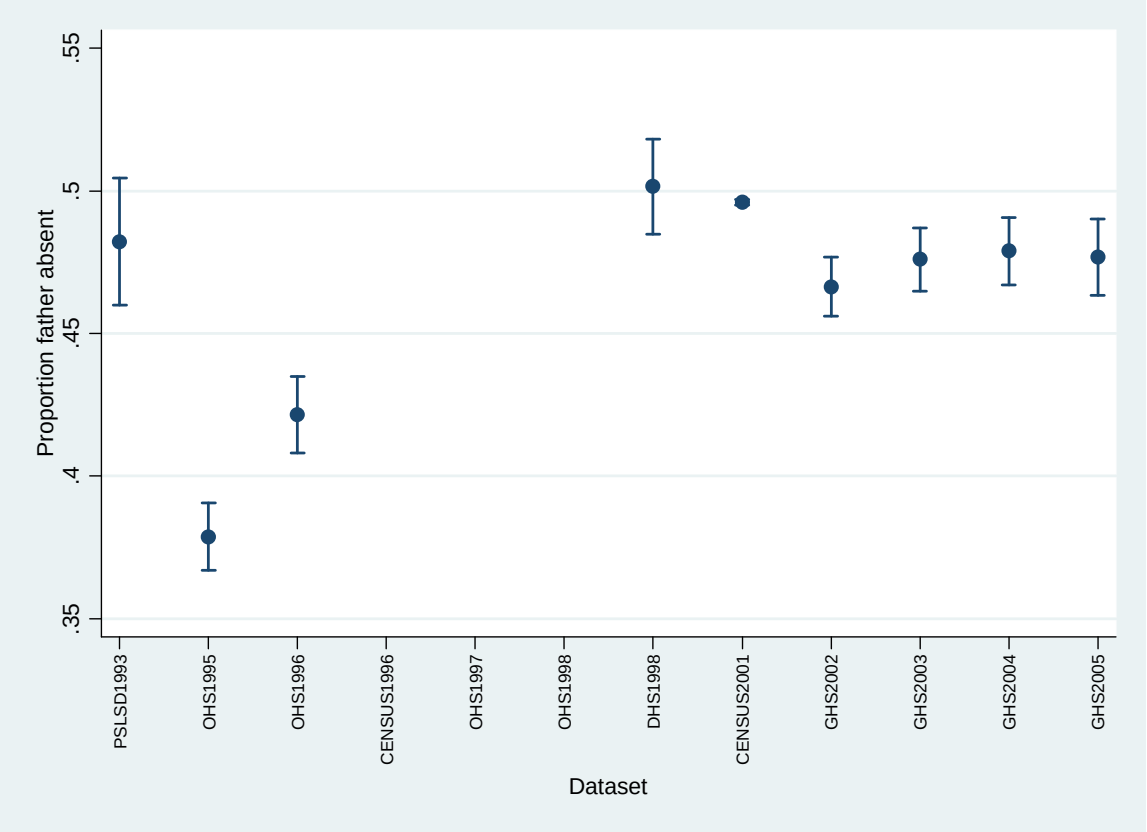
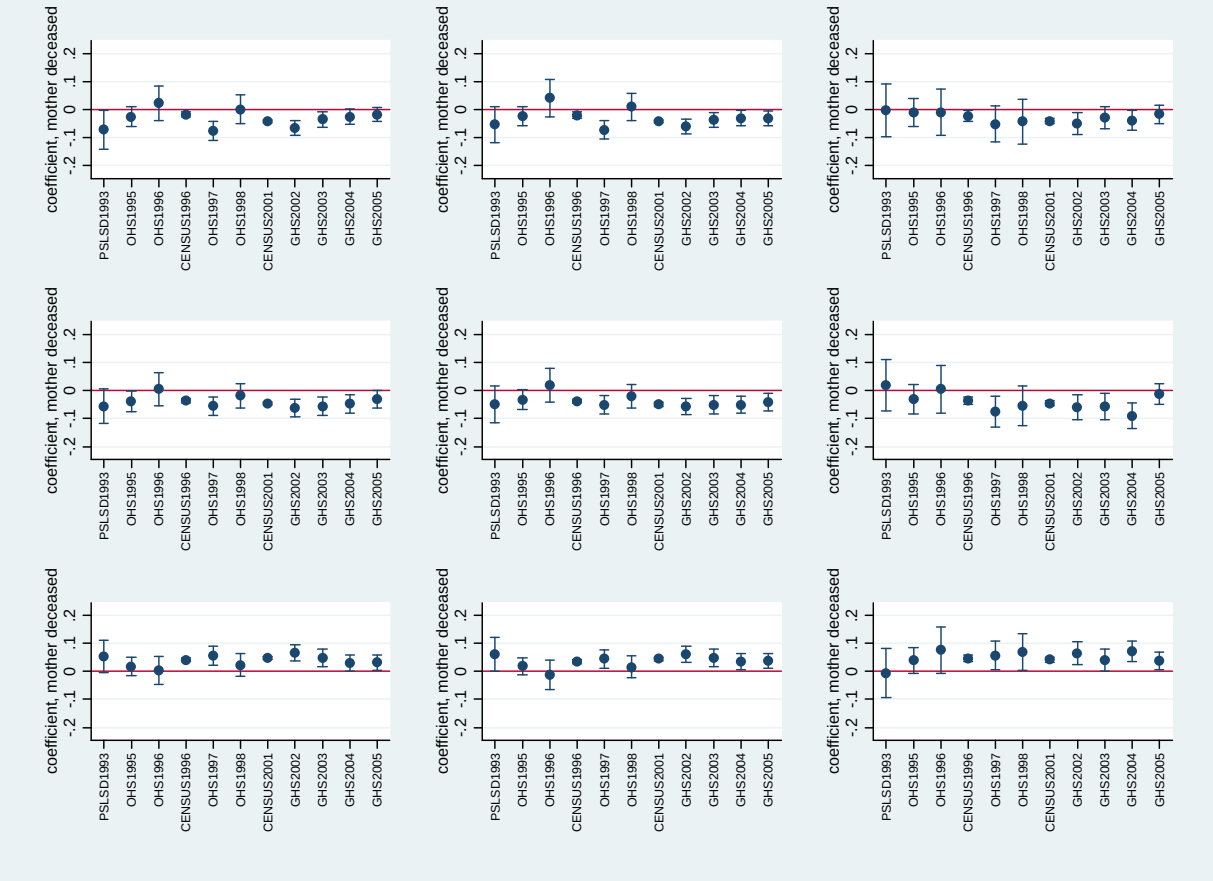
