ORPHANHOOD AND THE LONG-RUN IMPACT ON CHILDREN

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Childhood orphanhood is a major risk factor for poverty in adulthood, through, among other channels, shortfalls in human capital investments in children. In sub-Saharan Africa, the prevalence of orphanhood among children has been greatly exacerbated by the HIV/AIDS pandemic. Orphanhood is expected to influence health outcomes and schooling although there are multiple potential channels through which this effect may work. Obviously, income effects are a strong candidate, especially when parental deaths are associated with costs and income losses due to chronic illnesses. If households are credit constrained, then reduced incomes can result in lower investments in education. Aside from these direct wealth effects, orphanhood can be associated with an increased value of the child's time in home production (as a substitute for adult labor) which results in less schooling. There may be discrimination against orphans and favoritism toward biological children for double orphans or among single orphans who

do not reside with their surviving parent (i.e., are fostered out). Beyond the financial consequences of adult deaths and the implications of a loss of parental involvement, children who become orphans may suffer trauma which, in turn, affects schooling and health outcomes. Children who lose a parent due to AIDS may be additionally stigmatized, although most work does not differentiate between causes of parent deaths, almost all of which in this study are due to illness.

In this study, we use new data collected from Tanzania to examine the impact of orphanhood on children's school attainment and height. The unique features of the data set will allow estimation of the long-term, persistent impact of orphanhood shocks during childhood on adult health and educational attainment, based on a sample of children that were initially non-orphaned in our data, controlling for a wide variety of characteristics before the loss of a parent and allowing for migration since the baseline.

Background

Studies of the consequences of orphanhood usually focus on measuring its impact on education outcomes. The findings of these studies are mixed. Several studies use large cross-sectional household survey data with controls for concurrent household characteristics to identify the impact of the loss of a parent on schooling. To the extent that orphans are found in relatively better-off households that also have higher demand for schooling, simple cross-sectional comparisons of enrollment rates between orphans and non-orphans may underestimate the true impact (for example, see Hargreaves and Glynn (2002)). On the other hand, depending on mortality patterns, in some settings, an orphan's household may

be poorer prior to death, thus overestimating the impact of orphanhood. Ainsworth and Filmer (2006) find considerable diversity in the orphan/non-orphan differential across countries and conclude that it is difficult to draw generalizations about the extent to which orphans are disadvantaged. Case, Paxson, and Ableidinger (2004) use similar data; using household fixed effects, they find that orphans are disadvantaged relative to other children within the same household. However, 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 coresidents. Evidence of other outcomes for orphans beyond schooling is much more scant but here, too, the evidence is mixed (see, for example, Crampin et al. [2003] in Malawi, Lindblade et al. [2003] in Kenya, and Chatterji et al. [2005] in Rwanda and Zambia).

The studies cited above use cross-sectional data sets which are limited to examining correlates of outcomes after a parental death, without controls for initial conditions, prior to the death of the parent(s). Several recent studies utilize panel data to address these concerns, including Ainsworth, Beegle, and Koda (2005) in Tanzania, Case and Ardington (2005) in South Africa, Evans and Miguel (2005) in Kenya, and Yamano and Jayne (2005) also in Kenya.

While existing studies are varied in their methods and conclusions, several themes emerge. Panel data analyses show that omitted variables (pre-orphan characteristics) can bias results. Further, there may be considerable heterogeneity across different types of orphans, or in effects depending on the circumstances of different orphans, such as gender. Lastly, since these studies focus on samples of children, their findings may not reflect the consequences in adulthood of the loss of a parent as a child.

