Family Structure and Child Mortality in Tanzania

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To date, the majority of contemporary research, policy programming, and popular press on families and children in Africa focuses on orphanhood, primarily as resulting from high prime-age adult mortality due to the AIDS epidemic (Crampin et al., 2003; Gregson, Zaba, & Garnett, 1999; Hosegood et al., 2007; Hosegood, McGrath, Herbst, & Timaeus, 2004; Nakiyingi et al., 2003). In general, the research on orphanhood finds that orphans fare worse than their counterparts with living parents, particularly for maternal orphans (Ardington & Leibbrandt, 2010; Case, Paxson, & Ableidinger, 2004; Case & Ardington, 2006; Evans & Miguel, 2007). The evidence on paternal death is more mixed, with some studies finding that paternal absence has no effect, or matters only insofar as it depletes household economic resources (Case & Ardington, 2006). While certainly an important problem, a narrow focus on the death of biological parents to the exclusion of alternative causes of parental absence obscures children's varied experiences of family structure.

In previous work, I find that children are at greater risk of experiencing parental absence due to reasons other than parental death (Gaydosh 2014). While more children experience absence due to migration and marriage-related absence, we actually do not know a lot about how these kinds of absence influence children's wellbeing. While there is a robust literature examining divorce and remarriage in the United States, in the African context we know little about the experience of children who do not reside with their parents due to these factors. Different causes of absence represent varied experiences and may present vastly different advantages or disadvantages. Indeed, some types of absence, such as parental migration, may actually bring potential benefits, making it necessary to consider each cause separately.

There is a small but growing body of work that moves beyond orphanhood to study the constellation of forces influencing family structure. In a study on single motherhood using demographic and health survey data from across the continent, Clark and Hamplova find that, in most countries, children of single mothers have higher mortality than children in two parent families (Clark & Hamplová, 2013). Similarly, in a study of mother's divorce in Burkina Faso, Thiombiano and colleagues find that children of divorced mothers have higher mortality than children of married parents (Thiombiano, LeGrand, & Kobiané, 2013). Looking at migration, Madhavan and colleagues find that in South Africa, migrant fathers maintain ties to their children and continue to support them (Sangeetha Madhavan, Richter, Norris, & Hosegood, 2014). And DeRose and colleagues find that children in households with migrant fathers have higher educational attainment than children in households with resident fathers (DeRose, Garcia, Salazar, & Tarud, 2014). Goldberg conducts one of the first examinations of family instability on the continent, finding that instability in caregivers is associated with earlier initiation of sexual activity (Goldberg, 2013).

These studies represent a promising new direction in the study of African families, and it is to this literature that this project most directly contributes. However, despite their achievements in expanding our knowledge of family structures beyond orphanhood, these studies suffer from some limitations, mostly due to data constraints, that I aim to address in this project. First, many of the studies use mother's union status or father's migration to examine the absence of the father. This project considers both maternal and paternal absence. Second, most studies either focus on one cause of absence in isolation, or are unable to differentiate between different causes of absence. This project considers all causes of parental absence simultaneously, providing a better understanding of the distinctiveness and similarity of these causes.

In addition to a preoccupation with parental death as a cause of absence, the literature on family structure in Africa also tends to focus primarily on parental absence. While parental absence has been demonstrated to affect child outcomes, in this context children are likely to live with other family members. In a context of shared childrearing and extended family, as in Tanzania, care for children is not restricted to the parents. So the exit of a parent does not necessarily result in a loss of caregiving and may alter the ways in which parental absence is associated with child outcomes.

Indeed, as we see in Figure 1, while parents are the focus of many analyses of family structure, children actually live with other people as well. The proportion of children living in two parent, nuclear families with no co-resident extended kin (in blue) has been declining, from roughly 40% in 1999 to around 25% in 2010. Indeed, in 2010, the most common family structure at birth was a two parent, extended family (in red), followed by a single mother extended family (in purple). Notably, single motherhood in both extended and non-extended families is increasing – in the purple and the green.

While most children live in family structures with non-parental, co-residential adults, the association between their presence and child wellbeing is poorly understood. Nevertheless, there is a robust anthropological literature that examines the extended family from which we can draw, and that support the idea that the presence of extended kin will matter for children's well-being.

Evidence from biological anthropology suggests that extended kin, particularly maternal grandmothers, are beneficial for child survival (Sear, Steele, McGregor, & Mace, 2002). This research relies on the grandmother hypothesis, which suggests that maternal grandmothers are most invested in the wellbeing of their grandchildren once their own reproductive career has ended (Hamilton, 1964; Sear & Mace, 2008). Surviving maternal grandmother and sister tend to have a positive effect of survival, whereas living male relatives have no effect (Gibson & Mace, 2005; Sear et al., 2002). This literature draws primarily from historical data or natural fertility populations, however, which are not reflective of contemporary African family structures.

