Parental Living Arrangements, Parental Mortality, and Childhood Vulnerability

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Extended Abstract

Introduction: Due the high levels of mortality from AIDS, orphanhood has become a very serious problem in Africa and it has been estimated that over 11 million children in sub-Saharan Africa have lost one or both parents to AIDS (UNICEF, 2003). Concern has been expressed about many aspects of these children's welfare including nutrition and health, access to schooling and emotional well-being. While some studies have reported that orphans are faring as well as non-orphans, others have shown that if a parent dies, children may be disadvantaged in terms of schooling.

Objectives: The objective of this study is to examine the influence of parental residence and mortality on three indices of childhood vulnerability: 1) child mortality due to AIDS and other causes, 2) economic vulnerability, and 3) schooling.
Hypotheses: 1) Children whose parents have died will have higher mortality risks than children with surviving parents. 2) Children whose parents have died from AIDS will have higher mortality risks than children whose parents died form other causes. 3) Residence in a household where the mother or the father is a resident or nonresident member will reduce the child's risk of mortality. 4) Children whose parents have died will have a higher risk of living in a household with poor economic resources. 5) Children whose parents have died will be less likely to continue schooling.

Setting
The study area is part of the rural district of Umkhanyakude in northern KwaZulu Natal. It is situated about 250km north of the provincial capital of Durban. The study area includes both land under tribal authority that was designated as a Zulu 'homeland' under South Africa's former apartheid policy and a township under municipal authority. Homesteads in tribal land are widely dispersed with no village structure. Infrastructure in much of the area is poor. Although this is a rural area, there is little subsistence agriculture. Most households rely on waged income and pensions. Few local employment opportunities exist and consequently labor migration is high. Approximately 35% of female household members and 40% of men aged 18 years or more reside outside the area (Hosegood and Timaeus, 2001). Health services include a district hospital and a network of 10 community clinics and two mobile clinic teams.

KwaZulu Natal is the province of South Africa with the highest HIV prevalence rate among antenatal clinic attendees. An antenatal survey

conducted in the study area in 1998 found that 41% (95% CI: 34.7-47.9) of pregnant women were HIV-infected (Wilkinson, Connelly and Rotchford, 1999). Mortality in the study area rose sharply in the late-1990s. AIDS, with or without tuberculosis, was the leading cause of death in adulthood in 2000 (48%) (Hosegood, Vanneste and Timaeus, 2004). AIDS causes 73% and 61% of female and male deaths respectively at ages 15-44 in the study area.

Data sources

The Africa Centre Demographic Information System (ACDIS) started data collection on 1st January 2000. The study area was mapped and all households registered. The study population includes all household members, both resident and non-resident. Demographic and health information is collected every four months from all registered households and individuals. It includes reports of all births, deaths and moves between households as well as in and out of the area. The conceptual framework and rationales underlying the eligibility criteria and organization of the data are described in detail elsewhere (Hosegood and Solarsh, 2001; Hosegood and Timaeus, 2001). The following section summarizes some of these aspects.

Concepts and design of ACDIS data collection

Given the complex social dynamics and mobility of the population in areas such as rural KwaZulu Natal, it is important to distinguish between a physical place (homestead/facility) and the social group (household) that is resident at that place. ACDIS defines two types of physical place: homesteads whose intended main purpose is to provide accommodation, and facilities (schools, clinics, shops, churches) that provide services. The term 'bounded structure' is used to refer to both. Each eligible bounded structure is registered and mapped as identified by fieldworkers.

All bounded structures are visited and data are collected about previously registered households, as well as new households that have either in-migrated or newly formed. A household is eligible for registration if it is resident at a bounded structure (where it must have at least one resident member). Changes in households' composition (members), place of residence (migration), and headship are updated at each round. In ACDIS, individuals are eligible for registration provided that they are considered to be a member of a household within the demographic surveillance area (DSA). Residence within the DSA is not a criterion, although information about residency is recorded. Eligible members must have spent at least one night in residence in the 12 months prior to registration. Routine demographic and health data are collected for both resident and non-resident members.