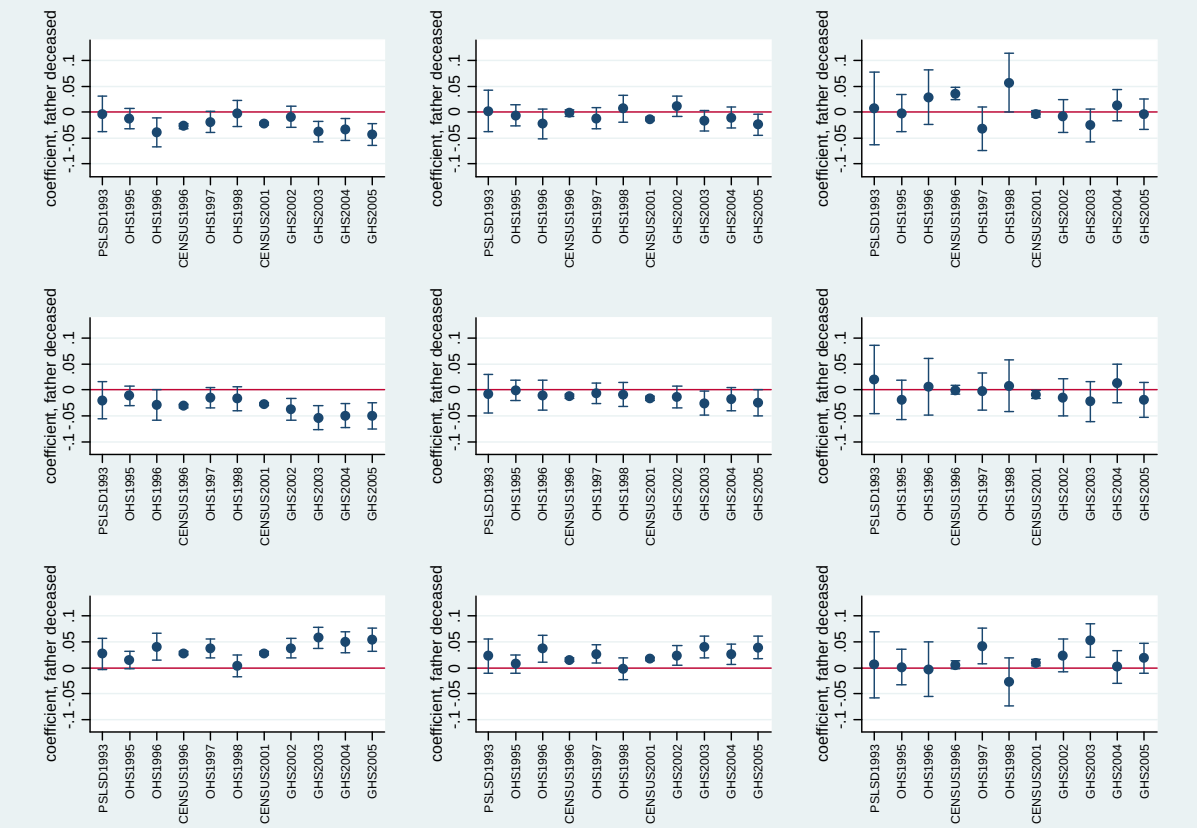