There is also a robust, but somewhat dated literature on child fostering, which examines redistribution of children across extended kin networks (Castle, 1995; E. N. Goody, 1982; J.

Goody, 1962). However, the findings on the consequences of child fostering are mixed, due in part to an inability to account for the different circumstances under which children are fostered, or the reasons for fostering (Verhoef & Morelli, 2007). Finally, the literature on orphanhood does acknowledge the importance of extended kin, but primarily examines their ability to absorb and care for orphaned children in the event of absence (Hunter, 1990; S. Madhavan, 2004). There is evidence from this literature, however, that extended kin, again particularly grandmothers, may moderate negative effects of absence (Case et al., 2004).

Drawing from this research on family structure, this project aims to answer three research questions.

1. Is parental absence associated with child mortality?
    a. Does it matter which parent is absent?
    b. Does it matter why the parent is absent?
2. Is presence of kin associated with child mortality?
    a. As is apparent from the literature, it is not only extended kin that matter, but the type of kin and their relation to the child. So I will examine, does it matter which kin are present, differentiating between laterally extended kin and vertically extended kin?
3. And finally, in a context of shared childrearing such as in Tanzania, does the presence of kin moderate the association between parental absence and child mortality?

These research questions make four main contributions to the literature on family structure and child outcomes in Africa. First, I consider maternal and paternal absence, while much of the literature has focused on father absence, particularly due to migration or divorce. Second, I differentiate between causes of absence, examining marriage related absence and migration in addition to parental death. Third, I consider role of extended kin, and fourth, I differentiate between extended kin ties.

Data and Methods

To address the research questions I use health and demographic surveillance data from Rufiji, Tanzania. Health and Demographic Surveillance Systems are data collection platforms that were established to monitor the health of populations in developing countries. In resource constrained countries such as Tanzania, there are no vital or national registration systems. In order to calculate vital statistics such as birth, death and fertility rates, demographic surveillance systems were established throughout the continent. Under this data collection strategy, the dates of all vital events within a given geographic area are recorded. This includes all births, deaths, migration and marital events.

For this project, I use data from the Rufiji Health and Demographic Surveillance System, or HDSS. The Rufiji HDSS is an ongoing platform that follows an open cohort of approximately 80,000 individuals living in an area of 1,800 square kilometers. You can see on the map here the location of Tanzania within the continent, and then Rufiji District within Tanzania, and the demographic surveillance area within the District, indicated in dark red in the right most panel.

Established in 1998 with an initial census of all individuals living in the area, the surveillance team visits all households three times per year to collect the residency and vital status of every registered member. New members are added through birth or in-migrations, and members exit through death or out-migration. While both processes are declining, the demographic setting can be characterized as high mortality, high fertility, with a modest life expectancy at birth of 65, and a high total fertility rate of 5.

Drawing from the dates of vital events, I constructed exposure episodes for all children born in the site from 2000 – 2010, resulting in about 38,000 children. Multiple births (twins) are excluded from the analysis, due to their elevated mortality risk. Exposure begins at birth and ends either with an event, here the death of the child, or with censoring. Censoring refers to a situation where the child is no longer included in the analysis, or in demographic terms, exposed to the risk of death. This can occur in three instances – when the child turns 5 (since we are only interested in child mortality), if the child moves out of the site, and at the end of observation, here December 31, 2011.

To estimate the influence of parental absence, I estimate Cox proportional hazards models. As there is correlation in the survival of siblings, I include a shared frailty term for the mother. The predictors of interest are time varying measures of maternal absence and paternal absence that indicate whether or not the parent is co-resident in the household. I also differentiate between reasons for absence – which are defined as death when a parent no longer resides with the child because he/she has died, marriage related which is when the parent or child moves out of the household within 6 months of a union status change (so this includes divorce, remarriage, or new marriages), and migration, which is when the parent moves out of the household not within 6 months of a union status change. For fathers, I also include a cause of non-marital childbearing, which refers to instances where the mother and father were unmarried at the time of birth, and the father has been absent since birth.

I also include a time-varying measure of presence of kin, defined as co residential non-parental adults. I differentiate between different types of kin using the ages of the household members. Lateral kin are defined as belonging to the same generation as the child's parent, and may include aunts, uncles, or additional wives. Vertical kin are defined as belonging to the generation above the parent, and may include grandparents or other elderly household members.

