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Kin Support and Child Health: Investigating Two Approaches in an African Slum

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Abstract

Extensive research from sub-Saharan Africa shows that mothers frequently rely on help from other family members to ensure their children's health and well-being. Yet, there is considerable debate about the relative importance of support from grandmothers versus fathers. Using an innovative survey instrument to interview 462 unmarried mothers in a slum area of Nairobi, Kenya, we provide insight into this debate by showing that a *status* versus *transfers* approach to measuring kin support asks subtly different questions and yields different results. A status approach reflects an evolutionary perspective that argues that maternal grandmothers have a greater incentive than non-residential fathers to provide material and practical support for young children. In contrast, a transfers approach is consistent with social support theories whereby the social capital provided by fathers may be more beneficial to children's health than that afforded by grandmothers. Demonstrating that different approaches to measuring kin support matter highlights the need for kin research that crosses disciplinary boundaries and encourages the development of more nuanced family policies designed to protect children's health in Africa.

Keywords

Kin Support; Child Health; African Families; Child Care; Financial Transfers

1. Introduction

Humans are often described as “cooperative breeders,” whereby mothers rely heavily on other family members to help raise their children (Hrdy, 2009; Sear and Coall, 2011). Empirical studies, across a wide range of cultural contexts, find that kin (in addition to mothers) play a critical role in protecting children's health, promoting their welfare, and

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ultimately ensuring their survival. Kin support may be especially important in low- and middle-income countries, which typically lack strong public safety nets (Adams et al., 2002; Carvalhaes et al., 2005; Kana'iaupuni et al., 2005; Surkan et al., 2007; Ziaei et al., 2015), and in higher-income countries among particularly disadvantaged groups. For example, studies from the U.S. indicate that lower-income and single mothers are more dependent on support from kin than their wealthier, married counterparts (Hogan et al., 1990; Jayakody et al., 1993; Taylor and Roberts, 1995; Turney, 2013). In Mexico and Brazil, kin also appear to be especially beneficial in protecting the health of children living in poorer households, including those headed by single mothers (Carvalhaes et al., 2005; Kana'iaupuni et al., 2005).

Much of the extensive literature in sub-Saharan Africa focuses on the importance of kin in raising foster or orphaned children (Case et al., 2004; Coneus et al., 2012; Finlay et al., 2016; Isiugo-Abanihe, 1985; Karimli et al., 2012; Lloyd and Desai, 1992; Lund and Agyei-Mensah, 2008; McDaniel and Zulu, 1996; Parker and Short, 2009; Verhoef, 2005). Yet even when mothers are alive and co-residing with their children, other family members often actively engage in caring for children (Caldwell and Caldwell, 1987; Goody, 1982; Madhavan et al., 2012). Nonetheless, despite their well-known involvement, exactly which other kin are most instrumental in ensuring children's health and survival is subject to some controversy. In most industrialized settings, fathers are generally the primary "co-parent". However, some scholars have argued that in contexts like sub-Saharan Africa, where consanguineous (kinship) ties are often stronger than conjugal (marital) bonds, other family members including grandparents, aunts, uncles, and even older siblings frequently act as "allo-mothers" (Caldwell and Caldwell, 1987; Goody, 1982; Weisner, 1997). Grandmothers, in particular, are often portrayed as the most crucial guardians of children's health, with all other family members, including fathers, assuming more minor roles (Cunningham et al., 2010; Davis et al., 2003; Duflo, 2003; Sear and Coall, 2011; Sear et al., 2000; Sear et al., 2002). Other research in Africa, however, suggests that fathers' contributions and involvement are central to promoting children's welfare (Chae, 2011; Clark et al., 2015; Clark and Hamplovà, 2013; Gage, 1997; Madhavan et al., 2014a; Ntoimo and Odimegwu, 2014; Sear, 2008; Thiombiano et al., 2013; Townsend et al., 2002).

Undoubtedly, part of these mixed findings reflect the multiple and flexible roles that different kin play under different conditions and in different contexts. Yet, these differences may also stem from different theoretical perspectives and methodological approaches. In this paper, we focus on two main theoretical and methodological approaches to studying kinship and its effects on children's well-being. The first, which we call the *status approach*, focuses on whether particular kin are alive and/or live in the same household as the child. This approach, most often taken by evolutionary anthropologists and (some) family demographers, implicitly or explicitly draws on theories of evolutionary biology and inclusive fitness (Case et al., 2004; Sear and Mace, 2008; Sear et al., 2000).¹ The second approach directly measures transfers by kin of support, including emotional, practical, or financial assistance. This *transfers approach* usually relies on theories from social network

¹There is no inherent reason that the status and transfers approaches are linked to evolutionary and social capital theories, respectively. For example, one could test evolutionary concepts using a transfers approach, but this is done less often.

and social capital research which contend that kin networks endow children with tangible and intangible resources that promote their well-being (Coleman 1988, 1990). Because these two approaches typically use different theoretical perspectives and employ different measures, it is perhaps not surprising that they arrive at different conclusions. Gaining a more nuanced understanding of these differences can help advance research on kin support and well-being across multiple disciplines.

In this paper, we directly compare and contrast the status and transfers approaches to addressing the same question, namely which type of kin are most effective in protecting children's health. To answer this question, we interviewed 462 single mothers living in a slum area of Nairobi, Kenya, using an innovative survey instrument, called the Kinship Support Tree (KST). The KST gathered extensive data on not only the survival status and residential location of immediate and extended family members, but also whether these family members provided support in the form of child care or financial assistance.

Because kin support is likely to be most critical in disadvantaged populations, our study focuses on children of unmarried mothers living in a slum environment that poses considerable health risks (Ernst et al., 2013; Ezech et al., 2016; Fink et al. 2014; Fotso, 2006). The kin support provided to the children of single mothers may differ markedly from that given to orphans or children of married mothers. Like orphans, children with unmarried mothers may receive more extended kin support than children whose parents are in a union. Unlike orphans, however, paternal kin may have fewer ties to the child, especially if the child's parents never married or if the union ended acrimoniously. The support provided by fathers may also vary. Support from fathers is likely to be higher when they co-reside with their children than when they live outside the household. Hence, our results reflect the particular constellation of kin support given to single mothers, which may not be generalizable to children of married mothers or orphans.

2. A status approach to kin support in Africa

A status approach uses kin's survival and residential status as a proxy for support. Data on co-residence is typically gleaned from household rosters with supplemental information on whether the child's father and grandparents are still alive. Evolutionary anthropologists and several demographers using this approach typically evoke evolutionary theories about inclusive fitness to motivate which kin are most likely to invest in children as a means of securing the child's survival and ultimately perpetuating their own genes (for recent reviews of this literature, see Sear and Coall, 2011; Sear and Mace, 2008; Strassmann and Garrard, 2011).²

Many researchers rely specifically on Hamilton's rule, which argues that kin who are more closely genetically related to a child will be more likely to engage in altruistic behaviors that protect children's health and ensure their survival (Hamilton, 1964). Empirical evidence from sub-Saharan Africa supports Hamilton's rule with respect to some types of relatives.