Household membership may change several times over a person's lifetime. Babies are usually considered to be members of their mother's household though they may also have other social connections, for example with their father's household in the case of unmarried parents. In adult life, individuals may join new households when they change their social allegiances and residence, for example, upon marriage. In ACDIS any individual who is a member of several households within the DSA simultaneously is recorded as a member of all of them. Household membership may also end without a change in

residency, as in the case of a non-resident member who does not maintain contact with the household and is eventually excluded from the social group. By keeping membership and residency distinct, ACDIS can record a change in the status of one attribute independent of the other.

Residency episodes for individuals and households are handled in a similar way within ACDIS. A resident individual or household must be resident at a bounded structure within the DSA. Household members self-report their place of residence. Typically this is the place where they keep their daily belongings and spend most nights. An individual can only be recorded as resident at one bounded structure at any point in time. At each fieldworker visit any change in residency (i.e. in- or out-migration) is recorded, together with information about the origin or destination and the date of the move. When member has been identified as having in- or out-migrated, information is collected about the migration event. A migration notification form is completed that records whether the individual has moved alone, moved together with one or more other members of the household, or whether the household as a whole has migrated.

Cause of death data

All notified deaths (of both residents and non-residents) are followed up by a verbal autopsy interview. The methodology is described in detail elsewhere (Hosegood, Vanneste and Timaeus, 2004). In brief, the interview is conducted by a trained nurse with the closest caregiver of the deceased and includes an open disease history, a checklist of signs and symptoms, and a structured questionnaire. Two clinicians independently assign the cause of death. Verbal autopsy diagnoses for individuals who died in the local district hospital were validated against their medical notes.

Statistical methods

The analyses in this paper use a sample of 39,601 residency episodes from 39,163 children age 0-17 at the start of the episode. The period of observation is for two years, 1st Jan 2000 to 1st Jan 2002. A data file was constructed for each residency episode observed for these children. A residency episode started either at 1/1/2000 or when the child migrated into the DSA. A residency episode ended when the child migrated either within or outside the DSA, died, or the period of observation ended.

Cox proportional hazard models were used to estimate the hazard rates for mortality. The STATA 8 statistical package was used. Standard errors of the hazard rates were adjusted for clustering due to multiple episodes per child and for children in the same household. Logistic regression was used to estimate the risk of living in a household with poor financial resources.

Measures

Age of child. Age of child at the beginning of the episode was coded in single years.

Gender. Gender of child was coded male or female . Female was used as the reference group.

Kinship ties. Kinship ties to the household were coded in terms of the mother and father's relationships to the household where the child is residing.

Mother's household ties at start of residency:
Mother a resident member
Mother a non-resident member
Reference group: Neither a resident nor a non-resident member of the household
Father's household ties at start of residency:
Mother a resident member
Mother a non-resident member
Reference group: Neither a resident nor a non-resident member of the household
Survival and mortality. Survival or mortality status of mother was coded as a number of dummy variables including mother alive at start of child's residency, mother died during child's residency and mother died of AIDS during child's residency. Survival status of father was defined in the same way. Child mortality was coded as a death during the residency period.
Cause of death. Variables were constructed for deaths due to all causes and for deaths due to AIDS.
Household characteristics. A number of household characteristics were included. First an *asset index* was constructed from a series of questions concerning whether or not the household owned certain items such as a radio, refrigerator or car. The information in this index was collected in the first quarter of 2001.
Number of adults and children. The number of adults and children at the start of residency was included in the model.
Household with no adult wage earner or person receiving a pension. This variable is coded one of there is no adult with a wage or pension income listed as a household member, zero otherwise.

Preliminary Results.
1) Child Mortality.
Two factors were related to the survival of children under age 1 (Table 1). The death of the mother and the asset index of the household increased all cause child mortality. Living arrangements of either parent and the mortality of the father were not related to the child's mortality. For older children (Table 2), the mother not living at the start of the residency as well as her death during the interval increased mortality among these older children. The presence of the father as a resident member of the household significantly reduced the mortality of these children.

AIDS mortality did not add significantly to the risk of child mortality for either age group of children. AIDS increased the risk of child mortality by increasing the overall risk of child mortality.
2) *Economic Vulnerability*. The likelihood of living in a household without a wage or pension earner was increased by the presence of the mother and father as resident members of the household. If the parents were nonresident members, this economic vulnerability was reduced. This may be due to the location of the study in a rural area. If the parents were present, they may be unemployed due to health or circumstance.