Data

The Kagera Region of Tanzania is located on the western shore of Lake Victoria, bordering Uganda to the north and Rwanda and Burundi to the west. The population (1.3 million in 1988, about 2 million in 2004) is overwhelmingly rural and primarily engaged in producing bananas and coffee in the northern districts and rain-fed annual crops (maize, sorghum,

cotton) in the southern districts. This study uses baseline data from the Kagera Health and Development Survey (KHDS), a longitudinal socioeconomic survey conducted from September 1991 to January 1994 covering the entire Kagera region (see World Bank 2004, and http://www.worldbank.org/lsms/). In 2004, another round of data collection was completed (Beegle, De Weerdt, and Dercon 2006a). The KHDS panel has an attrition rate that is much lower than that of other well-known panel surveys (see Alderman et al., 2001). Much of the success in recontacting respondents was due to the effort to track people who had moved out of the baseline communities. Tracking movers can have specific implications for orphans; in their study of Kwazulu Natal, South Africa, Ford and Hosegood (2005) found that children who became orphaned had significantly higher probabilities of moving. Among the children ages 0–15 reported to be alive in 2004, over 80% were located and reinterviewed. Of those, 42% were residing outside of the baseline community.

In our analysis, we focus on a sample of (panel) individuals who were 0–15 years old in the baseline survey (the first observation of the child during the KHDS1 years 1991–4) who were not orphaned at that time. We do not include children who were already orphaned at baseline, since we do not have pre-orphanhood characteristics of these children. The overall sample includes children who became orphaned from ages 0–15 years, but some of these respondents have not yet reached adulthood. It could be argued that the impact of orphanhood may not be permanent if it is possible for catch-up in health (measured via height) and in education (measured as completed years of education) after a slowdown/disruption in its accumulation. To clarify what effects we are capturing, we split the sample of children into those aged 11–18 in 2004 and 19–28 in 2004. For the latter sample, we are focusing on final adult height as well as years of education at an age where there is unlikely to be catch-up in schooling attainment. Due to the time frame of the panel (10–13 years), however, this second sample by design includes only children orphaned by age 7 or older. Thus, it reflects permanent orphanhood effects for those orphaned after age 6 whereas the 11–18 year olds are those orphaned at young ages on average. Twenty-three percent of children in the full sample lost at least one parent between the baseline survey and reinterview

in 2004. The most common shock was losing a father, experienced by about 18%; few lost both parents in this period. The loss of a parent at very young ages (under 3) is very rare in the data. As a consequence, it is difficult to focus on the loss of a parent at very young ages.

Comparing those who became orphaned to their non-orphan counterparts, we see differences at baseline. Children experiencing the death of one or more parents during the survey period are less likely to live with either their mother or father at baseline. The head of the household in which they were then living was older, less educated, and more likely to be female. However, they do not appear to be wealthier and the height of their mothers is also not significantly different suggesting that socioeconomic differences determining selection into orphanhood are possibly not as strong as in some other studies (see Case and Ardington 2005). Finally, orphans are more likely to be found outside the community, illustrating the importance of our tracking exercise.

Health and Education Investments

The outcomes used in this study relate to investments which affect long-term economic prospects of children. Height is used as the key long-term health measure, since it has been shown to affect wage-earning capacity as well as participation in the labor force for men and women. We measure educational attainment in terms of the years of education completed, counting each grade completed as a year. Several factors of influence are used to model height and education. These include the characteristics of the child (sex and age, via a full set of age dummies), genetic background of the family (using height at baseline

for both the child and the mother) as well as the socioeconomic environment in the household at baseline (whether the child was living with the mother, whether the child was living with the father, years of education of the head, sex and age of the head of the household and two indicators of wealth: cemented floor in dwelling and log per capita household consumption). For height and education, we control for child height and education at baseline, respectively. Finally, all our results are controlling for community fixed effects at baseline, isolating further the impact of orphanhood on health and education from factors such as access to schools and health services. We allow for separate effects for losing a father and a mother. We also investigate the possible additive effect of losing both parents before the age of 16 and the sensitivity of impacts depending on the age at which one becomes an orphan.

Table 1 gives the basic regressions, with full controls for baseline and child characteristics. For both height and educational attainment, the regressions suggest a significant effect from losing one's mother, after controlling for baseline characteristics (including initial height and education, and a full set of age controls) many of which were significantly different between orphans and non-orphans. The sample of respondents aged 11–18 years in 2004 who became maternal orphans by age 15 have 15% lower height. On the other hand, the height differential for older children (19–28 by 2004) is not quite significant, although approaching it, suggesting a mild permanent effect. The results for schooling are the reverse. The older children who become a maternal orphan between ages 7 and 15 complete about 1 less year of schooling. This represents 31% of one standard deviation of years of education in the sample.