²Because this paper focuses on the role of kin as "co-parents" or "allo-mothers" we are largely excluding the extensive literature on kin support for fostered and orphaned children.

For example, grandparents appear to invest more than other relatives, who in turn contribute more than unrelated adults (Case et al., 2004). Yet, Hamilton's rule also implies that fathers (who share half of their genes with their children) would be more beneficial than grandmothers (who share only a quarter of their genes) in ensuring children's survival.

Most empirical research using a status approach, however, finds the reverse. The survival status of maternal grandmothers, in particular, is significantly associated with children's positive health outcomes in the majority of studies (Cunningham et al., 2010; Davis et al., 2003; Gibson and Mace, 2005; Noel-Miller, 2006; Sear et al., 2000; Sear et al., 2002), with some exceptions (see Hadley, 2004; Sear, 2008; Strassmann, 2011). In contrast, less than half of previous status-based studies find that fathers' survival status has a positive effect on children's outcomes, leading some researchers to conclude that fathers make only limited contributions to children's survival (Davis et al., 2003; Sear and Coall, 2011; Sear and Mace, 2008; Sear et al., 2000; Sear et al., 2002). To explain the generally positive associations with maternal grandmothers and the mixed effects for fathers, some researchers have argued that men have different reproductive strategies than women. Specifically, since women bear a higher biological cost per child than men, women seek to maximize investments in each child rather than maximizing their number of children (Emlen, 1997). Others have evoked the "grandmother hypothesis," which contends that early menopause in humans enables grandmothers to invest in their grandchildren rather than continuing to bear additional children (Strassmann and Garrard, 2011).

Far less status-based research investigates the relative contributions of other kin. In many African societies, aunts and uncles are expected to provide considerable economic support, assist with child care, and give moral guidance and advice as children grow. However, they are somewhat less likely to co-reside with young children. One study in Kenya shows that presence of both maternal and paternal uncles increase the likelihood of child survival, particularly if the uncles are wealthy (Borgerhoff Mulder, 2007). However, another study in Tanzania found that only aunts improved children's nutrition (Hadley, 2004). The presence of older siblings, particularly older sisters, may also enhance children's survival prospects (Sear et al., 2000; Sear et al., 2002). However, the benefits conferred by paternal grandmothers and grandfathers appear to be rather limited (Cunningham et al., 2010; Gibson and Mace, 2005; Sear and Coall, 2011; Sear et al., 2002; Strassman and Garrard, 2011; Strassman, 2011).

Although widely used, the status approach faces several important limitations. First, the theoretical underpinnings of this approach are helpful in identifying which kin are most *motivated* to invest in children, but not necessarily which kin are most *effective* in protecting children health. Consider for example a 12-year-old older sister who is left in charge of her younger sibling while her mother is working. According to Hamilton's rule, she has a strong incentive to ensure the child's well-being, but she may lack the skills to effectively promote her siblings' health. A similar argument could be made for elderly grandmothers. Second, a status approach fails to distinguish among different types of investments or support. In some contexts, economic support may be more vital than practical assistance, but cultural and gender roles prescribed to specific kin members may limit the ability of some kin to provide different types of support. Lastly, the "presence" of kin in the household may be a poor

proxy for actual investments. Although some mothers may intentionally move into a household to maximize support received from particular kin, not all co-residential family members offer assistance with raising young children (Borgerhoff Mulder, 2007). On the contrary, some may consume more household resources than they contribute (Sear, 2008; Sear et al., 2002; Strassman and Garrard, 2011). Conversely, support from non-residential kin in sub-Saharan Africa is likely to be both common and sizeable (Madhavan et al., 2014b; Weinreb, 2002).

3. A transfers approach to kin support in Africa

The transfers approach to kin support overcomes many of these drawbacks by directly measuring social support provided by kin. Yet, it is conducted less often than surveys that collect status indicators as measuring multiple types of transfers from a potentially large kin network tends to be more time consuming than simply enumerating household members. Transfers approaches to kin support most often rely on theories of social capital. According to Bourdieu's classic definition, social capital is "the aggregate of actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu, 1986, p. 248). Because some social networks offer more resources than others, theories of social capital contend that social networks can influence an individual's health and well-being (Cohen, 2004; Smith and Christakis, 2008).

Most studies of social networks combine friends, neighbors, acquaintances, and family members regardless of where these individuals live (i.e., whether they co-reside with the child). Moreover, they typically do not distinguish between support received from family members or from non-relatives. Yet, there have been recent calls for greater attention to *family social capital* particularly with respect to health outcomes (Alvarez et al., 2017) and older studies have argued that family networks are especially important in studies of adolescents and children (Furstenberg and Hughes, 1995). In his pioneering work, Coleman (1988, 1990) noted that social capital provided by the family plays a critical role in enriching children's education and cognitive development, and (potentially) promoting their health.

Measuring social capital within social or kin networks, however, has proven to be challenging with researchers developing multiple indicators and employing diverse terminology (Stone, 2001). A transfers approach most closely aligns with social support studies, and in particular *enacted* or *functional support*, which focus on the provision of advice, emotional support, practical assistance, and both in-kind and financial resources (Barrera, 1986; Cohen and Wills, 1985). The majority of social support studies simply count the number of network members who provide support, although some researchers distinguish between perceived support and actual support provided by members. Social support studies rarely differentiate among different types of family members as is common in status-based studies. Rather, they generally treat support from family members as interchangeable. For example, child care provided by uncles is comparable to that given by grandmothers. However, support from some relatives may be more valuable (or effective) than from others, particularly if the amount or quality of support received differs. Support from particular family members may also carry with it important intangible or symbolic

forms of social capital in addition to the actual transfers of time or money. For example, economic support received from non-residential fathers may signal public recognition and, hence, greater social protection and status for children of unmarried mothers (Madhavan, 2010). In other words, the inclusion of mother and child in the paternal network as signified by fathers' acceptance of paternity and engagement may indicate an important form of embeddedness or *structural social support* (Barrera, 1986; Cohen and Wills, 1985).

