Child Mobility, Maternal Status, and Household Composition in Rural South Africa

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Abstract This article examines the influence of maternal status, socioeconomic status of the household, and household composition on the mobility of children aged 0–14 in Mpumalanga Province, South Africa, from 1999 to 2008. Using data from the Agincourt Health and Demographic Surveillance System, we found that children whose mothers were temporary migrants, living elsewhere, or dead had higher odds of moving than children whose mothers were coresident. Older children and children living in richer households faced lower odds of mobility. For children whose mothers were coresident, there was no effect of maternal substitutes on child mobility. However, among children whose mothers were temporary migrants or living elsewhere, the presence of prime-aged and elderly females lowered the odds of mobility. For maternal orphans, the presence of elderly women in the household lowered their odds of mobility. The results underscore the importance of examining the conditions under which children move in order to strengthen service delivery targeted at safeguarding children's well-being.

Keywords Children · Mobility · Household · Mothers · South Africa

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Introduction

Population mobility in Africa has received considerable attention in recent demographic scholarship (Bilsborrow 1998; Collinson et al. 2009; Tienda et al. 2006). Much of this literature has focused on the determinants and consequences of adult migration—particularly labor migration (Brockerhoff 1990; Oucho 1998) and, more recently, the relationship between migration and the spread of HIV (Lurie 2000). Children's mobility, however, has received far less attention. The literature on child mobility in Africa has focused mainly on the short- and long-term consequences of foster care in terms of health and education (Bledsoe et al. 1988; Castle 1996; Parker and Short 2009) and on community acceptance of fostered children (Young and Ansell 2003). Although we know that the impetus for foster care depends on factors such as parental survival, economic status, accessibility to schooling infrastructure, labor needs, and caregiving needs (Madhavan 2004), there is a notable gap in the demographic literature on the determinants of child mobility more generally. In one of the only existing studies on this topic, Ford and Hosegood (2005) found that although parental mortality from all causes substantially increased the risk of a child moving, maternal AIDS mortality lowered the risk compared with death from other causes. They also found that younger children, boys, and children whose mothers or fathers were members of their households were less likely to move.

The need for more research on child mobility is motivated on three fronts. The first is the increase in female migrants noted in several contexts in Africa, many of whom are mothers (Oucho 1998; Tienda et al. 2006). We know very little about the residential patterns of children with migrant mothers in Africa. Second is the increasing number of orphans in countries with high HIV prevalence. By 2007, nearly 12 million children in sub-Saharan Africa had lost one or both parents to HIV/AIDS (UNAIDS 2008). Whereas there has been much concern over the welfare of these children (Ainsworth and Semali 2003; Bicego et al. 2003; Case et al. 2002), we know little about the mobility patterns of these children and the conditions under which they move. Finally, children's mobility is likely to affect key areas of child well-being, such as educational attainment, nutritional status, and access to health care. Therefore, it is essential to gain a better understanding of the factors associated with mobility.

In this article, we examine the determinants of child mobility—in particular, the effects of maternal survival/residence status, socioeconomic status (SES) of the household, and the presence of potential maternal substitutes in the household. Using longitudinal data from the Agincourt Health and Demographic Surveillance System in the Agincourt subdistrict in northeastern South Africa, we conduct discrete-time event history analysis to determine the risk of a child leaving a household. The value of this analysis is underscored by concerns about caregiving arrangements for children in contexts marked by economic instability, labor migration, and high HIV prevalence. We conclude with a discussion of a future research agenda on child mobility and the importance of this research for policy initiatives to support children and their households in rural Africa.

Conceptualizing Child Mobility

We frame the issue of child mobility in rural communities in Africa using two key components: (1) parental status, particularly that of mothers; and (2) the coping capacity of households in the face of economic hardship and shocks resulting from death. Although it is clear that the attributes of both sending and receiving households condition the opportunities and decisions related to child mobility, we focus here on sending households in order to begin disentangling a very complex system of obligations and reciprocity between households. The implications of this decision are presented in the Discussion section.

   We focus on maternal survival and residential status because prior research has demonstrated the dominant influence of maternal status compared with paternal status on children's educational and health outcomes (Desai 1992; Lloyd and Blanc 1996). However, fathers do play a role in decisions regarding their children—particularly when they provide regular financial support to the child and the mother (Madhavan et al. 2008; Richter and Morrell 2006)—and therefore need to be considered in any analysis of child mobility. Mothers are increasingly mobile in pursuing employment and educational opportunities and because of union formation and dissolution. Although men historically have been the majority of labor migrants in South Africa, female internal labor migration has been steadily rising. Posel (2006) found that the percentage of female adults who are labor migrants from rural areas increased from 7.4% in 1993 to 8.9% in 1997, and that they are, on average, older than nonmigrants and are therefore more likely to have children. She also found that having young children (<6 years) decreased the probability of female migration, whereas having older children (7–14 years) increased it. Additionally, the presence of elderly women in the household increased the probability of female migration, possibly because of their ability to provide substitute care for children.