Figure A3.5: Coefficient estimates and 95% confidence intervals from regressions of a range of measures of educational attainment on indicators that child's mother is deceased for Africans aged 8-17



Notes to Figure A3.5: 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 A3.6: Coefficient estimates and 95% confidence intervals from regressions of a range of measures of educational attainment on indicators that child's father is deceased for Africans aged 8-17



Notes to Figure A3.6: 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 A3.6: Coefficient estimates and standard errors from regressions of years of completed education on indicators that mother and father are deceased for Africans aged 8-17

Dataset	Dependent variable: Years of completed education			
	Mother deceased		Father deceased	
Panel A - No household controls				
PSLSD1993	-0.311	(0.142)*	-0.08	(0.084)
OHS1995	-0.173	(0.08)*	-0.094	(0.043)*
OHS1996	-0.023	(0.117)	-0.155	(0.06)*
CENSUS1996	-0.199	(0.017)**	-0.143	(0.008)**
OHS1997	-0.3	(0.078)**	-0.138	(0.044)**
OHS1998	-0.074	(0.089)	-0.054	(0.045)
CENSUS2001	-0.235	(0.012)**	-0.141	(0.007)**
GHS2002	-0.266	(0.057)**	-0.148	(0.039)**
GHS2003	-0.221	(0.063)**	-0.227	(0.042)**
GHS2004	-0.145	(0.056)**	-0.197	(0.048)**
GHS2005	-0.148	(0.055)**	-0.215	(0.047)**
Panel B - Household controls				
PSLSD1993	-0.25	(0.135)	-0.042	(0.085)
OHS1995	-0.159	(0.078)*	-0.052	(0.041)
OHS1996	0.043	(0.122)	-0.086	(0.059)
CENSUS1996	-0.178	(0.017)**	-0.067	(0.009)**
OHS1997	-0.265	(0.073)**	-0.092	(0.041)*
OHS1998	-0.083	(0.086)	-0.011	(0.044)
CENSUS2001	-0.236	(0.012)**	-0.097	(0.007)**
GHS2002	-0.246	(0.055)**	-0.066	(0.038)
GHS2003	-0.225	(0.061)**	-0.135	(0.041)**
GHS2004	-0.176	(0.053)**	-0.081	(0.042)
GHS2005	-0.187	(0.052)**	-0.136	(0.045)**
Panel C - Household fixed effects				
PSLSD1993	0.092	(0.169)	-0.007	(0.127)
OHS1995	-0.271	(0.095)**	-0.047	(0.069)
OHS1996	-0.169	(0.144)	0.102	(0.095)
CENSUS1996	-0.209	(0.026)**	0.029	(0.017)
OHS1997	-0.297	(0.098)**	-0.158	(0.066)*
OHS1998	-0.308	(0.12)*	0.086	(0.087)
CENSUS2001	-0.23	(0.017)**	-0.059	(0.013)**
GHS2002	-0.251	(0.068)**	-0.043	(0.056)
GHS2003	-0.258	(0.071)**	-0.259	(0.058)**
GHS2004	-0.285	(0.065)**	0.03	(0.055)
GHS2005	-0.201	(0.058)**	-0.047	(0.051)

Notes to Table A3.6: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table A3.7: Sample characteristics for Africans aged 8-17: 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	625,585	19,805	19,092	18,353	21,296
Educational outcomes											
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
Individual controls											
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
Household controls											
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 A3.8: Sample characteristics for non-orphaned Africans aged 8-17: 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	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 A3.9: Sample characteristics for African maternal orphans aged 8-17: 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	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 A3.10: Sample characteristics for African paternal orphans aged 8-17: 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	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 A3.11: Sample characteristics for African double orphans aged 8-17: 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	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 A3.12: Educational attainment and parental death for Africans aged 8-12

Dataset	Dependent variable: Years of completed education			
	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	

Notes to Table A3.11: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table A3.13: Educational attainment and parental death for Africans aged 13-17

Dataset	Dependent variable: Years of completed education			
	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	

Notes to Table A3.12: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table A3.14: Coefficient estimates and standard errors from regressions of enrolment on indicators that mother and father are deceased for Africans aged 7-15

Dataset	Dependent variable: Years of completed education			
	Mother deceased		Father deceased	
Panel A - No household controls				
PSLSD1993	-0.035	(0.026)	-0.008	(0.012)
OHS1995	-0.02	(0.011)	-0.004	(0.006)
CENSUS1996	-0.041	(0.003)**	-0.018	(0.001)**
OHS1997	-0.017	(0.01)	-0.008	(0.005)
OHS1998	-0.003	(0.012)	-0.007	(0.007)
CENSUS2001	-0.026	(0.002)**	-0.014	(0.001)**
GHS2002	-0.012	(0.008)	-0.013	(0.005)*
GHS2003	-0.016	(0.008)	-0.015	(0.005)**
GHS2004	-0.006	(0.007)	-0.016	(0.005)**
GHS2005	-0.011	(0.005)*	0	(0.004)
Panel B - Household controls				
PSLSD1993	-0.033	(0.025)	-0.008	(0.013)
OHS1995	-0.023	(0.012)	-0.004	(0.006)
CENSUS1996	-0.037	(0.003)**	-0.013	(0.001)**
OHS1997	-0.017	(0.01)	-0.011	(0.005)*
OHS1998	0.003	(0.012)	-0.013	(0.007)
CENSUS2001	-0.022	(0.002)**	-0.012	(0.001)**
GHS2002	-0.009	(0.008)	-0.01	(0.005)
GHS2003	-0.017	(0.008)*	-0.014	(0.006)*
GHS2004	-0.004	(0.007)	-0.013	(0.005)*
GHS2005	-0.009	(0.005)	0.002	(0.004)
Panel C - Household fixed effects				
PSLSD1993	0.004	(0.028)	-0.045	(0.021)*
OHS1995	-0.014	(0.012)	-0.01	(0.009)
CENSUS1996	-0.047	(0.005)**	-0.021	(0.003)**
OHS1997	-0.022	(0.014)	-0.016	(0.009)
OHS1998	-0.034	(0.018)	-0.013	(0.013)
CENSUS2001	-0.021	(0.003)**	-0.01	(0.002)**
GHS2002	0.002	(0.01)	0.008	(0.008)
GHS2003	-0.021	(0.011)*	-0.02	(0.008)*
GHS2004	-0.013	(0.009)	-0.013	(0.008)
GHS2005	-0.014	(0.008)	0.011	(0.007)