Research that directly measures kin transfers and their impact on children's well-being in sub-Saharan Africa is somewhat limited. Most previous transfers-based research has focused on support received from only one type of kin. For example, research shows that grandmothers make important contributions to children's welfare through their contributions to housework and child care as well as by giving advice on nutrition and health care (Aubel, 2004 et al.; Bezner Kerr et al., 2008; Gibson and Mace, 2005; Madhavan et al., 2012). Financial resources in the form of pensions allocated to grandmothers also appear to directly benefit grandchildren (Duflo, 2003; Schatz and Ogunmefun, 2007). Other studies highlight the financial contributions and child care assistance provided by non-residential fathers in South Africa (Clark et al., 2015; Madhavan, 2010; Madhavan et al., 2016; Madhavan et al., 2014a; Richter and Morrell, 2006). Only one previous study in sub-Saharan Africa measured social support across multiple members of children's extended kinship networks. It assessed whether the number of kin members who provided practical support (mainly assistance with child care) significantly lowered the risk of child mortality among two ethnic groups in Mali (Adams et al., 2002). To our knowledge, however, no previous studies in sub-Saharan Africa have assessed the relative effectiveness of support from different types of kin for children's health. Hence, they shed little light on the question of whether support from grandmothers or fathers is more effective in protecting children's health.

4. Data and methods

4.1 Study site

Our study was conducted in Korogocho, an informal settlement area of Nairobi, Kenya. Like many slum areas, Korogocho is densely populated by an ethnically diverse and highly mobile population. Its ethnic composition reflects groups from across Kenya including Kikuyu (30%), Kamba (7%), Luhya (18%), and Luo (29%). There is also a growing Somali population. Although some members were born and raised in this area, many inhabitants are transient with about a fifth of its residents moving in and out of the area each year (Beguy et al., 2015). Located next to one of Nairobi's largest dumpsites, Korogocho has poor sanitation and environmental conditions that pose significant health risks to young children. Furthermore, although a variety of non-governmental organizations and government programs offer free or heavily subsidized health care services, the quality of care is often low and access is irregular (Muraguri, 2011). Many households face food insecurity, and parents struggle to provide their children with adequate daily nutrition (Mutisya et al., 2015). Consequently, rates of child morbidity and mortality are high. Most deaths are caused by preventable poor health conditions including pneumonia, diarrheal diseases, and malnutrition (Kimani-Murage et al., 2014; Kyobutungi et al., 2008).

4.2 Sample

Since 2002, the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) has conducted a full census of all household residents in Korogocho about three times per year. We used the most recent round of NUHDSS (March 2015) as our population frame and identified all single mothers, defined as women who were not currently married or cohabiting with a man and who had at least one child younger than seven years-old. In total, 657 women met these criteria. Nearly 20% ($n=126$) had moved out of Korogocho by the time of our first round of interviews, which were conducted between May and July 2015; 5.6% ($n=37$) refused to be interviewed and 5% ($n=32$) could not be located.

Our final sample consisted of 462 single mothers. The majority of these mothers (71.4%) were never married and slightly over a quarter (28.6%) had unions that ended, primarily through divorce. These mothers were asked a series of questions about the level of kin support and health of one of their children younger than seven years. For mothers with more than one child in this age group, we randomly selected one focal child. Hence, our total sample of mother-child pairs from our first round of interviews is 462. Starting in January 2016 (roughly six months later), we returned to interview these mothers again. We successfully re-interviewed 412 (89%) of these mothers via face-to-face interviews. An additional seven mothers who left the study area received an abridged version of the survey by phone. We could not locate 31 mothers for follow-up, an additional six refused to be interviewed, and three mothers had died, as did three of the focal children.

Given the high levels of out-migration in this population, our samples in both Waves 1, which was based on prior enumeration data, and 2 may select for mothers with longer durations of residency in Korogocho. In addition, analyses of attrition between Wave 1 and 2 show that mothers with smaller kinship networks are more likely to be re-interviewed than mothers with larger kin networks. Thus, our sample over-represents less mobile mothers with smaller kin networks. We found no other significant differences in attrition with respect to 25 other measures of children's, mothers' or kinship support characteristics. The project was reviewed and granted approval by three ethics review boards affiliated with each of the institutions supporting our study (details of the study can be found in Madhavan et al., 2017).

4.3 Measures

4.3.1 Dependent variable—Our outcome measure is the child's overall health as reported by the child's mother in both waves of the survey. This measure is based on the question, "How would you rate the current overall health of [child's name]?" Mothers evaluated their child's health on a five-point scale (1=very poor, 2=poor, 3=fair, 4=good, and 5=very good). In the second round of data collection, one mother reported that she did not know her child's current health; we excluded this observation from our analyses. Over three-quarters (75.3%) of mothers in Wave 1, and 65.1% in Wave 2, described their child's health as good, and an additional 6.9% and 9.0% of mothers, respectively, reported their child's health as very good. Given that a large majority of mothers reported that their children had good or very good health, we dichotomized this outcome, setting the value to 1 if a child had good or very good health and 0 otherwise. Children experienced considerable change in

health status across the two waves, and health status in Wave 1 is not significantly correlated with health status in Wave 2.

Maternal report of children's overall health is widely used in studies in sub-Saharan Africa as it is perceived to be a reliable global indicator of children's health and less susceptible issues of reverse causality than are reports of recent illness. Studies from other regions also show that it is strongly correlated with doctors' reports of children's health, children's acute and chronic conditions, and number of hospitalizations (Case et al., 2002; McCormick et al., 1993; Monette et al., 2007). Nonetheless, the absence of a significant correlation and notable decline in reported child health between waves suggests that our measure of overall children's health may reflect transient health status (Omore et al., 2016), particularly as the prevalence of colds, respiratory infections, and diarrhea may vary during the year.

4.3.2 Kin support measures—To capture kin support, mothers listed all of the focal child's immediate kin, including the child's father and older siblings, and the child's extended family members, including all of his maternal and paternal aunts, uncles, and grandparents. In total, mothers enumerated 5,344 kin members of which 3,453 were older than seven years and known to be alive at the time of the survey. We refer to these family members as *potential kin* as they are in principle capable of providing support. The number of these potential kin capture one aspect of structural social support, specifically the size of mothers' potential kin network. Finally, women were asked whether any more distantly related family members, neighbors, or friends provided financial support or child care. Mothers reported receiving support from only 27 more distant individuals, yielding too small a sample for further investigation. Hence, we excluded these responses from our analyses and focus exclusively on kin support.

For our status-approach measures, we replicated previous studies and measured whether the child had any older sisters or brothers as well as maternal aunts, uncles, or grandparents living in the household. In addition, we created indicators for the survival status of the child's father and both maternal grandparents. We do not include indicators for co-residence of fathers or paternal relatives, because this was rare in our sample of single mothers.³ Similarly, because the survival status was unknown for a sizeable proportion of paternal relatives, we exclude these measures from our analyses.⁴ By omitting the survival status of paternal grandparents, our status-approach measures differ from previous research on primarily married mothers.