The results for the younger and older groups should not be directly compared

Table 1.   Determinants of Height and Years of Schooling in 2004 in Northwestern Tanzania

Independent Variables	Ln Height		Years of Schooling	
	11–18 Years	19–28 Years	11–18 Years	19–28 Years
Mother died	−0.148** [0.069]	−0.010 [0.006]	0.039 [0.240]	−0.929** [0.380]
Father died	0.008 [0.044]	0.003 [0.006]	−0.376* [0.200]	−0.375 [0.309]
Number of observations	795	707	795	707

Notes: Single (*), double (**), and triple (***) asterisks denote significance at 10%, 5%, and 1% levels, respectively.

Results are from OLS estimates with community fixed effects and robust standard errors. Robust standard errors are in brackets.

All regressions include controls for child characteristics (sex and age dummies), and baseline characteristics (residing with mother and residing with father; household consumption, flooring material, age, years of education and sex of the household head). The height regressions include the height of the child at baseline and, when available, mother's height from the baseline data. The schooling regressions include the years of education of the child and whether the child was at school in the baseline.

since the younger group includes children who are orphaned at very young ages when orphanhood could potentially have its largest impact on height (i.e., under 5 years). Paternal orphanhood is not associated with height and only in the younger group does paternal orphanhood significantly reduce schooling of about 0.4 years, or 13% of one standard deviation of years of education.

The set of observable characteristics at baseline (including parental and household characteristics prior to becoming orphaned) are important controls. When these covariates are omitted from the regressions in table 1, school results are quite different. Paternal orphanhood significantly reduces schooling whereas maternal orphanhood is not significantly associated with lower schooling (although the magnitude of the coefficients is similar to results in table 1).

These regressions only control for the gender of the child using a dummy variable. Further analysis (not presented) showed that the impact of orphanhood had no gender dimension—the impact was never significantly sex dependent in any of the samples used for health and education. The potential additive effect of losing both parents was also tested but never to be found significant, although there are few double orphans in the sample. Double orphanhood also did not affect the size of the effects of orphanhood so it is not considered further. Finally, we explored whether the timing of orphanhood mattered, by splitting the orphanhood variables in whether the particular maternal or paternal death occurred when the child was below 12 or above 12 years of age. We find no significant differences between these age categories for paternal death and for maternal death in the full sample. We find that for maternal orphanhood shocks, the impact is significantly different for both age groups in the height regressions, with the entire effect taking place before the age of 12 and no effect subsequently of an orphan shock occurring after age 12. Given the general crucial role of mothers at a younger age, this is consistent with the larger impact of maternal death, resulting in stunting, from which there is only partial recovery.

One of the key problems in assessing the impact of shocks such as orphanhood is that unobservables correlated with orphanhood may bias the results. Finding that orphanhood is significant may not actually determine a causal impact, but rather may capture effects of unobservable covariates. One avenue of

investigating this is to classify the sample of non-orphans used in the previous section by their *future* orphan status. That is, we know in later survey rounds which non-orphans in the sample *became* orphans by the second round (2004). We would expect that future orphan status would not be correlated with current outcomes unless (i) orphanhood captures some unobservable characteristics for which we are unable to control or (ii) morbidities associated with deaths affect outcomes before becoming an orphan. This approach follows Case and Ardington (2005) who make a causal interpretation of maternal orphanhood in a panel (2001 to 2003/2004) by showing no effect of future orphan status on current schooling. In the KHDS data, we find that future orphanhood is not correlated with baseline height or education, suggesting that unobservables correlated with health and education are not correlated with becoming an orphan in the future (results not presented).