   Labor migration is not the only reason mothers are separated from their children. In some cases, women live away from their children because the mothers are in unions in which children from previous unions are not welcome. In these situations, if the mother is providing financial support for her children living elsewhere, she probably has a greater say about their welfare. Finally, it is important to consider the death of mothers, which, in the South African case, has led to great concern about the welfare of orphans left behind. In such cases, there are two possible scenarios. In the first, most of the decision-making power about the children left behind would rest with the household in which they reside. In the second, if the father is living elsewhere but involved in the child's life, he (and his household) may participate in decision making about the child. In general, a father's influence in decisions about child mobility is likely to be greater when he is a member of the household than if he lives elsewhere or is no longer in the child's life.

   The coping capacity of households can be examined using the rural livelihoods framework developed by Long (1997). *Livelihoods* is defined as the process through which people "make a living, meet various consumption and economic necessities, cope with uncertainties, respond to new opportunities and choose between different value positions" (Long 1997:11). The management of livelihoods is dependent not just on access to and distribution of limited economic resources but also on the

development and nurturance of social relationships between individuals and collective groups across space and time. In this sense, we see child mobility as both a way of spreading resources and responsibilities (physical and financial) and a means of drawing on and managing relationships across households.

Household livelihoods are dependent on (1) the resources that each member (including children) contributes, and (2) the burden that a household can sustain for its members (Rakodi 2002). Children's age and, to a lesser extent, their sex mainly determine their contributions to a household. Older children and girls may be expected to contribute more labor to the household. A household's response to stresses and shocks may include moving children out of a household. Household members may weigh a number of different factors when considering whether to move a child to another household, including the ability to provide care for the child (by the mother or maternal substitutes), children's contributions to household welfare, their consumption of limited household resources, their health and developmental needs, the father's level of involvement, the availability of a suitable receiving household, and the extent to which the move might strengthen ties between the sending and receiving households. Richer households tend to be better equipped to care for children but may be less likely to need children to contribute labor to the household. Also contributing to the potential financial resources of a household is the presence of temporary migrants and adult men who send remittances. Better-off households may foster out children to improve opportunities for the child, as in the case of sending children to a household with access to a better school (Bledsoe 1994). In this type of livelihood strategy, a household uses child mobility to build educational capital to strengthen a child's future positions in the labor market and, by extension, its own. Conversely, if household burden becomes too great, child mobility may be used as a rebalancing strategy, as in the case of fostering out children to reduce the dependency burden. Finally, in order to strengthen relationships between households, child mobility may be used to contribute labor to another household.

The factors influencing child mobility are likely to be different when a mother is coresident than when she is a temporary migrant, lives elsewhere, or is deceased. On the whole, it is important to understand how mothers' residence and survival status interact with SES and with household composition, particularly the presence of other caregivers. If a woman is a temporary migrant, her children may accompany her if she can manage child care. However, a mother may be more willing to leave her children behind if maternal substitutes are available and if economic conditions in the household permit. This may be a good short-term option when a mother is testing out her new environment. As a longer-term option, when a mother establishes a residence elsewhere, leaving children behind may still be a more efficient use of resources and may increase income generation for the household. For example, a female migrant would be able to save money on child care and remit money back to the household where her children live. Additionally, depending on the age of the child, it may be desirable for a household to keep children who can contribute household labor, such as collecting firewood or water, cooking, and cleaning. This would also be a preferred arrangement if a mother lives with a new partner but does not feel comfortable bringing in her children from a previous union.

In sum, maternal status, household SES, and household composition all influence child mobility. The following hypotheses reflect, from the perspective of the sending household, how the first two factors are likely to influence child mobility

independently and how maternal substitutes in the household might influence child mobility through interaction with maternal status.

Hypothesis 1:   Having a mother who is a temporary migrant, lives elsewhere, or is deceased will increase the odds of a child moving compared with having a mother who is coresident.

Hypothesis 2:   The higher the SES of the household, the lower the odds of mobility.

Hypothesis 3:   When the mother is a temporary migrant, lives elsewhere, or is deceased, the presence of maternal substitutes will lower the odds of mobility.

Even though the age of the child is not part of our central hypotheses, we expect older children to face a lower likelihood of moving because of their potential to contribute labor to the household. We also expect children with fathers who are coresident or temporary migrants to face lower odds of mobility than those with nonresident or deceased fathers.

Methods

Setting

Under apartheid, men and sometimes women were separated from their children for extended periods of time because labor migration necessitated foster care as a coping strategy (Murray 1981; Spiegel 1987). Children were moved between households as a means of coping with economic hardship (Jones 1993; Van der Waal 1996). This practice continues even today as men and increasingly women move away from rural households in search of work. The subdistrict of Agincourt, the site for the present analysis, is an area that was and continues to be a "sending" area for labor migrants. Located 500 km northeast of Johannesburg in Mpumalanga Province, this semirural area was part of a former homeland under apartheid. High population density and low rainfall make the area inadequate for subsistence farming and more suitable for cattle rearing. Although all villages have primary schools and attendance is near universal, school progress lags, with half of 20-year-olds still enrolled. Employment opportunities are scarce, made evident by unemployment rates of 29% for men and 46% for women (Collinson 2009). The province has an HIV-prevalence rate (based on antenatal survey data) of 32.1%, making it one of the worst-affected areas in the country (South Africa Department of Health 2007). This is an ideal setting to examine child mobility because (1) labor migration has always been high and increasingly involves women, (2) household SES varies, and (3) mortality from HIV has been increasing over time.