For our transfers analyses, we measure whether the potential kin member provided support regardless of whether he or she co-resided with the child. As such, these measures reflect mothers' enacted functional support networks. We focus on two important types of support: financial and child care. As our indicator of financial support, we draw on responses to the question, "In the last month, has [kin member's name] provided any financial or in-kind

³By the second wave of our study, about 6% of fathers had moved in with their children, reflecting the fluid nature of marriage and residence in this population. Including an indicator for these co-residential fathers does not alter our findings and is not significantly associated with child health.

⁴Alternative model specifications that include indicators for paternal kin whose survival status is known does not influence the coefficients with respect to other deceased or co-residential kin.

support for you?” This financial support may include contributions to general household expenses such as food, rent, or electricity as well as monetary or in-kind assistance for the child’s clothing, food, or health care. A similar question was used to indicate whether the kin member assisted the mother “with child care in any way” in the past month. Child care encompasses supervision, feeding, bathing, or playing with the focal child. Our analyses focus on whether any support was given, rather than the total amount of financial contributions or the type of child care provided, because our measures of these outcomes are rather limited. Nonetheless, exploratory analyses suggest that differences in the total financial contributions by type of kin rarely varied by more than 1,000 Kenyan shillings (approximately 10 U.S. dollars), and similar types of child care were provided, consisting primarily of supervision and feeding. To examine the reliability of mothers’ reported support, we interviewed about 100 family members. Comparisons of their responses about support show strong agreement between mothers and kin (see Madhavan et al., 2017).

Because a child can have only one biological father, maternal grandmother, or maternal grandfather, we created dichotomous variables indicating whether each type of kin provided either type of support. However, because a child may have multiple siblings, aunts, or uncles, we measure whether the mother received support from at least one of these types of relatives. Given that paternal kin rarely provide either type of support (less than 3%), these measures are excluded from our transfers analyses. Alternative classification schemes of paternal support had no effect on our findings. Financial contributions from older sisters and brothers were also minimal and excluded in these analyses.

4.3.3. Control Variables—In addition to measuring kin status and transfers, our models control for several variables known to be closely correlated with children’s health. These include a child’s age, child’s sex, and the number of other young children living in the household. On average, the focal child was 40.4 months (or 3.4 years) old in Wave 1, and about a quarter of the sample lived with another child under the age of seven. We also measure key characteristics of the mother, such as her age at the time of the survey, education level, and ethnicity. More than half of the mothers in our study had completed primary school, but less than 15% had completed secondary school. The ethnic composition of single mothers largely reflects that of the surrounding community, with the majority of women belonging to the Kikuyu ethnic group. To account for the possibility that mothers with larger kin networks may be more likely to receive transfers, our transfers-based models control for the total number of potential kin available in women’s kin networks. On average, mothers had approximately eight potential kin members, although only about one family member provided child care and one family member gave financial support. Interestingly, we found that the size of the potential kin network was related to whether fathers provided support and were alive. The number of potential kin was significantly larger for children whose fathers have died (8.5 kin) or whose fathers provide support (10.2 kin) than those whose father do not provide support (7.4 kin), suggesting that fathers’ transfers and status are linked to our one measured aspect of structural support.

4.4. Analyses

In our first set of analyses, which uses a status approach, we examine the association between the survival status and co-residence of kin members and overall child health. Our second set of analyses examines whether transfers received from relatives are correlated with child health. In our final set of analyses, we combine our status and transfers measures, although we note that the samples in several specific categories are rather small. Because different types of transfers may vary by type of relative and may influence child health differently, we assess transfers of financial support and child care assistance separately. In all our analyses, we pooled data from both survey waves and used random- and fixed-effects logistic models.

Our random effects models account for correlations in the error terms for children reported in both survey waves and include control variables for children's age and sex; number of other children present in the household under the age of seven; mothers' age, education level, and ethnicity; and survey wave. Our fixed-effects methods adjust for any time-constant factors pertaining to the mother-child pair. These include not only time-constant observable factors, but also important unobservable characteristics such as the child's underlying "frailty" or the mother's proclivity to accurately report the child's health status. In addition, these models control for time-varying factors, namely, number of other young children, number of potential kin, and survey wave. Because fixed-effects models estimate differences in the outcome between survey waves, they exclude all children who did not experience a change in health status between the first and second waves. Thus, our sample size falls from 873 observations representing 462 mother-child pairs in our random-effects models to 276 observations (138 pairs) in our fixed-effects logistic regressions. Fixed-effect linear probability models yield similar results, indicating that our findings are not driven primarily by model specification or dropped observations.

5. Results

5.1. Measures of kin support

Table 1 provides full descriptive statistics of both the status and transfers kin measures. With respect to our measure of co-residence, we find that in Wave 1 children were most likely to live with one or more of their maternal aunts (40.0%), followed closely by children living with a maternal grandmother (37.0%) or maternal uncle (32.5%). Approximately one in five children lived in a household with at least one older brother, sister, or maternal grandfather. Because this study focuses on single mothers, none of the children in our sample resided with their fathers in Wave 1. One in ten fathers were deceased compared to 23.6% of maternal grandmothers and 37.9% of maternal grandfathers.

With respect to financial assistance, maternal grandmothers (regardless of whether they live with their grandchildren) were more than twice as likely as any other type of relative to provide economic support (Table 1). Other maternal relatives, including a child's aunts (18.2%) and uncles (15.6%), also financially supported the children of single mothers. In Wave 1, 18.6% of mothers received financial assistance from the child's maternal

grandfather. Fathers were generally slightly less likely than maternal relatives to provide financial support (13%).

The pattern of support with respect to child care is somewhat different. Mothers were only a little less likely to receive help with child care from one of the child's maternal aunts (about 30.3%) as from the child's maternal grandmother (34.0%). Older siblings, particularly older sisters, were also regular "helpers at the nest," with more than a quarter of mothers reporting child care from at least one of the child's older siblings. Fathers were much less likely to participate in child care than to provide financial support, although the percentage of engaged fathers appeared to rise between the survey waves (from 2.8% in Wave 1 to 7.3% in Wave 2). This increase may reflect greater cultural expectations or opportunities for fathers to participate in their children's lives as they grow older.

These findings suggest that co-residence and survival status are not necessarily synonymous with support and that types of support provided differ starkly by type of kin. To highlight these differences, Figure 1 shows the combined status and financial transfers measure by type of kin alive at Wave 1. Since none of the children were living with their fathers in Wave 1, Figure 1 replicates the results shown in Table 1 that 13% of (non-residential) fathers provided financial transfers and about 10% of fathers were deceased. Figure 1 also demonstrates that even though over 20% of children lived with an older brother or sister, very few of these co-residential older siblings made financial contributions. The discrepancy between residential status and financial support is most stark for maternal aunts and uncles. A quarter of children lived with a maternal uncle but did not receive financial support from them, whereas 8% of children received economic support from at least one maternal uncle despite not living with any. A similar pattern exists for maternal aunts where it was common for children to live with aunts who did not provide economic support (28%) as well as to receive financial support from non-residential aunts (6%). In addition, although the aggregate proportion of children living with their maternal grandmothers (37%) is nearly identical to the proportion receiving financial support from their maternal grandmothers (38%), 9% of children received economic support from a non-residential grandmother and 8% of children lived with a grandmother who did not offer financial help.