The father being alive at the start of residence decreased economic vulnerability. The father's death during the interval increased vulnerability. Death due to AIDS did not add significantly to the risk of economic vulnerability. AIDS deaths affected economic vulnerability by increasing the level of mortality . 3) *Schooling.* Figure 2 shows the level of school attendance by survival of mother. Children age 13-18 were more likely to remain in school if their mother was living. The father's survival was not related to school attendance.

Conclusions. These preliminary results show the influence of the survival of both the mother and the father on the welfare of the children in this area. Mothers may influence the survival of infants and schooling of older children while fathers may protect children from economic vulnerability. Residence of the parents in the study area was related to economic vulnerability. Parental residence in this rural area may be due to ill health or unemployment.

Table 1. Hazard ratio for mortality of children under age 1 at start of residency. 2000-2002, KwaZulu Natal, South Africa

	Children under age 1			
	Hazard ratio (CI)	p	Hazard ratio (CI)	P
Living arrangements of mother				
Mother not living at start	1.02(0.10,9.95)	0.99	0.96(0.10,9.51)	.97
Mother living at start	1.00		1.00	
Mother a resident member	1.51(0.54,5.22)	0.42	1.52(0.54,4.22)	.42
Mother a nonresident member	2.84(0.94,8.66)	0.06	2.73(0.90,8.29)	.08
Mother not a member	1.00		1.00	
Living arrangements of father				
Father not living at start	.17(0.35,3.92)	0.80	1.18 (0.35,3.99)	.79
Father living at start	1.00		1.00	
Father a resident member	0.84(0.48,1.45)	0.53	0.82(0.47,1.46)	.51
Father a nonresident member	0.73(0.38,1.41)	0.35	0.75(0.39,1.44)	.39
Father not a member	1.00			
Mortality				
Mother died	6.37(3.39,12.0)	0.00	3.40(1.11,10.45)	.03
Father died	2.40(0.90,6.43)	0.08	1.67(0.44,6.37)	.42
Mother died of AIDS			2.71(0.71,10.30)	.14
Father died of AIDS			2.00(0.29,13.94)	.48
Gender				
Male	0.93(0.63,1.39)	0.74	0.94(0.63,1.41)	.78
Female			1.00	
Household Characteristics				
Asset index	0.90(0.84,0.96)	0.00	0.90(0.84,0.97)	0.00
Number of adults	1.03(0.94,1.11)	0.55	1.02(0.93,1.11)	0.68
Number of children	1.05(0.98,1.12)	0.15	1.05(0.98,1.12)	0.55
Wald CHI^2	83.43	0.00	89.46	0.00
Number of children (residencies)	6203(6276)		6203(6276)	

Table 2. Hazard ratio for mortality of children age 1 through 12 at start of residency. 2000-2002, KwaZulu Natal, South Africa

	Children age 1 to 12			
	Hazard ratio (CI)	p	Hazard ratio (CI)	p
Living arrangements of mother				
Mother not living at start	2.45(0.97,6.18)	0.06	2.42(0.96,6.12)	.06
Mother living at start	1.00		1.00	
Mother a resident member	1.09(0.56,2.14)	0.79	1.09(0.56,2.12)	.80
Mother a nonresident member	1.57(0.77,3.20)	0.21	1.57(0.77,3.19)	.22
Mother not a member	1.00		1.00	
Living arrangements of father				
Father not living at start	.74(0.39,1.41)	0.36	0.74 (0.39,1.40)	.36
Father living at start	1.00		1.00	
Father a resident member	0.38(0.20,0.76)	0.00	0.39(0.20,0.78)	.00
Father a nonresident member	0.64(0.35,1.21)	0.17	0.65(0.35,1.22)	.18
Father not a member	1.00			
Mortality				
Mother died	4.01(2.18,7.38)	0.00	2.29(0.78,6.70)	.13
Father died	3.32(0.78,6.90)	0.13	3.10(0.92,10.52)	.07
Mother died of AIDS			2.36(0.71,7.81)	.16
Father died of AIDS			0.41(0.04,3.90)	.44
Gender				
Male	1.18(0.80,1.75)	0.41	1.18(0.79,1.75)	.41
Female			1.00	
Household Characteristics				
Asset index	0.95(0.90,1.01)	0.12	0.95(0.90,1.01)	0.12
Number of adults	0.97(0.88,1.06)	0.49	0.97(0.88,1.06)	0.49
Number of children	1.02(0.95,1.09)	0.15	1.02(0.95,1.09)	0.54
Wald CHI^2	57.70	0.00	65.72	0.00
Number of children (residencies)	20,270(20,547)		20,270(20,547)	

Table 3. Hazard ratios for living in a household without an adult with a waged income or a pension, KwaZulu Natal, South Africa, 200-2002.