Data

The data for this analysis come from the Agincourt and Health Demographic Surveillance System (AHDSS) conducted in 25 villages covering 400 km^2. The baseline

census was conducted in 1992, followed by annual visits to each household in the site to update births, deaths, migration, and the individual status (e.g., residence, union status, relationship to household head, and education) of every household member. Household SES is based on ownership of assets (e.g., cattle, car, and cell phone), as well as access to amenities such as drinking water and sanitation. As in other HDSS sites, verbal autopsies are conducted to determine cause of death. Additional modules on labor force participation, social grants[1] uptake, and temporary migration have been conducted at periodic intervals (Kahn et al. 2007).

Migration, in the AHDSS, is classified into two categories. A *permanent migrant* is defined as a person moving into or out of a household with an intention to make this move permanent. Someone who leaves the household permanently after a census update will not appear on the subsequent household roster. A *temporary migrant*, on the other hand, is someone who is identified as a member of the household but has spent six or more months of the previous year residing elsewhere because of employment or some other reason. In this sense, the AHDSS employs a de jure definition of *household*. This distinction is important in assessing the strength of ties between migrants and their households. Temporary labor migrants are more likely to send remittances and to visit more frequently than permanent migrants (Collinson 2009). The migration definition requires crossing the field-site boundary, which acts as a proxy for distance and implies that the moves within a village and between villages are not considered migration. Four of the 25 villages are situated near the border of the field site, so a move from one of these villages to an adjacent village that lies just outside the border is defined as an out-migration. Therefore, out-migration from these villages may be slightly overestimated because of their geographical proximity. Considerable effort has gone into the collection of high-quality data on migration, including the training of fieldworkers, the cross-checking of data, and ongoing efforts at reconciling migration from one household into another in the site in order to minimize double counting of household members.

In 2008, the total surveillance population was 81,147 living in 14,119 households. Despite a notable fertility decline from a TFR of 6.0 in 1979 to 2.3 in 2004, the population is relatively young, with 36% of the population under the age of 15 (Garenne et al. 2007). There has been an increase in mortality partly attributable to HIV/AIDS, which constituted 8% of all deaths for the 15–49 age group in the 1992–1994 period but jumped to 48% in the 2002–2005 period. The site has seen a change in the mortality profile from the early 1990s, when acute diarrhea and respiratory diseases dominated for children, road accidents dominated for adults, and noncommunicable diseases dominated for older adults; by contrast, in the 2002–2005 period, HIV/TB dominated in nearly all age groups, followed by assault and road accidents for adults and noncommunicable diseases for older adults (Tollman et al. 2008). Previous work on migration using the AHDSS data has found that population mobility in Agincourt has increased over time, particularly among young children and adult women. Each year, around 20% of children make a permanent or temporary move; mobility among children 0–4 increased between 1995–1999 and 2000–2004. Children accompanied only 4% of temporary migrant fathers and 10% of temporary

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[1] South Africa is one of the only countries in Africa that provides a set of state funded social grants for the care of the elderly, children, and the disabled in poor communities.

migrant mothers when they moved. Most of the children who stay behind remain in the same household, usually under the care of the mother if the father is the temporary migrant or under the care of grandmothers if the mother is a temporary migrant (Collinson 2009). Recent ethnographic work shows that men manage to retain some form of social connection with their children even if they are not members of the same household (Madhavan et al. 2008). Seasonal return migration during the Christmas and Easter seasons is evident for men (Collinson et al. 2006), but no such patterns have been recorded for children.

Statistical Analysis

The child cohort is composed of children aged 0–14 who ever lived in the site in the period July 1, 1999–July 1, 2008.[2] Children entered the cohort either through birth or in-migration. The event occurred when a child moved out of his/her household. Observations were right-censored if they turned age 15, died, or reached the end of the study before experiencing a move. The result is a child cohort over nine years, with a total of 197,970 child-years observed for 50,978 children younger than 15.

A discrete-time event history analysis was conducted whereby each child's exposure time was divided into child-years starting at birth or entry into the household and consisting of one-year intervals. For each year (July 1 to June 30 of the following calendar year), a dummy variable indicated whether or not the child made a move before the end of that year. All individual and household measures are taken at the beginning of each period; the event of interest, child move, can occur at any time before the next update. We restricted this analysis to the child's first move after entering the AHDSS site and included only characteristics of the sending household. Although multiple moves are indeed common in this area, in the interest of clarity, we opted to focus on one set of household conditions rather than to model multiple household circumstances. In privileging the sending over the receiving households, we do not account for the contingent nature of mobility—namely, that conditions in a receiving household influence the decision to move a child from the sending household. Unfortunately, data restrictions do not permit this analysis to be carried out. However, our focus on sending households is a valuable first step in understanding a very complex process. Finally, we combined children's temporary and permanent migration in creating the child mobility variable because it is important, as a first step, to better understand the determinants of mobility in general before proceeding to disaggregating types of mobility.