I also include several controls. First, I control for mother's age, parity and education. I also control for child gender. I include a measure of household wealth constructed from an asset ownership index using principal components analysis and dividing into wealth quintiles. And finally, I include a measure of the number of other co-resident children.

Results

Returning to my first research question, I ask, does parental absence (overall regardless of which parent and cause) matter for child mortality? In Figure 2 I plot the hazard ratio, comparing the hazard of mortality for children living with both parents (present) compared to

children with any parental absence (absent). The red line at 1 represents a 1:1 ratio, where there is no difference in the hazard of the compared groups. The diamond represents the hazard ratio, with the lines indicating the 95% confidence interval. The diamond for present is on the line and does not have confidence intervals, indicating that it is the reference category. Controlling for maternal characteristics, child gender, household wealth, and other co-resident children, parental absence overall is associated with higher child mortality. Having any parent absent is associated with 36% higher hazard of death. While this provides evidence of an association between parental absence and child mortality, it does not account for which parent is absent.

In Figure 3, I test whether the association depends on which parent is absent. Including indicators for both maternal and paternal absence in the same model, we see that while both are associated with higher child mortality, maternal absence is of a greater magnitude. The hazard for maternal absence is almost two times greater than the hazard for children with a present mother. In contrast, the hazard is 22% higher hazard for children with an absent father compared to a co-resident father.

While there is evidence that both maternal and paternal absence is associated with elevated child mortality, this does not tell us anything about the reason for absence, and how this relationship may vary. In Figure 4 I examine if the reason for absence changes the association. Maternal death is associated with the largest magnitude increase in the hazard of child mortality, almost 11 times higher when mother is absent due to death compared to when mother is present. Maternal marriage-related absence is also associated with greater risk – over 2 times higher. Finally, maternal migration is also associated with a higher hazard of child mortality, but of the smallest magnitude – only 50% higher than when the mother is co-resident.

Moving to the same analysis for paternal absence, again paternal death is associated with greater risk – hazard 60% higher, and significant. There is no association between paternal marriage-related absence. Paternal migration is actually associated in the opposite direction, with 50% lower hazard of child mortality. Finally, paternal absence due to non-marital childbearing – children born to unmarried mothers with absent father birth – is associated with higher child mortality, hazard 32% higher.

Figure 4 also allows interesting comparisons between maternal and paternal absence by cause, emphasizing important similarities and differences. Both maternal and paternal death are associated with higher mortality; while death makes up smallest share of children's experience of absence, it is associated with the largest magnitude increase in child mortality. Only maternal marriage-related absence is associated with higher mortality; there is no association when the father is absent due to marriage-related reasons. Finally, there is an opposite association for migration between mothers and fathers – maternal migration is associated with a higher hazard, while the association is negative for paternal migration. These findings demonstrate that considering parental absence generally obscures very different underlying associations.

Moving to the second research question, I move beyond a focus on parents to consider the role of extended kin. In Figure 5 I present the hazard ratio for children in households with no kin to children in households with any kin, not accounting for type of kin. There is no association between child mortality and co-residence with extended kin. However, including an overall measure of kin presence may mask meaningful distinctions between the types of kin. In Figure 6 I differentiate between the types of kin, separating laterally and vertically extended households. Residence in households that are laterally extended is associated with 12% lower risk of child mortality. In contrast, residence in households that are vertically extended is associated with roughly 20% higher risk of child mortality.

I want to turn now to the final research question, does the relationship between parental absence and child mortality depend on the type of other kin that are present? In Figure 7 I present the main effects of type of kin; this is the association with kin when the mom is present. On the bottom I now present the association when the mom is absent.
In contrast to the direction of the main effects, interacting the presence of kin with maternal absence, co-residence with lateral kin is associated with the highest increase in hazard. While co-residence with vertical kin in the event of maternal absence is associated with an increased hazard of child mortality, the magnitude is smaller than co-residence with lateral kin.

Turning to the parallel analysis for paternal absence, in Figure 8 I present results for the moderating association of kin by type, which differ when compared to maternal absence. Again we see similar main effects of kin, although residence with vertical kin in the presence of the father is not associated with child mortality compared to residence with the father and no kin. But again, lateral kin are associated with a lower hazard of mortality. When the father is absent, residence with no kin and residence with lateral kin are not associated with hazard of child mortality. Instead, in event of paternal absence, residence with vertical kin is associated with a higher hazard of child mortality.

This research demonstrates the importance of parents and extended kin for child health. Furthermore, the findings underscore important variation in causes of absence and type of kin.