Notes to Table A3.14: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table A3.15: Coefficient estimates and standard errors from regressions of years of enrolment on indicators that mother and father are deceased for Africans aged 16-18 who have not completed Grade 12

Dataset	Dependent variable: Years of completed education			
	Mother deceased		Father deceased	
Panel A - No household controls				
PSLSD1993	-0.071	(0.049)	-0.038	(0.024)
OHS1995	-0.092	(0.024)**	-0.027	(0.012)*
CENSUS1996	-0.079	(0.005)**	-0.036	(0.002)**
OHS1997	-0.065	(0.021)**	-0.021	(0.01)*
OHS1998	-0.011	(0.03)	-0.047	(0.016)**
CENSUS2001	-0.063	(0.004)**	-0.046	(0.003)**
GHS2002	-0.05	(0.02)*	-0.038	(0.014)**
GHS2003	-0.06	(0.024)*	-0.039	(0.015)**
GHS2004	0	(0.02)	-0.061	(0.017)**
GHS2005	-0.034	(0.021)	-0.037	(0.015)*
Panel B - Household controls				
PSLSD1993	-0.041	(0.047)	-0.039	(0.03)
OHS1995	-0.077	(0.025)**	-0.033	(0.013)*
CENSUS1996	-0.068	(0.005)**	-0.038	(0.003)**
OHS1997	-0.048	(0.02)*	-0.026	(0.011)*
OHS1998	-0.017	(0.029)	-0.054	(0.017)**
CENSUS2001	-0.058	(0.004)**	-0.048	(0.003)**
GHS2002	-0.046	(0.02)*	-0.033	(0.013)*
GHS2003	-0.057	(0.024)*	-0.03	(0.015)
GHS2004	-0.002	(0.02)	-0.049	(0.016)**
GHS2005	-0.041	(0.02)*	-0.027	(0.016)
Panel C - Household fixed effects				
PSLSD1993	-0.119	(0.115)	-0.069	(0.087)
OHS1995	-0.116	(0.058)*	-0.007	(0.044)
CENSUS1996	-0.072	(0.012)**	-0.032	(0.008)**
OHS1997	-0.125	(0.045)**	-0.072	(0.032)*
OHS1998	-0.063	(0.068)	-0.04	(0.047)
CENSUS2001	-0.034	(0.01)**	-0.033	(0.008)**
GHS2002	-0.014	(0.048)	-0.05	(0.041)
GHS2003	0.081	(0.045)	0.043	(0.04)
GHS2004	0.043	(0.044)	-0.118	(0.037)**
GHS2005	-0.011	(0.04)	-0.002	(0.038)

Notes to Table A3.15: 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 are included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, and those marked with one (*) are significant at the 5% level.

Table A5.1: Parental death and schooling outcomes at ages 7-17: Wave 4 information assumed correct

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.084	-0.081	-0.027	-0.061	-0.007	-0.065
	(0.036)*	(0.030)**	(0.029)	(0.038)	(0.029)	(0.036)+
Father deceased	0.004	-0.013	0.012	-0.068	-0.039	-0.046
	(0.024)	(0.019)	(0.018)	(0.035)+	(0.030)	(0.031)
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21626	21953	19934	20514	20762	19043
Number of children	2064	2064	2058	1972	1972	1959

Notes to Table A5.1: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. In the event of conflicting information about parent's vital status between Wave 1 and Wave 4, the Wave 4 information is assumed to be correct. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.2: Regressions of years of completed education on indicators that mother and father are deceased for coloured children aged 8-17: Census 1996 and Census 2001

	Census 1996			Census 2001		
	Dependent variable: Grades successfully completed			Dependent variable: Grades successfully completed		
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.356	-0.23	-0.18	-0.375	-0.242	-0.152
	(0.048)**	(0.048)**	(0.065)**	(0.038)**	(0.039)**	(0.053)**
Father deceased	-0.157	-0.048	0.031	-0.219	-0.13	-0.062
	(0.028)**	(0.030)	(0.049)	(0.023)**	(0.025)**	(0.040)
Household controls	No	Yes	No	No	Yes	No
Household fixed effects	No	No	Yes	No	No	Yes
Observations	65076	54700	65076	60562	50592	60562