Figure 2 provides a comparison of kin members' residential and survival status and child care assistance. It shows that while most children living with older sisters were also cared for by them, only about half of children living with an older brother also received care from older brothers. A similar gendered pattern emerges with respect to maternal aunts and uncles, but a sizeable percentage of both aunts and uncles did not provide child care despite living with their nephews and nieces. For maternal grandmothers, there is a closer alignment between residential status and practical transfers measures, but for 13% of children there are discrepancies between these different measures of support. Lastly, the majority (over 75%) of residential grandfathers did not assist with child care.

5.2. Co-residence and survival status: A status approach

In Table 2, we replicate the modeling strategy taken by most previous studies and use indicators of relatives' survival status and co-residence. Consistent with previous studies that predict a negative correlation, a one-tailed test shows that having a deceased maternal

grandmother is associated with poorer child health ($p=0.039$). Children who co-resided with their maternal grandmothers, however, do not appear to be healthier than those who lived apart. In contrast, fathers' survival status is not significantly associated with child health and, in fact, the coefficient on fathers' mortality is positive. Directly comparing the impact of fathers' versus maternal grandmothers' survival shows that children whose maternal grandmother had died experienced significantly worse health than those whose fathers had died ($p=0.028$).

The associations between child health and the survival of the child's maternal grandfather and the residence of older siblings, aunts, or uncles are generally weak and insignificant. Few of the control variables significantly predict children's health. Children belonging to the Kamba ethnic group typically have poorer health than Kikuyu, Luo, or Somali children. In addition, the presence of younger siblings is associated with worse overall health.

5.3. Financial support and child care assistance: A transfers approach

Table 3 examines the relationship between children's health and support from different types of living kin regardless of whether they co-resided with the child. The most striking finding is that financial support from the child's father roughly triples the odds that a child was in good or very good health in both the random- and fixed-effects models. In comparison, although maternal grandmothers were most likely to financially support their grandchildren, their economic contributions appear to have little benefit for children's health. Direct comparisons show that financial contributions from fathers have a significantly greater effect on children's health than those from maternal grandmothers ($p=0.007$). Financial support from other maternal relatives (aunts, uncles, and grandfathers) is usually positively associated with children's health, but this effect is never significant. Similarly, children with larger potential kin networks were generally, but not significantly, healthier.

Fathers' contributions to child care also matter. Similar to our results for financial support, we find that the coefficient on fathers' child care contributions is significantly larger than that for maternal grandmothers ($p=0.043$). Although many fewer fathers were involved in child care, those who were conferred a substantial and significant health benefit to their children. Children whose non-residential fathers were actively engaged in child care enjoyed a three-fold increase in the odds of being in good health (although this effect is only significant in the random-effects model). Furthermore, consistent with our financial transfers results, we find that although maternal grandmothers were most likely to provide help with child care, their contributions did not significantly enhance their grandchildren's well-being.

5.4. Co-residence, survival status, and either financial support or child care assistance: A combined approach

In our final set of analyses, presented in Table 4, we combine our indicators of kin status (co-residence and survival) with one of our measures of support, either financial transfers or child care assistance. As is apparent in Figures 1 and 2, some combinations of status and transfer measures are relatively rare. For example, only 5% of mothers received financial support from non-residential grandfathers and only 4% of mothers had an older daughter who did not provide help with child care. Bearing in mind that estimates of such small cell

sizes can be unstable, it is nonetheless interesting to compare transfer and status measures in the same model.

Table 4 shows that support from fathers, whether practical or monetary, is strongly associated with better overall child's health. In fact, the effect sizes in the fixed effects models in Table 4 are considerably larger than those in Table 3, since the reference category in Table 4 is limited to living fathers who were not providing support whereas the reference category in Table 3 includes all father who were not providing support regardless of whether they were alive. Similar to our results in Table 2, we find that children whose fathers had died fared better, although this effect is not significant at the 5% level. Furthermore, when we remove our control for total number of potential kin, the coefficient for fathers who provided support increases to 1.23. These changes suggest that at least some of the effect of fathers' status and transfers can be explained by their association with higher levels of structural support. In particular, children whose fathers are actively engaged in their support are likely to have more potential kin, especially paternal kin.

A further disaggregated inspection of grandmothers' roles reveals that across all four models, children who received support from non-residential grandmothers had better overall health. However, in contrast to fathers, these effects are never significantly different from children who did not receive support from non-residential grandmothers. Interestingly, the relationship between child health and support from co-residential grandmothers is usually negative, although this effect is only significant in the fixed effects model for child care (Model 4). Nonetheless, this finding suggests that children cared for by co-residential grandmothers have worse health than those who do not live with their grandmothers (regardless of whether the non-residential grandmother provides care). Lastly, consistent with findings from Table 2, we find that having a deceased grandmother is generally associated with poorer health, although again it is only significant in Model 4.

Unlike our previous findings, our combined fixed effects models suggest that residence and transfers from maternal uncles are also associated with child health. For example, a one-tailed test in Model 2 shows that children who received financial support from at least one non-residential uncle were three times as likely to have good or very good health than children who received no support and had no co-residing uncles ($p=0.025$). In contrast, receiving child care from a non-residential uncle appears to be detrimental to children's outcomes (Model 4). This finding, however, should be interpreted with caution as only 2% of children received child care from an uncle who lived outside the household.

6. Discussion and Conclusions

These analyses shed new light on the complex relationship between kin support and health in a vulnerable population of young children in sub-Saharan Africa. In particular, we show that applying two different methods to measuring kin support provided to single mothers, yields strikingly different results. When we take the more traditional status approach, which uses measures based on the survival status and co-residence of kin, our findings are closely in-line with previous studies emphasizing the importance of maternal grandmothers and minimizing the role of fathers in protecting children's health. Consistent with a large

fraction of these studies, we find that having a deceased maternal grandmother is negatively correlated with children's health, yet co-residence with a maternal grandmother does not confer any additional health benefits (Cunningham et al., 2010; Davis et al., 2003; Gibson and Mace, 2005; Noel-Miller, 2006; Sear et al., 2000; Sear et al., 2002). Moreover, fathers' survival status is not significantly associated with children's health (Davis et al., 2003; Sear and Coall, 2011; Sear and Mace, 2008; Sear et al., 2000; Sear et al., 2002).