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Figure 1. Percent in Living Arrangement at Birth, Rufiji HDSS, 1999-2010

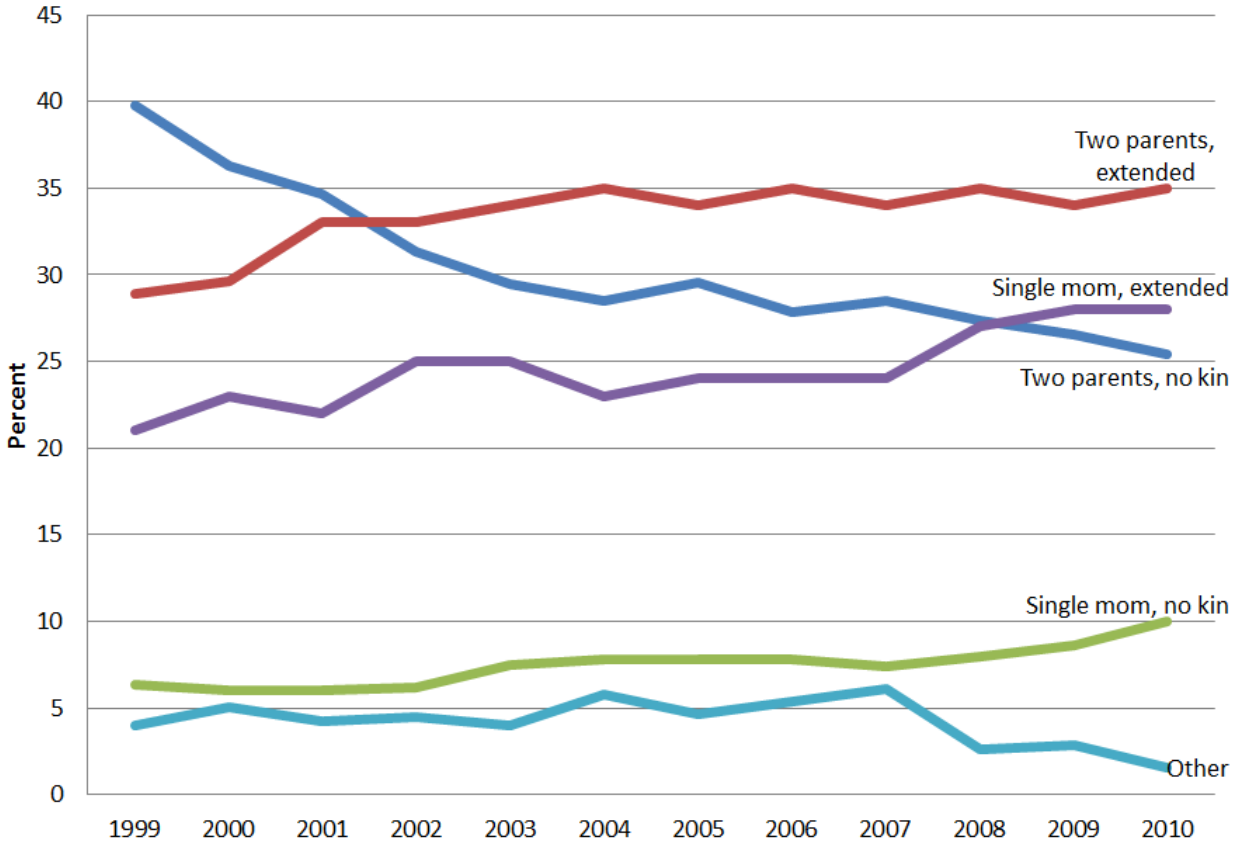

Figure 2. Hazard Ratio for Any Absent Parent

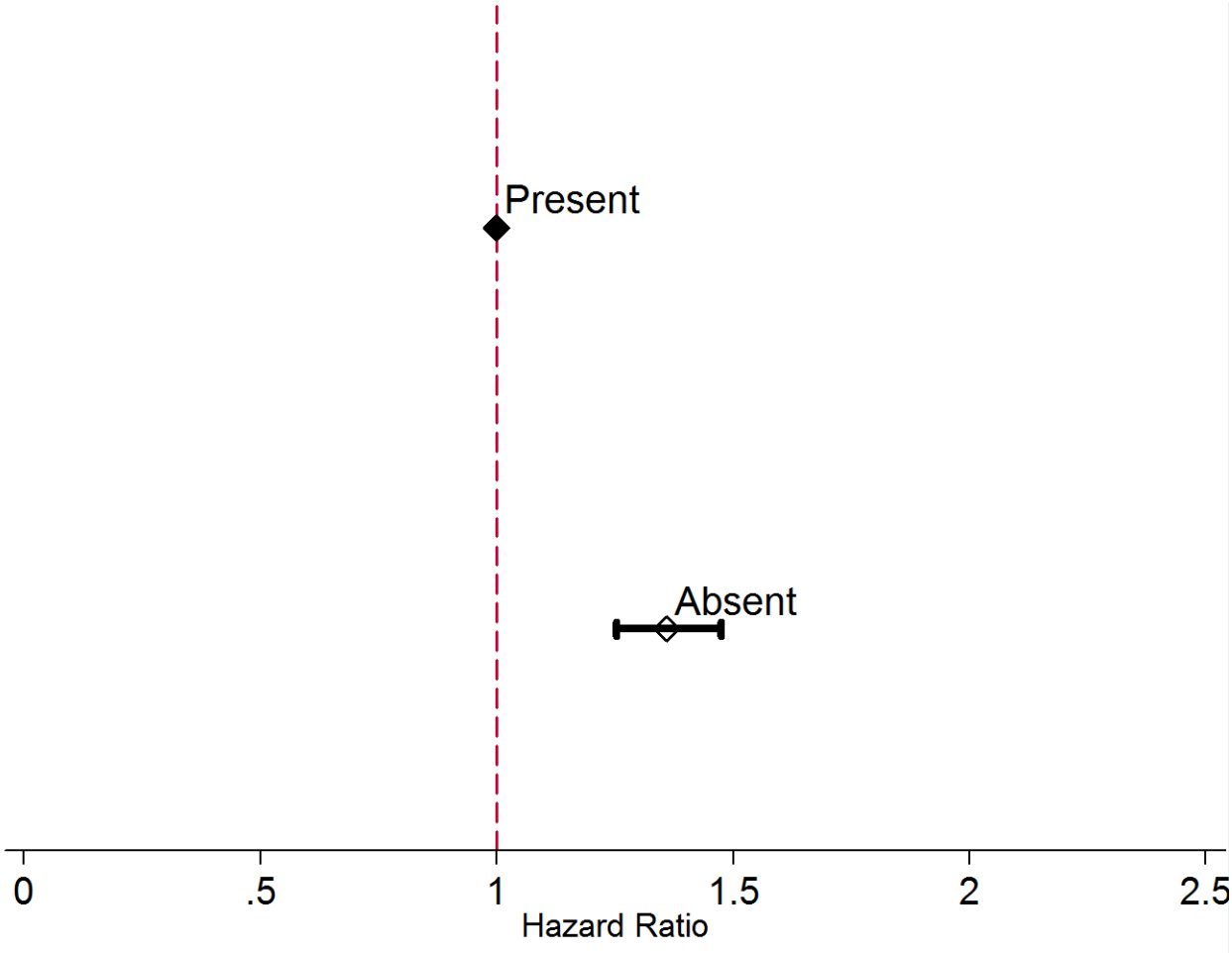

Figure 3. Hazard Ratio