Notes to Table A5.2: Standard errors that allow for correlation between unobservables for children in the same sampling cluster are presented in parenthesis below the coefficients. First column controls for child's age and sex. The second column also includes household controls: age, sex and education level of the household head, indicators for each of the 9 provinces, an indicator that the area is urban, logarithm of per capita household income, indicators that the household has access to 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 a least one female/male resident who is age-eligible for the social pension. The third column estimates household fixed effects. Indicators that parent's vital status is missing included in all regressions. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.3: Parental death and progress through school for CAPS respondents born between 1985 and 1987 and re-interviewed in 2006

	African		Coloured	
	Dependent variable: Completed Grade 12 by 2006 or successfully completed 4 grades between 2002 and 2006		Dependent variable: Completed Grade 12 by 2006 or successfully completed 4 grades between 2002 and 2006	
	(1)	(2)	(1)	(2)
Mother deceased before 18	-0.179	-0.166	-0.114	-0.133
	(0.064)**	(0.065)*	(0.076)	(0.067)+
Father deceased before 18	-0.013	-0.004	-0.159	-0.042
	(0.050)	(0.051)	(0.057)**	(0.054)
Logarithm of per capita household income		0.03		0.138
		(0.032)		(0.028)**
Number of assets		0.021		0.032
		(0.010)*		(0.007)**
Logarithm of household size		-0.061		-0.109
		(0.064)		(0.065)+
Fraction of household under age 14		-0.058		0.205
		(0.166)		(0.141)
Pension age-eligible female		0.005		0.081
		(0.070)		(0.051)
Pension age-eligible male		-0.006		0.104
		(0.102)		(0.071)
Observations	549	549	661	660

Notes to Table A5.3: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.4: Parental death and socioeconomic status

	African					Coloured				
	Dependent variable:					Dependent variable:				
	Assets (2002)	Logarithm of per capita household income (2002)				Assets (2002)	Logarithm of per capita household income (2002)			
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Mother deceased (2002)	0.005	0.136				0.545	-0.131			
	(0.579)	(0.183)				(0.595)	(0.131)			
Father deceased (2002)	-0.433	-0.203				-1.278	-0.379			
	(0.318)	(0.118)+				(0.407)**	(0.110)**			
Mother deceased (2006)			0.018					-0.091		
			(0.128)					(0.109)		
Father deceased (2006)				-0.138					-0.218	
				(0.084)					(0.144)	
Father is co-resident (2002)					0.098					0.456
					(0.083)					(0.072)**
Observations	684	684	1462	1114	704	770	770	1520	1365	879

Notes to Table A5.4: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include dummies for year of birth, an indicator that the respondent was born before July, an indicator that the respondent is female and indicators that parent's vital status is unknown. The sample in columns 1 and 2 is restricted to CAPS respondents born between 1985 and 1987. The sample in column 3 is restricted to CAPS respondents who were re-interviewed in 2006 (Wave 4) and whose mother was alive in 2002 (Wave 1). The sample in column 4 is restricted to CAPS respondents who were re-interviewed in 2006 (Wave 4) and whose father was alive in 2002 (Wave 1). The sample in column 5 is restricted to CAPS respondents who were younger than 18 years of age and whose fathers were alive in 2002 (Wave 1). Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.5: Parental death and schooling outcomes at ages 7-17: missing data strategy 1

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.076	-0.08	-0.018	-0.048	-0.017	-0.04
	(0.035)*	(0.027)**	(0.029)	(0.035)	(0.029)	(0.033)
Father deceased	0	-0.008	0.001	-0.116	-0.08	-0.082
	(0.024)	(0.019)	(0.017)	(0.032)**	(0.028)**	(0.026)**
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22962	23310	21146	21473	21733	19945
Number of children	2151	2151	2147	2005	2005	2001

Notes to Table A5.5: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. All missing observations on parents' vital status have been replaced with zeros and regressions include indicators that mother's and father's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.6: Parental death and schooling outcomes at ages 7-17: missing data strategy 2

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.081	-0.078	-0.029	-0.059	-0.022	-0.048
	(0.036)*	(0.030)*	(0.031)	(0.035)+	(0.031)	(0.034)
Father deceased	0.011	-0.004	0.009	-0.108	-0.074	-0.07
	(0.024)	(0.019)	(0.017)	(0.033)**	(0.029)*	(0.026)**
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21613	21943	19921	20907	21155	19429
Number of children	2060	2060	2052	1975	1975	1966

Notes to Table A5.6: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Where individuals were missing only one observation on parent's vital status, this observation was replaced with a zero and regressions include indicators that mother's and father's vital status is unknown. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.7: Parental death and schooling outcomes at ages 7-17: missing data strategy 3

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.077	-0.079	-0.021	-0.073	-0.024	-0.062
	(0.038)*	(0.032)*	(0.031)	(0.036)*	(0.032)	(0.035)+
Father deceased	0.009	-0.004	0.009	-0.1	-0.066	-0.068
	(0.024)	(0.019)	(0.017)	(0.032)**	(0.029)*	(0.025)**
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21147	21463	19493	20563	20807	19121
Number of children	1988	1988	1985	1929	1929	1926

Notes to Table A5.7: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Individuals with parent's vital status missing for more than one observation were excluded from the sample. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.8: Parental death and schooling outcomes at ages 7-17: missing data strategy 4