	Hazard ratio (CI)	p	Hazard ratio (CI)	p
Living arrangements of mother				
Mother not living at start	1.00		1.00	
Mother living at start	1.12(0.84,1.49)	0.45	1.12(0.84,1.49)	.45
Mother a resident member	1.68(1.46,1.94)	0.00	1.68(1.45,1.94)	.00
Mother a nonresident member	0.61(0.47,0.800)	0.00	0.61(0.47,0.81)	.00
Mother not a member	1.00		1.00	
Living arrangements of father				
Father not living at start	1.00		1.00	
Father living at start	0.58(0.49,0.69)	0.00	0.58(0.49,0.69)	0.00
Father a resident member	1.71(1.48,1.99)	0.00	1.71(1.48,1.99)	.00
Father a nonresident member	0.77(0.62,0.96)	0.02	0.77(0.62,0.96)	.02
Father not a member	1.00			
Mortality				
Mother died	0.84(0.58,1.22)	0.37	0.62(0.38,1.01)	.05
Father died	1.69(1.21,2.37)	0.00	1.67(1.11,2.53)	.01
Mother died of AIDS	----		1.72(0.91,3.25)	.09
Father died of AIDS	----		1.02(0.52,2.01)	.94
Gender				
Male	0.99(0.92,1.07)	0.91	1.00(0.92,1.07)	.92
Female	1.00		1.00	
Age	0.99(0.95,1.02)	0.47	0.99(0.95,1.02)	.48
Wald CHI^2	230.06	0.00	231.98	0.00
Number of children	35,716		35,715	

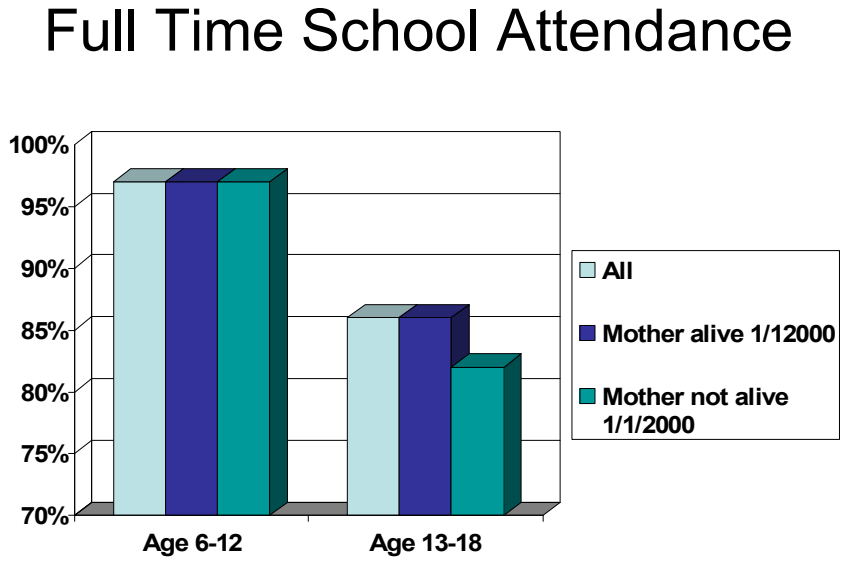

Figure 1. Full Time School Attendance of Children Age 6-12 and 13-18, KwaZulu Natal South Africa , 200-2002.

Acknowledgements**:** Support was received from a Mellon Foundation Grant to the Population Studies Center of the University of Michigan and from The Wellcome Trust through grants to the Africa Centre for Health and Population Studies (#50534), the Africa Centre's Demographic Surveillance System (ACDIS, #50534, and Hosegood/Timaeus (#61145). The authors acknowledge the contribution of the Africa Centre Population Studies Group to the development and operation of ACDIS.