The specifications in table 1 treat orphanhood as a homogenous impact on all children, so the results are average effects across different types of children. To better differentiate between different orphans, we include a number of interactions with the orphanhood indicators. We focus on three sets of results: the role of wealth variables, living arrangements, and, for schooling, educational status at the time of orphanhood. For educational status, we simply interact the orphan effect with a variable describing whether the child was already enrolled at the time of the parental death. This is the only variable available at the time of parental death (constructed from the education histories in the KHDS 2004 data). For wealth variables and living arrangements, we do not have information at the time of orphanhood and instead use characteristics at the baseline survey for interactions. Specifically, we define a dummy to signify the wealthiest quartile of households in terms of household consumption per capita in the baseline survey. For living arrangements, we interact the orphanhood shock with whether the child was living with the respective parent who subsequently died at the time of the baseline survey. All regressions control for the uninteracted effect as well, i.e., for wealth and living arrangements.

Table 2 gives the results for schooling. When these interactions are included, the impact of both maternal and paternal death is strongly significant, at least for particular groups of children. For schooling status, the interaction

Table 2. Determinants of Years of Schooling in 2004 in Northwestern Tanzania: Interactions

Independent Variables	11–18 Years	19–28 Years	11–18 Years	19–28 Years	11–18 Years	19–28 Years
Mother died	−0.476 [0.318]	−3.426*** [0.972]	0.319 [0.519]	−1.714** [0.862]	0.168 [0.525]	−0.007 [0.603]
Father died	−0.944*** [0.239]	−1.981*** [0.549]	−1.116*** [0.353]	−0.542 [0.563]	−0.079 [0.331]	0.796* [0.483]
Interaction terms:						
Mother died and already enrolled	1.444*** [0.406]	3.208*** [1.018]				
Father died and already enrolled	1.596*** [0.305]	2.442*** [0.611]				
Mother died and in top 75% of cons pc			−0.342 [0.588]	1.032 [0.964]		
Father died and in top 75% of cons pc			1.019** [0.409]	0.246 [0.656]		
Mother died and living with mother					−0.155 [0.596]	−1.533** [0.751]
Father died and living with father					−0.444 [0.396]	−1.678*** [0.618]
Number of observations	795	707	795	707	795	707

Notes: Single (*), double (**), and triple (***) asterisks denote significance at 10%, 5%, and 1% levels, respectively.
Results are from OLS estimates with community fixed effects and robust standard errors. Robust standard errors are in brackets.
Specifications are as described in footnote of table 1, supplemented with specific interaction terms. Wealth and living with father/mother are baseline characteristics. Whether enrolled at time of death is measured relative to the year of death of the parent.

terms suggest that the results only hold if the child was not yet enrolled at the time of the parental death. If a child was not enrolled when orphaned between ages 7 and 15, about 57% less schooling is completed (more than 3 years) by adulthood. For the younger sample, the reduction is about 12%. Paternal death when not enrolled at school between ages 7 and 15 years results in 33% less schooling among adults in 2004, and 24% for the younger sample which includes those orphaned between ages 0 and 15. This circumstance at the time of the parental death, whether already enrolled, significantly affects the impact of orphanhood. Delayed entry to some extent reflects wealth effects (since richer children are more likely to be enrolled without delay), although these specifications include pre-orphanhood household income. Timely school entry may reflect unobservable family attitudes toward education overriding the impact of the serious mortality shocks affecting the family. Alternatively, this may reflect social pressure from the community on the host family not to deprive the orphan in any obvious way. Withdrawing a child who has already enrolled is much easier to monitor than delaying entry, especially given the large share of children in the general population in Tanzania who fail to entry by the official starting age. Delayed entry, in turn, may result in higher drop out as well as lower probabilities of continuation to secondary school.

Orphanhood shocks were also interacted with whether the household was richer at baseline—using the bottom three quartiles as the base group. For children in poorer households, the paternal orphan shock leads to significantly less schooling for those ages 11–18 in 2004, but for other groups, there is no protective effect of wealth in the baseline household. However, it is not possible to entirely assess the impact of wealth since the wealth measure is not measuring the circumstances at the time of death but rather in the baseline period.