	African			Coloured		
	Dependent variable:			Dependent variable:		
	Advancing a grade	Enrolment	Passing (conditional on being in school)	Advancing a grade	Enrolment	Passing (conditional on being in school)
	(1)	(2)	(3)	(1)	(2)	(3)
Mother deceased	-0.081	-0.075	-0.018	-0.059	-0.015	-0.063
	(0.043)+	(0.035)*	(0.031)	(0.046)	(0.041)	(0.044)
Father deceased	0.019	-0.004	0.023	-0.078	-0.043	-0.064
	(0.025)	(0.021)	(0.019)	(0.038)*	(0.031)	(0.036)+
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20430	20732	18850	19594	19828	18235
Number of children	1913	1913	1910	1829	1829	1826

Notes to Table A5.8: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Individuals with parent's vital status missing any observations were excluded from the sample. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

Table A5.9: Age at parental death and progress through school at ages 7-17: child fixed effects

	African	Coloured
	Dependent variable: Advanced a grade	Dependent variable: Advanced a grade
	(1)	(1)
Mother deceased	0.218	-0.082
	(0.133)	(0.111)
Mother deceased x child's age	-0.019	0.001
	(0.008)*	(0.008)
Father deceased	0.134	0.076
	(0.052)*	(0.072)
Father deceased x child's age	-0.009	-0.012
	(0.004)*	(0.005)*
Child fixed effects	Yes	Yes
Observations	21538	20807
Number of children	2060	1975

Notes to Table A5.9: Standard errors that allow for correlation between unobservables for young adults in the same sampling cluster are presented in parenthesis below the coefficients. All regressions include a full set of indicators for age. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

A6.1 Enrolment and receipt of the Child Support Grant

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. Therefore 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 7. The age cut off was extended to 9, 11 and 14 in April of 2003, 2004 and 2005 respectively. Take up was initially low for children who became eligible when the age extensions were introduced and 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).[35] The regressions in Table A6.1 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.

[35] The results are qualitatively similar if I only restrict the sample based on age eligibility.

Table A6.1: Grant receipt and enrolment for Africans aged 6-8 whose primary caregiver passes the means test

	Dependent variable: Currently enrolled in school	
Mother deceased	-0.020	-0.023
	(0.015)	(0.019)
Father deceased	-0.001	-0.024
	(0.01)	(0.014)
Grant recipient	0.035	0.026
	(0.009)**	(0.010)**
Mother dead x Grant		0.011
		(0.028)
Father dead x Grant		0.050
		(0.020)*
Household controls	Yes	Yes
Observations	11496	11496

Note to Table A6.1: Indicators for missing parents' vital status, individual and household controls included in all regressions. Standard errors presented in parentheses below coefficients. Estimates marked with two asterisks (**) are significant at the 1% level, those marked with one (*) are significant at the 5% level, and those marked with a plus sign (+) are significant at the 10% level.

REFERENCES

Ainsworth, M., K. Beegle, and G. Koda. 2005. "The Impact of Adult Mortality and Parental Deaths on Primary Schooling in North-Western Tanzania." *The Journal of Development Studies* 41(3):412-39.

Ainsworth, M. and D. Filmer. 2002. "Poverty, AIDS and Children's Schooling: A Targeting Dilemma." Policy Research Working Paper 2885. Washington, DC: World Bank.

—. 2006. "Inequalities in Children's Schooling: AIDS, Orphanhood, Poverty and Gender." *World Development* 34(6):1099-1128.

Anderson, B. and H Phillips. 2006. "Trends in the Percentage of Children who are Orphaned in South Africa: 1995–2005." Report No. 03-09-06. Pretoria: Statistics South Africa.

Anderson, K.G. 2005. "Relatedness and Investment in Children in South Africa." *Human Nature* 16(1):1-31.

Anderson, K.G., A. Case and D. Lam. 2001. "Causes and Consequences of Schooling Outcomes in South Africa: Evidence from Survey Data." *Social Dynamics* 27(1):1-23.

Ardington, C., A. Case and V. Hosegood. Forthcoming. "Labor Supply Responses to Large Social Transfers: Longitudinal Evidence from South Africa." *American Economic Journal: Applied Economics*

Barnes, H., M. Noble, C. Dibben, C. Meth, G. Wright and L. Cluver. 2007. "South African Microdata Scoping Study." Working Paper No 6. Centre for the Analysis of South African Social Policy, University of Oxford.

Becker, G. and N. Tomes. 1976. "Child Endowments and the Quantity and Quality of Children." *Journal of Political Economy* 84(4 pt. 2):S143-62.

—. 1979. "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility." *Journal of Political Economy* 87(6):1153-89.

—. 1986. "Human Capital and the Rise and Fall of Families." *Journal of Labor Economics* 4(3 pt. 2):S1-39.

Beegle, K., J. de Weerdt and S. Dercon. 2006. "Orphanhood and the Long-Run Impact on Children." *American Journal of Agricultural Economics* 5:1266-72.