In contrast, when we apply a transfers-based approach, which directly measures kin support in the form of child care and financial assistance, we draw the opposite conclusions. Despite our finding that maternal grandmothers were far more likely than non-residential fathers to support their unmarried daughters, neither the financial nor practical assistance they provide has a beneficial effect on children's health. However, fathers' provision of both financial and child care assistance was strongly positively associated with their children's well-being. When unmarried fathers provide either financial assistance or help with child care, they triple the chances their child will be in good health. These findings largely persist in our analyses that combine measures of the status and transfers approach. Although in general support provided by non-residential kin is positively associated with better health, this relationship is strongest for fathers. Moreover, the death of a grandmother tends to be detrimental to children's well-being, while the survival status of fathers is neutral.

These contrasting results highlight underlying theoretical differences that drive methodological approaches and ask slightly different questions. Evolutionary theories are best suited to address questions regarding which kin are most motivated or most likely to provide support. Hence, finding that maternal grandmothers most often act as allo-mothers when their daughters are unmarried is consistent with the grandmother hypothesis. Showing that co-residence with grandmothers is not associated with better outcomes does not necessarily refute these theories, but it does draw into question whether grandmothers can effectively translate this support into better outcomes. In the context of a poor urban area, grandparents themselves may suffer from poor health and mobility limitations and, hence, are less capable caregivers. Moreover, they may lack the skills or knowledge to provide beneficial child care. Similarly, other kin may be willing, even eager, to offer financial assistance, but have few resources to share.

In comparison, social capital theories recognize that kinship networks may differ in the type, amount, and quality of support provided and, hence, can best address which networks (or network characteristics) are most effective in promoting children's well-being. Our findings suggest that fathers are able to provide greater social capital than grandmothers or other relatives, although data limitations prevent us from providing a detailed understanding of why their contributions are more effective. One plausible explanation is that fathers offer greater functional social support. Specifically, they may contribute larger financial transfers than grandmothers. Supplemental analyses, however, indicate that fathers who provided economic support actually gave slightly less on average than did maternal grandmothers (5,522 KSH from fathers versus 5,775 KSH from grandmothers) and controlling for household wealth and income does not influence our results. Moreover, differences in the amount of functional support would not explain differences with respect to child care transfers unless fathers were also better child care providers.

Alternatively, engaged fathers may signify more structural support or embeddedness in larger and more robust kin networks that include more paternal relatives. Indeed, we find that children whose fathers provide support or are deceased have larger potential kin support networks than those whose fathers are living, but offer no assistance. Although controlling for the size of the potential kin network does not fully account for the effect of fathers' transfers, it does suggest that such transfers are linked to structural social support, which may provide intangible benefits. This interpretation is consistent with previous work from South Africa showing that unmarried mothers actively seek to gain public paternal recognition of their children as a means of obtaining social protection (Madhavan et al., 2010). In resource poor settings, the absence of this social protection may carry significant health risks for children of unmarried mothers.

These different findings can also help refine policies. For example, if grandparents, especially grandmothers, are most likely to give financial support, then public pension plans, such as the one implemented in South Africa, which target the elderly may have the greatest effect on improving children's well-being. However, they also suggest that strategies to "motivate" fathers to be more involved in their children's lives could yield significant benefits. Countries across sub-Saharan Africa have adopted laws that require parents (regardless of their marital status) to provide child support (e.g., the Constitution of Kenya, Article 53 (1) (e); South Africa Maintenance Act No. 99). Yet, such laws are rarely enforced and many unmarried mothers do not know about them (Molokomme, 1991). Moreover, some scholars have argued that such laws rely on "imported and culturally inappropriate concepts of paternity" and will ultimately make unmarried women and their children worse off by undermining the customary ways these women were supported (Garey and Townsend, 1996, p. 190). Given the limited total amount of kin support women in our sample received, it appears that many traditional sources of support have already eroded, and shifting norms about familial obligations coupled with a failure to enforce child maintenance laws are leaving unmarried mothers and their children with neither traditional nor new means of support.

In addition to legal approaches mandating financial support, social encouragement of fathers to actively participate in child care is likely to also benefit children. Although research on the effects of fathers' engagement in sub-Saharan Africa is limited, our findings are consistent with evidence from the U.S. that highlights fathers' multidimensional role in shaping children's development (Cabrera, 2016; Marsiglio and Roy, 2012). Unfortunately, previous research suggests that non-residential, unmarried fathers in South Africa often feel "shut out" by the child's mother or maternal kin, particularly if they are not providing economic assistance (Clark et al., 2015; Richter and Morrell, 2006; Swartz and Bhana, 2009). Encouraging fathers to engage directly in their children's lives (through both financial and personal interactions) could enhance children's welfare.

Limitations

Although the KST was specifically designed to provide more direct, and potentially improved, measures of kin support, they are by no means perfect. In our study, we were able to capture two dimensions of kin support from a large number of potential kin, but the very

novelty of this instrument posed its own challenges. First, we interviewed a relatively small sample of women ($n < 500$). As a result, many of our findings suggest positive correlations but failed to reach statistical significance. Small sample sizes may be especially problematic for our fixed-effects analyses. Furthermore, although we re-interviewed mothers six months after the initial survey, our analyses do not capture cumulative or longer-term effects on children's health.

A second limitation is that we do not include measures of reciprocity (i.e., we measure from whom mothers received support but not to whom they provided support). Kin transfers of time and money likely flow primarily toward single mothers, but in this resource-constrained environment, other kin members may also exhibit considerable need, and reciprocity, even if only symbolic, is often expected. Future studies that measure net transfers of time and material resources could help further refine this instrument.

Perhaps most importantly, like all research on family support and child outcomes, our models suffer from biases, because whether mothers receive support from their family members is an inherently endogenous process. Our fixed-effects models control for all time-constant factors, including those that are unobservable or not captured by the survey instrument, but they do not correct for the problem of reverse causality. Although overall children's health is potentially less vulnerable to reverse causality than reports of recent illness, the sharp decline in children's health between waves most likely reflects temporary, seasonal variation in the prevalence of colds and respiratory infections. It is quite plausible that when a child falls ill, kin step in to pay for health care or provide child care to alleviate the mother's increased burden, generating a negative association between children's health and kin support. There is some evidence that this may be influencing our findings, especially our results pertaining to child care. To the extent that reverse causality is occurring, we are potentially underestimating the beneficial effects of kin support.

Another drawback of using children's overall health is that it fails to identify the specific mechanisms through which different types of support from various kin members may affect health. For example, economic support from fathers may be used to pay for health care services, whereas having a surviving grandmother may ensure that the child is given adequate food and shelter in times of crisis. Future studies which delineate the specific pathways through which support impacts children's well-being are required to fully understand why status appears to be more important for some relatives and transfers for others.