Living arrangements (whether the child was fostered or living with the parent at the time of the baseline interview) also feature strongly. Among the sample of children reaching adulthood, those who were living with the respective parent at baseline are significantly affected by deaths of mothers when the child is between the ages 7 and 15, suggesting the importance of fostering arrangements before the death of the mother. Perhaps contrary to expectations, children who were fostered

Table 3.   Determinants of Height in 2004 in Northwestern Tanzania: Interactions

Independent Variable	11–18 Years	19–28 Years	11–18 Years	19–28 Years
Mother died	−0.194 [0.159]	0.010 [0.009]	−0.557** [0.224]	−0.017 [0.013]
Father died	0.086 [0.064]	0.004 [0.008]	−0.031 [0.072]	0.007 [0.008]
Interaction terms:				
Mother died and in top 75% of consumption per capita	0.057 [0.184]	−0.027** [0.012]		
Father died and in top 75% of consumption per capita	−0.107 [0.076]	0.000 [0.009]		
Mother died and living with mother			0.525** [0.238]	0.011 [0.014]
Father died and living with father			0.039 [0.089]	−0.005 [0.009]
Number of observations	795	707	795	707

Notes: Single (*), double (**), and triple (***) asterisks denote significance at 10%, 5%, and 1% levels, respectively.

Results are from OLS estimates with community fixed effects and robust standard errors. Robust standard errors are in brackets.

Specifications are as described in footnote of table 1, supplemented with specific interaction terms. Wealth and living with father/mother are baseline characteristics. Whether enrolled at time of death is measured relative to the year of death of the parent.

before their mother died do not have reduced schooling. Rather, it is their counterparts who are living with their mother in baseline who have significantly lower schooling.

Turning to height, interacting orphan transitions with consumption appears to dilute all effects, or at least increase standard errors, for children 11–18 (table 3). Older children from a richer baseline household fare *worse* in terms of height after their mother dies. For the sample of respondents 11–18 years, we find that maternal orphans not living with the mother at baseline have lower height. For the adult sample orphaned at older ages, fostering status is not associated with differential height outcomes in adulthood.

Finally, we evaluate the importance of tracking panel respondents who have relocated. As discussed above, the KHDS 2004 attempted to track all individuals from the baseline survey resulting in a high reinterview rate. That is, the KHDS 2004 data include individuals still living in the same communities as during the baseline survey (10–13 years earlier) as well as those who had migrated to new locations by 2004. Other analysis of the panel respondents in the KHDS 2004 finds strong evidence that migration is not random, and, on average, relocation by 2004 is associated with higher economic growth rates (Beegle, De Weerdt, and Dercon 2006b).

We can restrict the sample in tables 1–3 to those respondents still residing in the same baseline community (not necessarily in the same dwelling but the same village); this is the sample that would have been collected using more standard panel data collection practices (e.g., only tracing individuals who continue to reside in their original location). We find

that the significant effects of death on height and schooling would have been *overestimated* without the tracking exercise (results not presented).

Conclusions

This article has provided unique and robust evidence on the long-term effects of the loss of a parent on children. Focusing the analysis on a sample of initially non-orphaned children in 1991–4, this study estimated the impact of observed orphanhood shocks on height and educational attainment in 2004, controlling for a wide range of household and child conditions before orphanhood and for community fixed effects. By further restricting the sample to those already reaching adulthood in 2004, we provide evidence on the persistent impacts of becoming orphaned from ages 7 to 15, from which little or no recovery is possible.

We find strong effects of maternal and paternal orphanhood on education. Maternal orphans permanently lose on average close to one year of schooling. Maternal orphanhood is associated with height deficiencies for those aged 11–18 years in 2004, but we cannot ascertain if these effects are permanent. By exploring the interaction of the orphanhood shock with particular characteristics, we find that these effects are concentrated specifically among some groups. For example, children not enrolled at the time of the loss of a parent lose significantly more schooling in comparison to non-orphans or orphans already in school when their parent dies. We find some evidence that schooling is protected for orphans from wealthier households. Fostering arrangements

have mixed effects in terms of mitigating the negative impact of the death of a parent. Children who are not fostered out before their mother or father passes have lower schooling attainment, but those orphaned at younger ages obtain higher height.

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