Beegle, K., J. de Weerdt and S. Dercon. 2008. "Adult Mortality and Consumption Growth in the Age of HIV/AIDS." *Economic Development and Cultural Change 56(2): 299-326*

Behrman, J. 1997. "Intrahousehold Distribution and the Family." Pp. 87-125 in *Handbook of Population and Family Economics*, edited by M. Rosenzweig and O. Stark. Amsterdam: North-Holland.

Bennel, P. 2005. "The Impact of the AIDS Epidemic on the Schooling of Orphans and Other Directly Affected Children in sub-Saharan Africa." *The Journal of Development Studies* 41(3):467-88.

Bergstrom, T. 1997. "A Survey of Theories of the Family." Pp. 21-79 in *Handbook of Population and Family Economics*, edited by M. Rosenzweig and O. Stark. Amsterdam: North-Holland.

Biblarz, T. and G. Gottainer. 2000. "Family Structure and Children's Success: A Comparison of Widowed and Divorced Single-Mother Families." *Journal of Marriage and the Family* 62:533-48.

Bicego, G., S. Rutstein and K. Johnson. 2003. "Dimensions of the Emerging Orphan Crisis in sub-Saharan Africa." *Social Science and Medicine* 56:1235-47.

Budlender D, S. Rosa and K. Hall. 2005. "At all Costs? Applying the Means Test for the Child Support Grant." Children's Institute and the Centre for Actuarial Research, University of Cape Town.

Case, A. and C. Ardington. 2004. "Socioeconomic Factors." Chap. 8 in *Demographic and Health Events*, Monograph Series, Africa Centre for Health and Population Studies.

—. 2006. "The Impact of Parental Death on School Outcomes: Longitudinal Evidence from South Africa." *Demography* 43(3):401-20.

Case, A. and A. Deaton. 1998. "Large Cash Transfers to the Elderly in South Africa." *Economic Journal*, 108(450):1330-61.

—. 1999. "School Inputs and Education Outcomes in South Africa.", *Quarterly Journal of Economics* August, 114(3):1047-84.

Case, A., V. Hosegood and F. Lund. 2005. "The reach and impact of Child Support Grants: Evidence from KwaZulu-Natal." *Development Southern Africa* 22(4):467-82.

Case, A., I. Lin and S. McLanahan. 2001. "Educational Attainment of Siblings in Stepfamilies." *Evolution and Human Behavior* 22:269-89.

Case, A., C. Paxson and J. Ableidinger. 2004. "Orphans in Africa: Parental Death, Poverty and School Enrollment." *Demography* 41(3):483-508.

Corak, M. 2001. "Death and Divorce: The Long-Term Consequences of Parental Loss on Adolescents." *Journal of Labor Economics* 19(3):682-715.

de Walque, D. 2006. "Who Gets AIDS and How? The determinants of HIV infection and sexual behaviors in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania." World Bank Policy Research Working Paper 3844

Deaton, A. 1997. *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Baltimore: John Hopkins University Press.

Department of Education. 2004. "School Admission Age for Grade One Learners." Available online at www.info.gov.za/speeches/2004/04080214451004.htm

Department of Social Development. 2005. "Policy Framework for Orphans and Other Children Made Vulnerable by HIV and AIDS South Africa – Building a Caring Society Together." Available online at www.sarpn.org.za/documents/d0002008/index.php

Duflo, E. 2003. "Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa." *World Bank Economic Review* 17(1):1-25.

Evans, D. and E. Miguel. 2007. "Orphans and Schooling in Africa: A Longitudinal Analysis." *Demography* 44(1):35-57.

Fiske, E. and H. Ladd. 2004. *Elusive Equity. Education reform in post-apartheid South Africa.* Washington, DC : Brookings Institute Press.

Fortson, J. 2007. "Mortality Risk and Human Capital Investment: The Impact of HIV/AIDS in sub-Saharan Africa." Unpublished manuscript, Princeton University.

Foster, G. 2000. "The Capacity of the Extended Family Safety Net for Orphans in Africa." *Psychology, Health and Medicine* 5(1):55-62.

—. 2002. "Supporting Community Efforts to Assist Orphans in Africa." *The New England Journal of Medicine* 346(24):1907-10.

Freedman, D., A. Thornton, D. Camburn, D. Alwin and L. Young-DeMarco. 1988. "The Life History Calendar: A Technique for Collecting Retrospective Data." *Sociological Methodology* 18:37-68.

Gertler, P., D.I. Levine and M. Ames. 2004. "Schooling and Parental Death." *The Review of Economics and Statistics* 86(1):211-25.

Giese, S., H. Meintjes, R. Croke, and R. Chamberlain. 2003. "Health and Social Services to Address the Needs of Orphans and Other Vulnerable Children in the Context of HIV/AIDS. Research Report and Recommendations." Children's Institute, University of Cape Town.

Ginther, D. and R. Pollak. 2004. "Family Structure and Children's Educational Outcomes: Blended Families, Stylized Facts, and Descriptive Regressions." *Demography* 41(4):671-96.

Guarcello, L., S. Lyon, F. Rosati and C.A. Valdivia. 2004. "The Influence of Orphanhood on Children's Schooling and Labour: Evidence from Sub Saharan Africa." UCW Working Paper, UNICEF.

Hall, K. and J. Monson. 2006. "Free to learn: The School Fee Exemption policy and the National School Nutrition Programme." Pp. 45-50 in *South African Child Gauge 2006*, Children's Institute, University of Cape Town.