We used multilevel mixed- and fixed-effects models in STATA. Mixed-effects models incorporate both fixed and random effects, with the fixed part estimated directly as in standard regression models and the random effects summarized using their variances. This procedure has the added advantage of addressing clustering of data at both the household and child levels by explicitly modeling the contribution of the grouping variables to the total variance and adjusting the standard errors of the coefficients accordingly (Stata 2009). In order to check for bias resulting from time-constant unobserved heterogeneity within households (e.g., treatment of children or

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[2] The choice of this period was based on the availability of the most complete and reliable data.

family conflict), we ran a household fixed-effects model as well. We ran several logistic regression models. The first is a set of nested models estimating the odds of a child moving using both mixed- and fixed-effects specification. Because of our interest in maternal status, we ran a second set of fixed-effects models that include various interaction effects of maternal status and the presence of maternal substitutes. Finally, we ran an ordinary logistic model estimating the odds of a child moving using cross-sectional data from 2007 that included paternal status. We used the cluster command to adjust for nonindependence of observations from having more than one child per household.

Measures

The key factors of interest are mother's survival/residence status, presence of maternal substitutes, and SES. Maternal status is categorized as 1 for coresident member of household, 2 for temporary migrant, 3 for living elsewhere, and 4 for deceased. Maternal substitutes are measured by the presence of prime-aged females (15–59) other than the mother and by the presence of at least one elderly female (60+). Prime-aged female is a three-category variable categorized as 0 for none present, 1 for one present, and 2 for two or more present. Elderly female is a dichotomous variable categorized as 0 for none and as 1 for at least one. We treat these groups of women separately because they make different types of contributions to child care as a result of their physical status and, sometimes, financial status. In South Africa, women aged 60 and older receive a means-tested noncontributory state-funded pension, which has increasingly been used to sustain households without wage earners (Case and Deaton 1998; Schatz and Ogunmefun 2007). SES is measured by household asset ownership converted into wealth quintiles. Each asset variable was weighted equally and combined into five subindicators: modern assets, livestock assets, power supply, water and sanitation, and dwelling structure. These subindicators were then combined and standardized to produce an absolute SES indicator that could discriminate between the poverty levels of different households. The absolute SES, which ranged from 0.75 to 4, was then converted into quintiles. All these variables are treated as time varying.

   Control variables include the sex of child, age of child categorized into three groups (0–4, 5–9, and 10–14), and number of children (other than index child) aged 0–14 in the household; the number of adult male temporary migrants in the household at the start of the period is also included to capture the effects of other income sources. With the exception of children's sex, all are treated as time varying, although age group does not necessarily change yearly. The effect of age is confounded by time, such that children who survive one year without an event are likely to survive the next, when they are another a year older. To address this potential selection bias, we also controlled for the number of years since the first observation. Because we found no effect of duration, we did not include it in the final models.

   As in most surveillance sites, data quality at this site has been steadily improving over time because of the rigorous cross checking of data, training of field staff, and intensified efforts to assure internal integrity. As a result, missing data issues are not significant for most measures; the exception is paternal status, for which we find 20%

of child-years without any information on fathers. Father status was first collected in 2007 on all children aged 0–17 and has not been systematically updated, although efforts are underway to standardize this aspect of data collection. This means that children who moved out of the household before 2007 would be missing this information. Therefore, we could not include this variable in the multilevel models but instead included it in a cross-sectional logistic model for 2007. Paternal status is categorized as 1 for coresident, 2 for temporary migrant, 3 for living elsewhere, and 4 for deceased. SES data were first collected in 2001 and then updated in 2003, 2005, and 2007. However, we were able to interpolate the scores for the post-2001 years in which data were not collected, leaving only 3% of child-years with missing SES data.

Results

Descriptive Characteristics

Table 1 shows the distribution of children's move status stratified by age and sex. The mobility of children is high, particularly in the youngest age group, among whom almost 50% of boys and 50% of girls made a move in the time period. As age increases, the percentage of children making a move decreases. The only significant sex difference is found in the oldest age group, reflecting the possible preference for sending girls out of the household to be cared for elsewhere or to provide care for others.

Table 2 shows the distribution of maternal status at the beginning of the first observation period. Most children have mothers who were living with them at the beginning of the period, although this decreased as the children aged. As expected, a higher proportion of older than younger children have mothers who were temporary migrants or who lived elsewhere. It is striking that 6.2% of children aged 10–14 were maternal orphans at the start of the observation period.

Table 1 Distribution of children's move status, by age and sex over the period 1999–2008

	Age Group						Total
	0–4		5–9		10–14		
Move Status	Male	Female	Male	Female	Male	Female***	N
Move	49.6	49.8	42.7	42.8	15.0	17.5	16,513
	(3,767)	(3,790)	(2,503)	(2,568)	(1,779)	(2,106)	
No Move	50.4	50.2	57.3	57.2	85.0	82.5	34,465
	(3,824)	(3,818)	(3,357)	(3,434)	(10,099)	(9,936)	
Total	7,591	7,607	5,860	5,999	11,878	12,042	50,978

Note: Numbers in parentheses are *N*s.