Finally, because our study is based in a particular location and among an especially vulnerable group of mothers and children, we cannot make generalizations about the importance of kin support for other populations or in other settings. In particular, because our study focuses exclusively on kin support of single mothers, it provides little information on the implications of kin support for orphaned children or those living with two parents. Our study also examines kin support of young children, most of whom are not enrolled in primary school. Since different types of kin tend to provide different types of support, it is likely that the constellation of supportive kin and their relative importance will shift over the child's life course. Future studies could use the KST to examine the impact of kin support

for children whose mothers are married, or perhaps among mothers living in rural areas where larger numbers of kin may live nearby, or among older children attending school. Nonetheless, our findings can help explain some of the apparent contradictions in previous studies and encourage researchers to think more carefully about their methodological approaches to studying the complex processes and multifaceted relationship between kin support and child well-being.

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Fig. 1.

Percentage of mothers living with and receiving financial support from different types of kin at baseline (n=462).

Fig. 2.

Percentage of mothers living with or receiving child care from different types of kin at baseline (n=462).

Table 1.

Descriptive Characteristics of Single Mother-Child Pairs.

	Wave 1 n=462	Wave 2 n=412		Wave 1 n=462	Wave 2 n=412
Dependent Variables			Control Variables		
Child Health (%)			Child's Age (months) (ave.)	40.4	47.8
Very Poor	0.7	0.7	Child's Sex (%)		
Poor	2.8	9.5	Female	50.2	51.0
Fair	14.3	15.5	Male	49.8	49.0
Good	75.3	65.1	Other Children (%)		
Very Good	6.9	9.0	None	75.8	70.4
Status of Kin (%)			One or More	24.2	29.6
Father Deceased	10.0	11.9	Mother's Age (%)		
Sister(s) Co-resident	21.2	25.2	15–19 Years	7.6	7.0
Brother(s) Co-resident	21.4	26.2	20–24 Years	29.7	27.9
Mat. Aunt(s) Co-resident	40.0	33.5	25–29 Years	25.3	25.0
Mat. Uncle(s) Co-resident	32.5	27.9	30–34 Years	18.0	18.9
Mat. Grandmother Deceased	23.6	26.2	35 Years or More	19.5	21.1
Mat. Grandmother Co-resident	37.0	33.3	Mother's Education (%)		
Mat. Grandfather Deceased	37.9	37.4	Primary or Less	24.0	32.5
Mat. Grandfather Co-resident	19.3	16.5	Completed Primary	61.0	53.2
Transfers from Kin Financial (%)			Secondary	14.9	14.3
			Ethnicity (%)		
Father	13.0	14.1	Kikuyu	41.8	43.5
Sister(s)	2.0	1.2	Luo	24.2	23.5
Brother(s)	1.1	1.5	Luhya	16.7	14.6
Mat. Aunts(s)	18.2	14.6	Kamba	7.6	8.5
Mat. Uncles (s)	15.6	12.6	Somali	6.1	7.0
Mat. Grandmother	38.3	36.9	Other	3.7	2.9
Mat. Grandfather	18.6	17.7			
Child Care (%)			Number of Kin (ave.)	7.5	8.4
Father	2.8	7.3			
Sister(s)	17.1	20.4			
Brother(s)	10.2	14.8			
Mat. Aunts(s)	30.3	31.3			
Mat. Uncles (s)	11.7	9.7			
Mat. Grandmother	34.0	34.2			
Mat. Grandfather	4.6	5.6			

Mat. = Maternal

Table 2.

Association between Kin Status and Children's Health (Random and Fixed Effects Logistic Regression).

	Random Effects				Fixed Effects			
	O.R.	Coef.	Robust St. Er.	Sig.	O.R.	Coef.	Robust St. Er.	Sig.
Kin Status								
Father Deceased	1.58	0.46	0.31		1.67	0.51	0.73	
Sister(s) Co-resident	1.23	0.21	0.23		1.07	0.07	0.50	
Brother(s) Co-resident	1.09	0.09	0.23		0.67	-0.40	0.50	
Mat. Aunt(s) Co-resident	1.22	0.20	0.21		1.19	0.18	0.35	
Mat. Uncle(s) Co-resident	0.73	-0.31	0.23		1.03	0.03	0.42	
Mat. Grandmother Deceased	0.68	-0.39	0.22		0.32	-1.13	0.65	
Mat. Grandmother Co-resident	0.79	-0.23	0.25		0.52	-0.64	0.56	
Mat. Grandfather Deceased	1.29	0.25	0.20		0.54	-0.62	0.43	
Mat. Grandfather Co-resident	1.49	0.40	0.30		0.88	-0.13	0.59	
Child Characteristics								
Age (months)	1.00	0.00	0.00					
Male Child (ref=female)	0.83	-0.19	0.17					
Mother Characteristics								
Age (ref=15–19 years)								
20–24 Years	1.06	0.06	0.39					
25–29 Years	0.55	-0.60	0.41					
30–34 Years	0.62	-0.48	0.45					
35 Years or More	0.63	-0.47	0.46					
Education (ref=primary or less)								
Completed Primary	0.84	-0.18	0.21					
Completed Secondary	0.78	-0.25	0.29					
Ethnicity (ref^Kikuyu)								
Luo	1.08	0.08	0.24					
Luhya	0.77	-0.26	0.25					
Kamba	0.55	-0.59	0.30	*				
Somali	1.90	0.64	0.43					
Other	0.81	-0.21	0.47					
Other Children (ref=none)	0.63	-0.47	0.19	*	1.19	0.18	0.37	
Wave 2	0.59	-0.53	0.17	**	0.61	-0.49	-0.19	*
Constant	7.97	2.08	0.46	***				
Wald/LRchi2		39.6		*		14.7		
Number of obs.		873				276		
Number of groups		462				138		

*
p<.05;**
p<.01;***
p<.001; Mat. = Maternal

Table 3
Association Between Kin Transfers and Children's Health(Random and Fixed Effects Logistic Regression).