Haveman, R. and B. Wolfe. 1995. "The Determinants of Children's Attainments: A Review of Methods and Findings." *Journal of Economic Literature* XXXIII (December 1995):1829-78.

Hosegood, V. and I. Timæus. 2005. "Household Composition and Dynamics in KwaZulu Natal, South Africa: Mirroring Social Reality in Longitudinal Data Collection." Pp. 58-77 in *African Households: Censuses and Surveys*, edited by E. Van de Walle. Armonk, NY: M.E. Sharpe.

Johnson, L. and R. Dorrington. 2001. "The Impact of AIDS on Orphanhood in South Africa: A Quantitative Analysis." Centre for Actuarial Research Monograph No. 4, University of Cape Town.

Kelly, M. 2000. "Planning for Education in the Context of HIV/AIDS." IIEP Fundamentals of Educational Planning, No. 66. UNESCO, Paris.

Keswell, M. and L. Poswell. 2003. "How Important is Education for Getting Ahead in South Africa?" CSSR Working Paper 22, University of Cape Town.

Lam, D., C. Ardington and M. Leibbrandt. 2007. "Schooling as a Lottery: Racial Differences in School Advancement in Urban South Africa." ERSA Working Paper 56, University of Cape Town.

Lam, D., J. Seekings and M. Sparks. 2006. "The Cape Area Panel Study: Overview and Technical Documentation for Waves 1-2-3." University of Cape Town.

Lang, K. and J. Zagorsky. 2001. "Does Growing Up With A Parent Absent Really Hurt?" *Journal of Human Resources* 36(2):253-73.

Leatt, A. 2006. "Grants for Children: A Brief Look at the Eligibility and Take-up of the Child Support Grant and Other Cash Grants." Children's Institute Working Paper No. 5, University of Cape Town.

Lee, E., R. Forthofer and R. Lorimor. 1989. *Analysing Complex Survey Data.* Newbury Park, CA: Sage

Manuel, T. 2008. "2008 Budget Speech." Available online at www.treasury.gov.za

Meintjes, H., D. Budlender, S. Giese, and L. Johnson. 2003. "Children in 'Need of Care' or in Need of Cash? Questioning Social Security Provisions for Orphans in the Context of the South African AIDS Pandemic." A Joint Working Paper of the Children's Institute and the Centre for Actuarial Research, University of Cape Town.

—. 2005. "Social Security for Children in the Time of HIV/AIDS: The mis-use of foster care?" Pp. 32-6 in *South African Child Gauge 2005*, Children's Institute, University of Cape Town.

Monasch, R. and J.T. Boerma. 2004. "Orphanhood and Childcare Patterns in sub-Saharan Africa: an Analysis of National Surveys from 40 Countries." *AIDS* 18(suppl 2):S55-65.

Shisana O, T. Rehle, L. Simbayi, W. Parker, K. Zuma, A. Bhana, C. Connoly, S. Jooste, V. Pillay. eds. 2005. *South African National HIV Prevalence, HIV Incidence, Behaviours and Communication Survey, 2005*. Cape Town: HSRC Press.

South African Social Security Agency. 2008. "Grant amounts." Available online at www.sassa.gov.za/content.asp?id=1000000512

Statistics South Africa. 1996. "Census 1996 Persons Meta Data." Statistics South Africa, Pretoria.

Strauss, J. and D. Thomas. 1995. "Human Resources: Empirical Modeling of Household and Family Decisions." Pp. 1883-2024 in *Handbook of Development Economics*, edited by J. Behrman and T. Srinivasan. Amsterdam: Elsevier.

Subbarao, K. and D. Coury. 2004. *Reaching Out to Africa's Orphans, A Framework for Public Action.* Washington, DC: The World Bank.

Timæus, I. and T. Boler. 2007. "Father Figures: the Progress at School of Orphans in South Africa." *AIDS* 21(supplement 7):S83-93.

UNAIDS. 2002. "Report on the Global HIV/AIDS Epidemic." Available online at www.unaids.org/barcelona/presskit/report.html

UNAIDS/UNICEF/USAID. 2004. "Children on the Brink 2004, A Joint Report of New Orphan Estimates and a Framework for Action." Available online at www.unaids.org

UNESCO. 1990. "World Education for All." Available online at www.unesco.org/education/efa/ed_for_all/background/jomtien_declaration.shtml

UNICEF. 2003. "Africa's Orphaned Generation." Available online at www.unicef.org

Woolard, I., M. Carter and J. Aguero. 2005. "Analysis of the Child Support Grant: Evidence from the KwaZulu-Natal Income Dynamics Study, 1993-2004." Unpublished report. Department of Social Development, Pretoria.

Wooldridge, J. 2002. *Econometric Analysis of Cross Section and Panel Data.* Cambridge, Massachusetts: MIT Press.

World Bank. 2002. *Education and HIV/AIDS, A Window of Hope.* Washington, DC: World Bank.

Yamano, T. and T. Jayne. 2005. "Working-Age Adult Mortality and Primary School Attendance in Rural Kenya." *Economic Development and Cultural Change* 53:619-53.