Source: From authors' calculations of AHDSS data.

***$p < .001$

Table 2 Distribution of maternal status by age group of child at the beginning of the first observation period

	Age Group			
Maternal Status	0–4	5–9	10–14	Total
Coresident	85.8	74.5	69.2	38,245
Temporary Migrant	7.6	8.6	9.8	4,088
Lives Elsewhere	5.4	12.7	14.9	4,698
Deceased	1.2	4.2	6.2	1,568
Missing	3.8	2.3	8.8	2,369
Number of Children	24,618	13,407	12,953	50,978

Source: From authors' calculations of AHDSS data.

Multivariate Analysis

Table 3 presents results from three random-effects models and one household fixed-effects model of child mobility for all children. The first model includes only age and sex; the second adds maternal status; and the third includes SES and household composition.

The direction of effects is exactly the same in the full mixed-effects model (Model 3) model as it is in the fixed-effects model (Model 4) with the exception of one variable: the presence of one adult female. However, the magnitude and significance levels are different enough across most variables to suggest that unobserved heterogeneity is producing biased estimates in the mixed-effects models. Additionally, the Akaike Information Criterion (AIC) score suggests that the fixed-effects model has the best goodness of fit, thereby strengthening our confidence in the fixed-effects results. Boys face lower odds of moving than girls in all models, although the significance decreases in the full mixed-effects and fixed-effects models. Both the middle and the oldest age groups face significantly lower odds of moving than the youngest age group, with the oldest age group facing 61% lower odds of moving in all the models. With regard to maternal status, in all the models, having a mother who is a temporary migrant nearly triples the odds of a child moving, and living elsewhere more than doubles it, compared with having a coresident mother. Having a deceased mother also increases the odds of moving. In terms of SES, the higher the wealth quintile of the household, the lower the odds of moving, although the effect is not entirely linear. Not surprisingly, we find higher odds of moving for the index child as the overall number of children in the household increases. In terms of maternal substitutes, the presence of an elderly woman actually increases the odds of a child moving, but the presence of resident prime-aged females has no effect in the full mixed-effects model. In the fixed-effects model, the variable for the presence of an elderly woman loses significance, whereas both variables for prime-aged female presence gain significance. Finally, the number of male adult temporary migrants increases the odds of moving by about 18% in the mixed- and fixed-effects models.

Table 3 Multilevel logistic models for the effects of sex, age, maternal status, and household characteristics on child mobility, 1999–2008 (odds ratios)

	Model 1	Model 2	Model 3	Model 4[a]
Male	0.94***	0.95**	0.95*	0.95*
	(0.018)	(0.019)	(0.020)	(0.022)
Age Group				
0–4	—[b]	—[b]	—[b]	—[b]
5–9	0.69***	0.67***	0.64***)	0.74***
	(0.015)	(0.015)	(0.015)	(0.018)
10–14	0.44***	0.41***	0.39***	0.46***)
	(0.010)	(0.010)	(0.010)	(0.013)
Maternal Status				
Coresident	—	—[b]	—[b]	—[b]
Temporary migrant	—	2.68***	2.78***	2.08***
		(0.089)	(0.094)	(0.081)
Living elsewhere	—	2.45***	2.62***	1.97***
		(0.079)	(0.087)	(0.074)
Deceased	—	1.33***	1.34***)	1.11
		(0.078)	(0.033)	(0.077)
Household SES				
1	—	—	—[b]	—[b]
2	—	—	0.84***	0.86**
			(0.033)	(0.044)
3	—	—	0.80***	0.81***
			(0.032)	(0.041)
4	—	—	0.78***	0.81***
			(0.032)	(0.051)
5	—	—	0.86***	0.89
			(0.037)	(0.061)
Number of Children in Household	—	—	1.06***	1.19***
			(0.008)	(0.012)
Presence of at Least One Elderly Woman	—	—	1.19***	1.06
			(0.038)	(0.054)
Number of Resident Prime-Aged Females				
None	—	—	—[b]	—[b]
One	—	—	0.97	1.14***
			(0.028)	(0.041)
Two or more	—	—	1.00	1.25***
			(0.032)	(0.052)
Number of Male Adult Temporary Migrants	—	—	1.18***	1.17***
			(0.017)	(0.022)
AIC	105,629.1	98,988.2	90,570.5	55,677.4
N	197,970	194,452	189,043	112,054

Notes: Numbers in parentheses are standard errors. Fixed-effects regression has a smaller *N* because observations were dropped if no change in the dependent variable occurred. The Akaike Information Criterion (AIC) statistic compares goodness-of-fit of the three models, with the lowest score indicating the best fit.

Source: From authors' calculations of AHDSS data.

[a] Fixed-effects model.

[b] Reference category.

*p < .05; **p < .01; ***p < .001

Table 4 examines interaction effects of maternal status with household composition using household fixed-effects models. Only main and interaction effects are shown, but all controls were included in each of the models. The models include interaction effects of maternal status and (1) the presence of prime-aged women, (2) the presence of elderly women, and (3) the presence of both. We combined the two categories of prime-aged female presence used in Table 3 into one to simplify the interpretation of the interaction effects.