Maternal and Paternal Absence

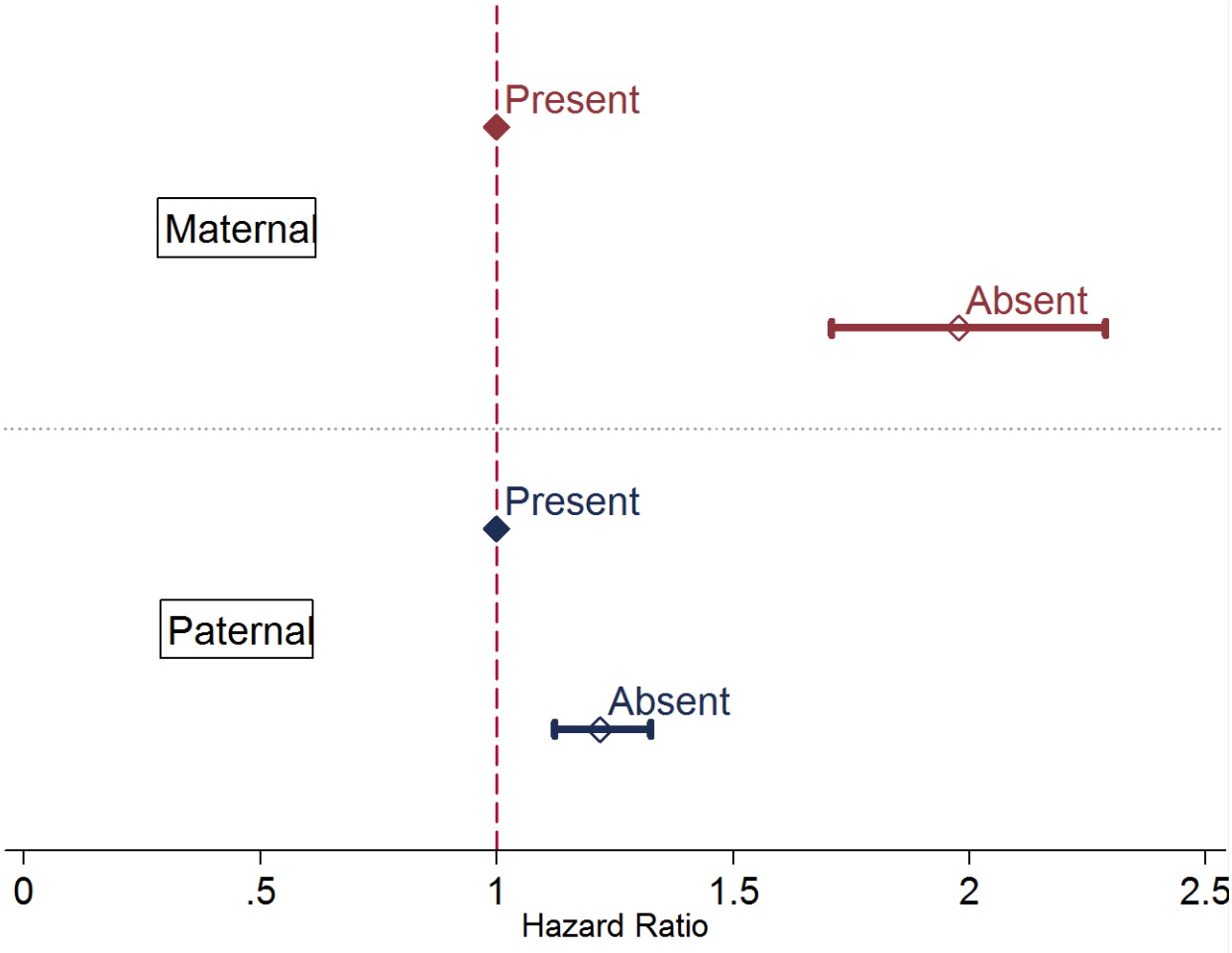

Figure 4. Hazard Ratio Maternal and Paternal Absence by Cause