	Financial Support						Child Care					
	Random Effects Model 1			Fixed Effects Model 2			Random Effects Model 3			Fixed Effects Model 4		
	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.
Kin Transfers												
Father	3.01	1.10	0.35	**	3.33	1.20	0.57	*	3.36	1.21	0.56	*
Sister(s)	NA	NA	NA	NA	NA	NA	NA	NA	1.47	0.38	0.25	1.08
Brother(s)	NA	NA	NA	NA	NA	NA	NA	NA	1.36	0.31	0.29	1.17
Mat. Aunt(s)	1.18	0.17	0.25		0.67	-0.40	0.41		1.43	0.36	0.21	1.35
Mat. Uncle(s)	1.43	0.36	0.28		2.05	0.72	0.46		0.95	-0.05	0.30	1.04
Mat. Grandmother	1.02	0.02	0.21		1.44	0.37	0.42		1.02	0.02	0.21	0.92
Mat. Grandfather	1.03	0.03	0.27		1.25	0.22	0.44		0.90	-0.11	0.43	1.05
Child Characteristics												
Age (months)	1.01	0.01	0.00						1.01	0.01	0.00	
Male Child (ref=female)	0.84	-0.18	0.18						0.82	-0.20	0.17	
Mother Characteristics												
Age (ref=15-19 years)												
20-24 Years	0.96	-0.05	0.40						0.94	-0.06	0.40	
25-29 Years	0.55	-0.59	0.41						0.52	-0.66	0.41	
30-34 Years	0.66	-0.41	0.44						0.57	-0.56	0.44	
35 Years or More	0.74	-0.30	0.44						0.62	-0.48	0.45	
Education (ref=primary)												
Completed Primary	0.80	-0.23	0.21						0.87	-0.14	0.21	
Completed Secondary	0.69	-0.37	0.30						0.77	-0.27	0.29	
Ethnicity (ref=Kikuyu)												
Luo	1.21	0.19	0.24						1.12	0.12	0.24	
Luhya	0.77	-0.26	0.25						0.81	-0.21	0.25	
Kamba	0.53	-0.63	0.31	*					0.53	-0.64	0.31	*
Somali	1.36	0.31	0.44						1.50	0.40	0.44	
Other	0.84	-0.18	0.48						0.83	-0.19	0.47	

	Financial Support						Child Care					
	Random Effects Model 1			Fixed Effects Model 2			Random Effects Model 3			Fixed Effects Model 4		
	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	O.R.	Coef	Sig.	O.R.	Coef	Sig.
Number of Kin	1.03	0.03	0.03		1.04	0.04	1.04	0.03		1.05	0.05	
Other Children (ref=none)	0.63	-0.47	0.19	*	1.10	0.10	0.62	-0.49	*	0.98	-0.02	
Wave 2	0.55	-0.59	0.18	**	0.57	-0.56	0.54	-0.62	***	0.57	-0.55	**
Contant	5.11	1.63	0.49	**			5.40	1.69	**			
Wald/LRchi2		38.9		*		19.9		39.4	*		13.4	
Number of obs.		873				276		873			276	
Number of groups		462				138		462			138	

* P<05;

**

P<01;

P<001;Mat=Maternal

Table 4
Association Between Kin Transfers and Children's Health (Random and Fixed Effects Logistic Regression)

	Financial Support						Child Care					
	Random Effects Model 1			Fixed Effects Model 2			Random Effects Model 3			Fixed Effects Model 4		
	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.
Kin Status and Transfers												
Father^a												
Non-resident, Support	3.19	1.16	0.35	***	7.39	2.00	0.72	**	3.41	1.23	0.56	*
Deceased	1.79	0.58	0.31		2.39	0.87	0.83		1.66	0.51	0.32	
Sister(s)^a												
Co-resident, No Support	1.18	0.17	0.24		0.66	-0.41	0.59		0.87	-0.14	0.39	
Co-resident, Support	NA	NA	NA		NA	NA	NA		1.42	0.35	0.26	
Brother(s)^a												
Co-resident, No Support	1.03	0.03	0.23		0.82	-0.20	0.55		0.84	-0.17	0.29	
Co-resident, Support	NA	NA	NA		NA	NA	NA		1.37	0.32	0.30	
Mat. Aunt(s)^a												
Co-resident, No Support	1.28	0.25	0.23		1.83	0.61	0.45		1.14	0.13	0.31	
Non-resident, Support	1.12	0.11	0.37		0.69	-0.37	0.63		1.45	0.37	0.44	
Co-resident, Support	1.43	0.36	0.34		0.81	-0.21	0.63		1.48	0.39	0.25	
Mat. Uncles(s)^a												
Co-resident, No Support	0.73	-0.32	0.25		1.46	0.38	0.48		0.69	-0.37	0.26	
Non-resident, Support	1.46	0.38	0.36		3.41	1.23	0.63		0.56	-0.57	0.63	*
Co-resident, Support	1.15	0.14	0.43		3.15	1.15	0.93		0.89	-0.11	0.36	
Mat. Grandmother³												
Co-resident, No Support	1.00	0.00	0.43		1.03	0.03	0.77		0.97	-0.03	0.41	
Non-resident, Support	1.10	0.10	0.37		1.57	0.45	0.60		1.17	0.16	0.45	
Co-resident, Support	0.87	-0.13	0.28		0.70	-0.36	0.68		0.85	-0.17	0.28	*
Deceased	0.74	-0.30	0.24		0.26	-1.37	0.77		0.72	-0.33	0.23	*
Mat. Grandfather³												
Co-resident, No Support	1.24	0.21	0.50		0.40	-0.91	0.95		1.57	0.45	0.33	
Non-resident, Support	0.79	-0.23	0.43		0.79	-0.23	0.74		NA	NA	NA	

	Financial Support						Child Care					
	Random Effects Model 1			Fixed Effects Model 2			Random Effects Model 3			Fixed Effects Model 4		
	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.	O.R.	Coef	Robust St. Er.	Sig.
Co-resident, Support	1.43	0.36	0.34		0.80	-0.22	0.73		1.73	0.55	1.07	
Deceased	1.28	0.24	0.21		0.42	-0.86	0.51		0.50	-0.69	0.48	
Child Characteristics												
Age (months)	1.01	0.01	0.00									
Male Child (ref=Female)	0.81	-0.21	0.17									
Mother Characteristics												
Age (ref=5–19 years)												
20–24 Years	1.10	0.09	0.40									
25–29 Years	0.58	-0.54	0.41									
30–34 Years	0.64	-0.45	0.46									
35 Years or More	0.71	-0.34	0.48									
Education (ref=primary or less)												
Completed Primary	0.81	-0.21	0.21									
Completed Secondary	0.69	-0.37	0.30									
Ethnicity (ref=Kikuyu)												
Luo	1.10	0.10	0.25									
Luhya	0.75	-0.29	0.25									
Kamba	0.51	-0.67	0.31	*					*			
Somali	1.43	0.35	0.46									
Other	0.85	-0.17	0.48									
Number of Kin	1.03	0.02	0.03		1.03	0.03	0.06		1.03	0.03	0.06	
Other Children (ref=none)	0.64	-0.45	0.19	*	1.23	0.21	0.41		*	1.18	0.16	0.41
Wave 2	0.56	-0.59	0.18	***	0.61	-0.50	0.21	*	**	0.54	-0.61	0.23
Contant	4.96	1.60	0.51	***								
Wald/LRchi2		52.9	*			31.3				36.4		*
Number of obs.		873				276				276		
Number of groups		462				138				138		

* p<.05;

** p<.01;

Mat = Maternal; a ref=non-resident, no support

p<.001;

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