The main effect of maternal status continues to be highly significant and positive in all three models, as does the effect of prime-aged females. However, the main effect of elderly women disappears entirely, and there is no effect of the presence of both. The interaction terms show some interesting effects. The presence of prime-aged females significantly lowers the odds of a child moving when the mother is a temporary migrant or lives elsewhere. The effect is not significant when the mother is coresident. The presence of elderly women lowers the odds of a child moving when the mother lives away or is deceased. None of the interaction effects with both types of maternal substitutes present are significant. All the control variables continue to exert the same influence as in the models without any interaction effects.

Table 5 presents results from an ordinary logistic regression for 2007 that includes paternal status. All household and composition variables were measured on July 1, 2007.

Age effects are similar to the multilevel models, but child's sex has no effect. Compared with when the mother is coresident, the odds of moving is 10 times greater when the mother is a temporary migrant, almost four times greater when she lives elsewhere, but not significantly different when she is deceased. Having a father who is a temporary migrant nearly doubles the odds of a child's moving, but having a father who lives elsewhere or is deceased has no effect. SES has no effect on the odds of a child moving. In terms of household composition, the number of children in the household has a negative effect on the odds of a child moving, but this might be a spurious result from reverse causation. The presence of an elderly woman has no effect, but the presence of prime-aged females significantly lowers the odds of a child moving. Finally, the higher the number of adult male temporary migrants, the higher the odds of moving.

Summary and Discussion

Using data from the Agincourt Health and Demographic Surveillance System in Mpumalanga Province, South Africa, we examined the influence of maternal status, household SES, and household composition on child mobility. Confirming Hypothesis 1, we found that children face higher odds of moving when their mothers are temporary migrants, living elsewhere, or deceased. Hypothesis 2 was also supported: we found that children face lower odds of moving out of households in higher wealth quintiles. However, the effect is not entirely linear; the magnitude and significance of the highest SES category is lower than that of the other categories, hinting at the possible strategy of sending children to live in households in higher wealth quintiles to achieve better schooling. As explained by the livelihoods framework, different resources available to

Table 4 Multilevel logistic models for interaction effects of maternal status and presence of maternal substitutes on child mobility, 1999–2008 (odds ratios)

	Model 1	Model 2	Model 3
Main Effects			
Maternal status			
Coresident (ref.)	—	—	—
Temporary migrant	2.92***	2.05***	2.13***
	(0.211)	(0.097)	(0.094)
Living elsewhere	2.67***	2.24***	2.16**
	(0.191)	(0.103)	(0.092)
Deceased	1.04	1.30**	1.19*
	(0.172)	(0.113)	(0.098)
Presence of at least one elderly woman	1.0	1.17	—
	(0.053)	(0.097)	
Presence of at least one prime-aged female	1.31*	1.17***	—
	(0.245)	(0.039)	
Presence of both	—	—	1.08
			(0.011)
Interaction Effects of Prime-Aged Female Presence and:			
Mother coresident	0.93	—	—
	(0.164)		
Mother temporary migrant	0.59**	—	—
	(0.111)		
Mother lives elsewhere	0.63*	—	—
	(0.117)		
Mother deceased	—[a]	—	—
Interaction Effect of Elderly Woman Presence and:			
Mother coresident	—	0.95	—
		(0.074)	
Mother temporary migrant	—	—[a]	—
Mother lives elsewhere	—	0.69***	—
		(0.067)	
Mother deceased	—	0.64**	—
		(0.097)	
Interaction Effect of Both Present and:			
Mother coresident	—	—	1.14
			(0.060)
Mother temporary migrant	—	—	1.11
			(0.174)
Mother lives elsewhere	—	—	0.88
			(0.135)
Mother deceased	—	—	—[a]
Likelihood Ratio Test	1,865.42***	1,848.34***	1,821.03***
N	112,054	112,054	112,054

Notes: All control variables were included in the model, and odds ratios were unchanged from models without interactions. Numbers in parentheses are standard errors. Some interaction categories were dropped because of collinearity. The likelihood ratio test compares the model fit between restricted and unrestricted models using maximum likelihood estimation.

Source: From authors' calculations of AHDSS data.

[a] Variable omitted.

*p < .05; **p < .01; ***p < .001

Table 5 Standard logistic model for the effects of sex, age, maternal and paternal status, and household characteristics on child mobility, 2007

	Odds Ratio
Male	0.98
	(0.076)
Age Group	
0–4 (ref.)	—
5–9	0.37***
	(0.035)
10–14	0.17***
	(0.020)
Maternal Status	
Coresident (ref.)	—
Temporary migrant	10.21***
	(1.107)
Living elsewhere	3.85***
	(0.539)
Deceased	1.69
	(0.446)
Paternal Status	
Coresident (ref.)	—
Temporary migrant	1.93***
	(0.314)
Living elsewhere	1.35
	(0.222)
Deceased	1.25
	(0.267)
Household SES	
1 (ref.)	—
2	0.93
	(0.137)
3	0.84
	(0.122)
4	0.89
	(0.127)
5	0.99
	(0.146)
Number of Children in Household	0.90***
	(0.027)
Presence of at Least One Elderly Woman	0.93
	(0.092)
Number of Resident Prime-Aged Females	
None (ref.)	—
One	0.64***
	(0.068)
Two or more	0.50***
	(0.059)
Number of Male Adult Temporary Migrants	1.39***
	(0.057)
Pseudo-R^2	.1742
N	20,258

Note: Numbers in parentheses are standard errors.