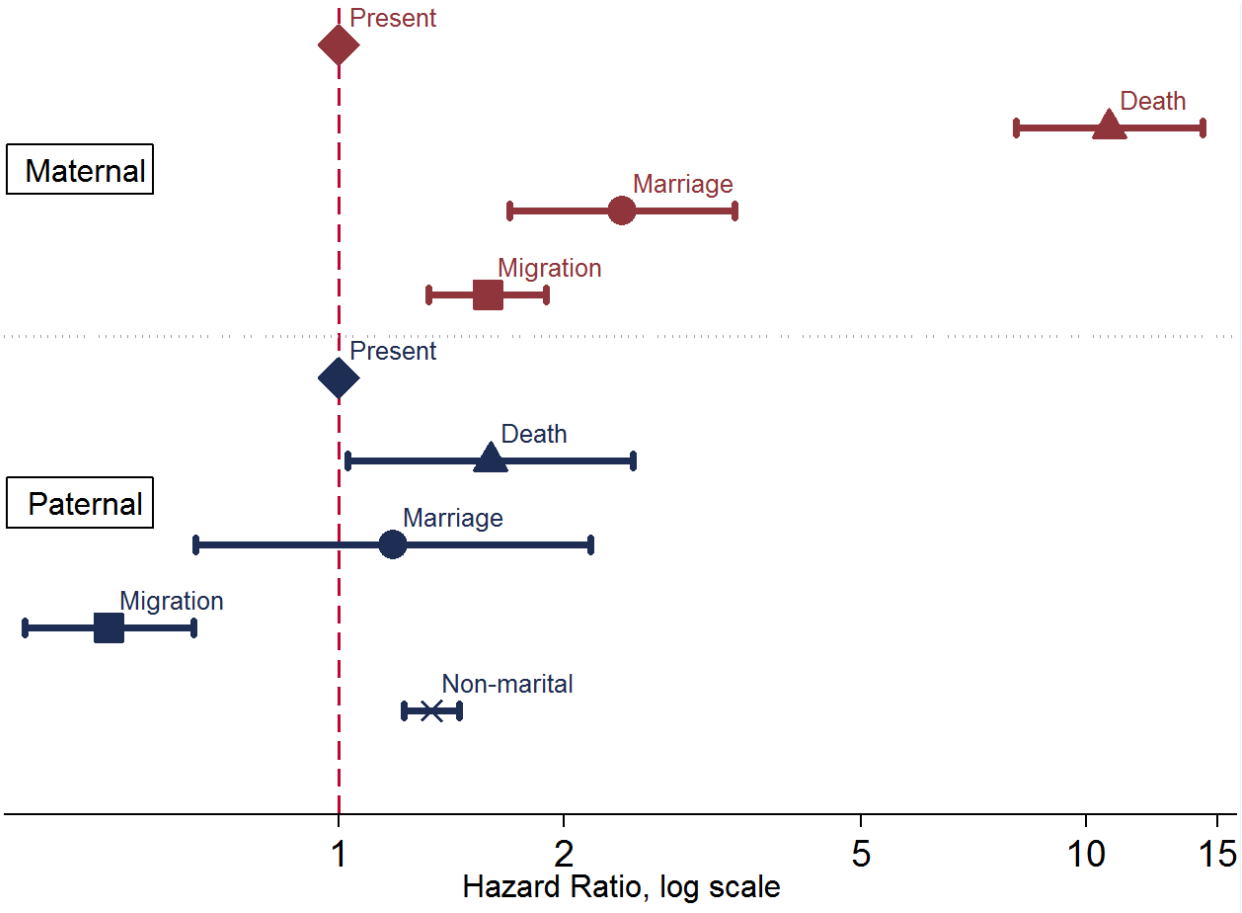

Figure 5. Hazard Ratio Any Extended Kin

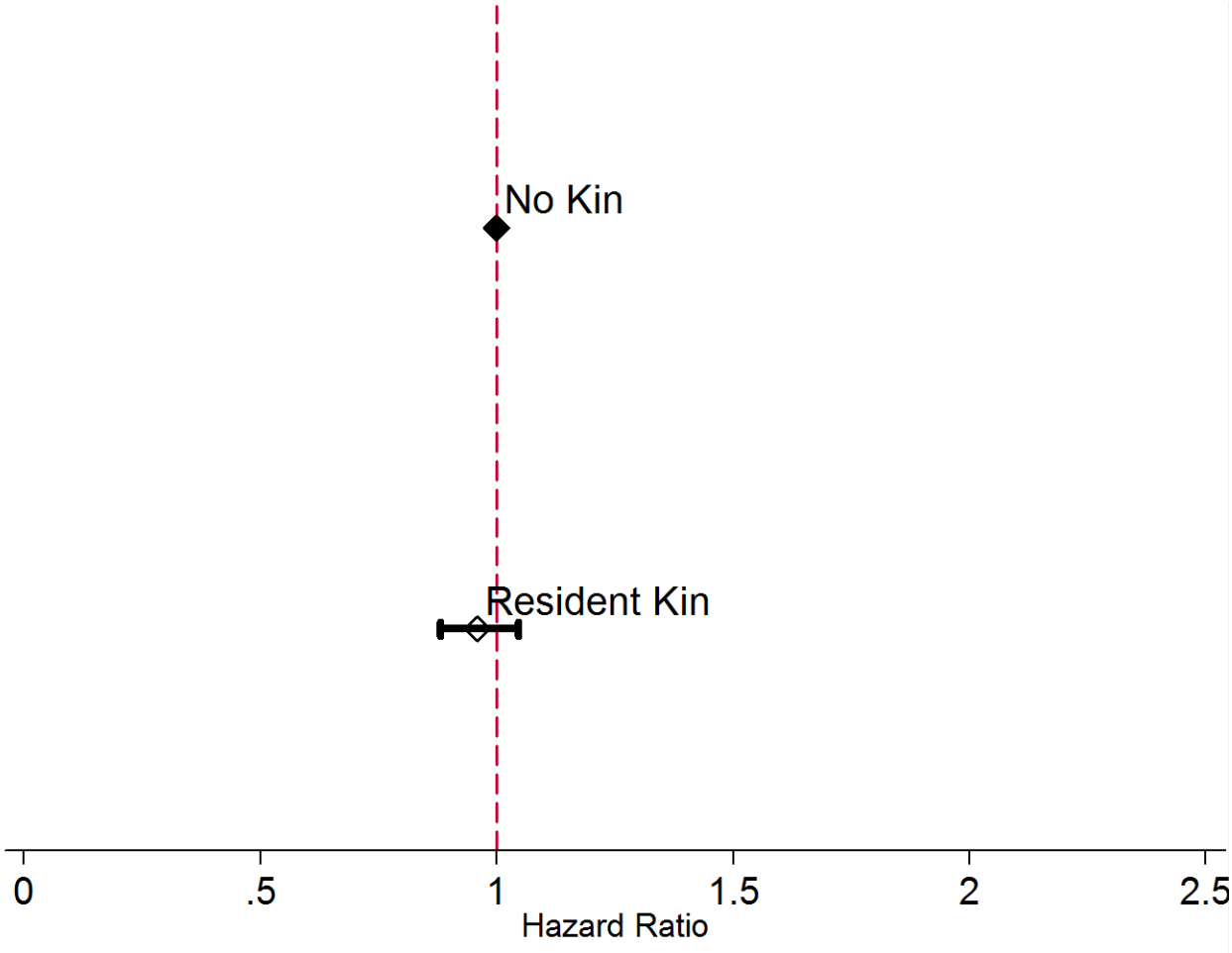