Source: From authors' calculations of AHDSS data.

*$p < .05$; **$p < .01$; ***$p < .001$

households constrain their choices. The poorest households are pushed into child mobility, but wealthier households can afford to send children to better schools and may choose to do so.

The most interesting findings address Hypothesis 3, which posits that the presence of maternal substitutes keeps children from moving when mothers are temporary migrants, live elsewhere, or are deceased. From the interaction effects, we found that when the mother resides with the child, the presence of elderly women and the presence of at least two prime-aged females has no effect on the odds of moving. The situation changes quite dramatically when the mother is a temporary migrant. In this case, we find that elderly women exert no influence, but the presence of prime-aged females significantly decreases the odds of moving. When the mother lives elsewhere, the presence of both types of maternal substitutes greatly lowers the odds of mobility. For maternal orphans, the presence of elderly women lowers the odds of moving. Additionally, we also found that older children are less likely to move, probably because of their potential to contribute labor and possibly income to the household. Finally, the higher the number of adult male temporary migrants in the households, the higher the odds of mobility, suggesting that this variable may be capturing the effects of household size as a push factor rather than household income as a retention factor. However, it is possible that having more temporary migrants makes the whole household more mobile.

Caution must be exercised in interpreting the paternal status results because the cross-sectional analysis does not establish causality. The positive association between having a temporary migrant father and child mobility suggests that when fathers are mobile but remain connected to their households, there is increased motivation and perhaps resources for their children to move. That the effect of mothers' temporary migrant status increases substantially suggests that there is an added effect of both parents being mobile on children's mobility. The lack of any association with child mobility for fathers living elsewhere or being deceased is in line with our expectations that nonresident fathers may not have much influence over decisions about their children's mobility.

Interpreted through a livelihoods framework, the results suggest that rural households utilize different strategies regarding the placement of children when the mother is coresident, when she is a temporary migrant, when she lives elsewhere, and when she is no longer alive. When the mother resides in the household, other household members, particularly prime-aged and elderly females, would expect her to bear more of the child-rearing responsibilities. Therefore, if she were to move, she would be expected to take her children with her, particularly if they are young and viewed as a greater burden on household resources. The effect of elderly women in the household is partly a function of their pension status. Other research has shown that pensioners in a household increase female mobility by allowing women greater freedom to pursue opportunities (Ardington et al. 2008). Our results extend this finding by including children in this increased mobility. It is also possible that the pensions of the elderly provide financial resources necessary for children to move for schooling.

The strategy changes when the mother is a temporary migrant, lives elsewhere, or is deceased. When mothers are temporary migrants, they are most likely remitting to the household in which their children live. Therefore, it would make sense to optimize the use of this income by keeping child care within the household and

benefitting from the child's labor contributions. Both would reduce child mobility. Similarly, when mothers live elsewhere, the additional income from a pensioner, available child care from prime-aged females, and the potential labor contributions of the child might compose the optimum arrangement for keeping the child in the household. For maternal orphans, far less choice is involved given that the circumstances are the result of a crisis situation instigated by death. Children are likely to be seen as being more vulnerable and therefore in greater need of support from household members, particularly elderly females who are willing to substitute for mothers.

Although the statistical results presented here are robust and are based on a large sample, important limitations to the analysis must be acknowledged. This analysis does not account for the conditions in the receiving households. It has been well established that the care of children in African communities is embedded in an extended family network dispersed over multiple households (Bledsoe 1994; Caldwell and Caldwell 1987). As explained earlier in the discussion of the livelihoods framework, the decision to move children is fundamentally linked to conditions in both sending and receiving households. Some of the migration literature (almost exclusively focused on adults) has shown the importance of destination attributes in influencing the decision to move (Curran and Rivero-Fuentes 2003; Massey and Espana 1987). More recent work on fathers and children has shown that the links between households are as important as the conditions within each household (Madhavan et al. 2008). In statistical terms, the absence of data on the receiving household could lead to endogeneity through omitted variable bias. Our data do not allow us to account for receiving conditions at this time, but efforts are underway to reconcile in- and out-migrants in the field site, which would then allow us to extend our analysis to include receiving households.

Another concern about endogeneity arises because household composition and the outcome of interest are often jointly determined by some unobserved factor. For example, a mother's illness might instigate in-migration of elderly female kin in order to help with child care, as in the case of HIV/AIDS–affected households. This suggests a possible selection effect in which households with chronic illness are more likely to have a particular household composition as well as a propensity to outmigrate children. Unfortunately, we do not have morbidity data to address this directly, although the use of propensity scores to control for the likelihood of being selected into particular households holds promise (Kuhn et al. 2011). Other research on HIV/AIDS mortality and household dependency ratios has shown that anticipatory movements in preparation for a death did not lead to any significant endogeneity problems (Madhavan et al. 2009). Even if there were some sort of household effect whereby families both have adults dying and cannot care for the children, identifying such households would still be important from an intervention perspective.

Timing of events is another potential problem. In this analysis, we focused on the relationship between household composition and child mobility. As explained in the Data section, the temporal configuration of our data is such that child mobility can be affected by household composition only at the time of the previous update. However, it is still possible that a child move (or lack thereof) might bring about changes in household composition that would be recorded only in the next update, thereby bringing into question the direction of causation. This would be of particular concern in households that are prone to high levels of fluidity within

short periods of time. The fixed-effects models presented in this analysis address the time-constant unobserved heterogeneity but not the time-varying component. In summary, although we acknowledge that we have not accounted for all sources of endogeneity, we are also heeding Moffitt's (2005) advice that it is important not to compromise too much external validity in the quest for complete internal integrity of models.

The analysis presented here is an important first step in understanding a very complex system of child mobility and household well-being. It has also identified several issues that need to be considered in future research. First, we examined only the child's first move, but children are likely to move multiple times. The extent to which conditions of subsequent moves resemble those of the first, as well as the contingent nature of mobility decisions, are important topics that can be investigated using AHDSS data. A focus on moves rather than children might yield different insights on mobility patterns. Second, distinguishing between temporary and permanent child moves may help to clarify the conditions under which coping mechanisms work. This type of research could be further refined by examining reasons for moving. Third, it is important to discriminate accompanied from unaccompanied child mobility. Our exploratory work on joint movement of children and mothers shows that among children who moved, boys faced higher odds than girls of moving accompanied by their mothers and that the presence of elderly women in the household increased the odds of an accompanied movement. This finding is likely linked to the conditions of women's mobility. For example, why and where the mother migrates might help to explain why children stay behind or accompany her. The type of job and accompanying wage and/or the distance to place of employment are several factors that might help to explain decision making regarding children's mobility. Much more research is needed to better understand the conditions under which children move with adults and when they move on their own. Despite the recognition that migration is a family decision (Lauby and Stark 1988; Root and de Jong 1991), there is a notable absence of a focus on children in the migration literature, in which children are assumed to simply follow their parents. We hope that the analysis presented in this article sets the stage both for questioning this assumption and for follow-up work.

Our confidence in these results is increased in several ways. First, our results are consistent with Ford and Hosegood's (2005) results for KwaZulu-Natal. Both analyses found that older children, boys, and children from wealthier households are less likely to move. Second, research that has compared adult migration patterns in the AHDSS data and the national census data found similar patterns. Both data sets revealed high levels of circular migration, stepwise migration, and return migration to the rural areas (Collinson et al. 2007). Household mobility is common to rural black communities in South Africa and neighboring countries owing to their common history of apartheid-era labor migration policies and ongoing labor market dynamics that provide incentives for labor migration from rural areas. Therefore, these data are generalizable to other rural black communities in South Africa and conceivably to rural communities in neighboring countries as well. This insight is important despite the lack of national representativeness because national-level data sets cannot show the dynamics of child mobility in impoverished rural communities the way that localized, prospectively collected, subdistrict data can. Furthermore, although health

systems improvements have been made in the 18-year span of the AHDSS because of the presence of the field site, the overall demographic dynamics of the population have not been affected, which can be evidenced by a comparison of mortality and fertility trends with national data sets.

From a policy perspective, the value of this analysis can be seen in two ways. First, understanding the conditions under which children move is crucial for the improvement of service delivery mechanisms already in place. South Africa is one of the only African countries wealthy enough to provide a suite of poverty alleviation grants for the poor. This aid comes in the form of elderly pensions, child care grants, disability grants, and foster care grants. In addition, there are various initiatives (e.g., cash transfer and food parcel programs) focused specifically on HIV-affected households and orphans. The success of these programs depends, to a large extent, on better understanding household dynamics and interhousehold connectivity. Child mobility is clearly one important component of this agenda. Second, this analysis sets the stage for addressing two key policy-driven questions: Under what conditions does child mobility enhance well-being, and when does it have adverse effects on health and education? Exploratory bivariate analysis on the AHDSS data shows that there is no effect on educational attainment for children who accompanied their parents as temporary migrants, but there is a negative effect of accompanied permanent migration. If child mobility is part of a rural household livelihood strategy, then it is conceivable that one objective is to enhance child well-being, as in the case of sending children to live elsewhere to receive better schooling. However, child mobility is also likely to occur in a crisis situation driven by, for example, a mother's death, with potentially negative outcomes. This has important implications for policies that are targeted toward improving rural livelihoods and children's outcomes. Rather than assume that children ought to stay where they are, it is clearly desirable to decide children's residency on the basis of evidence about the conditions under which various living arrangements are preferable. Therefore, research should more centrally incorporate measures of children's mobility into data collection and analyses focused on children's well-being.

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