Figure 6. Hazard Ratio Extended Kin by Type

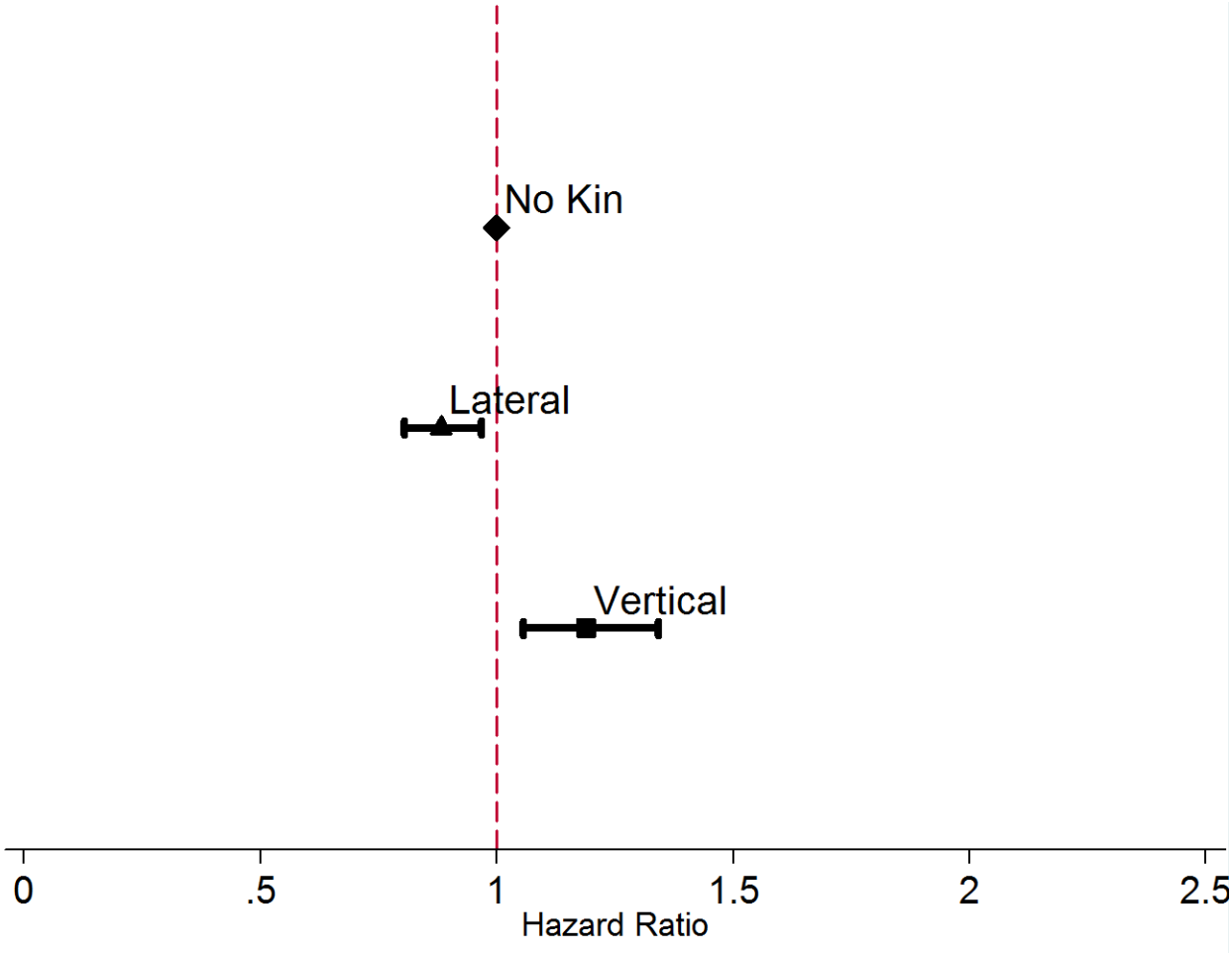

Figure 7. Hazard Ratio Extended Kin by Type and Maternal Co-residence

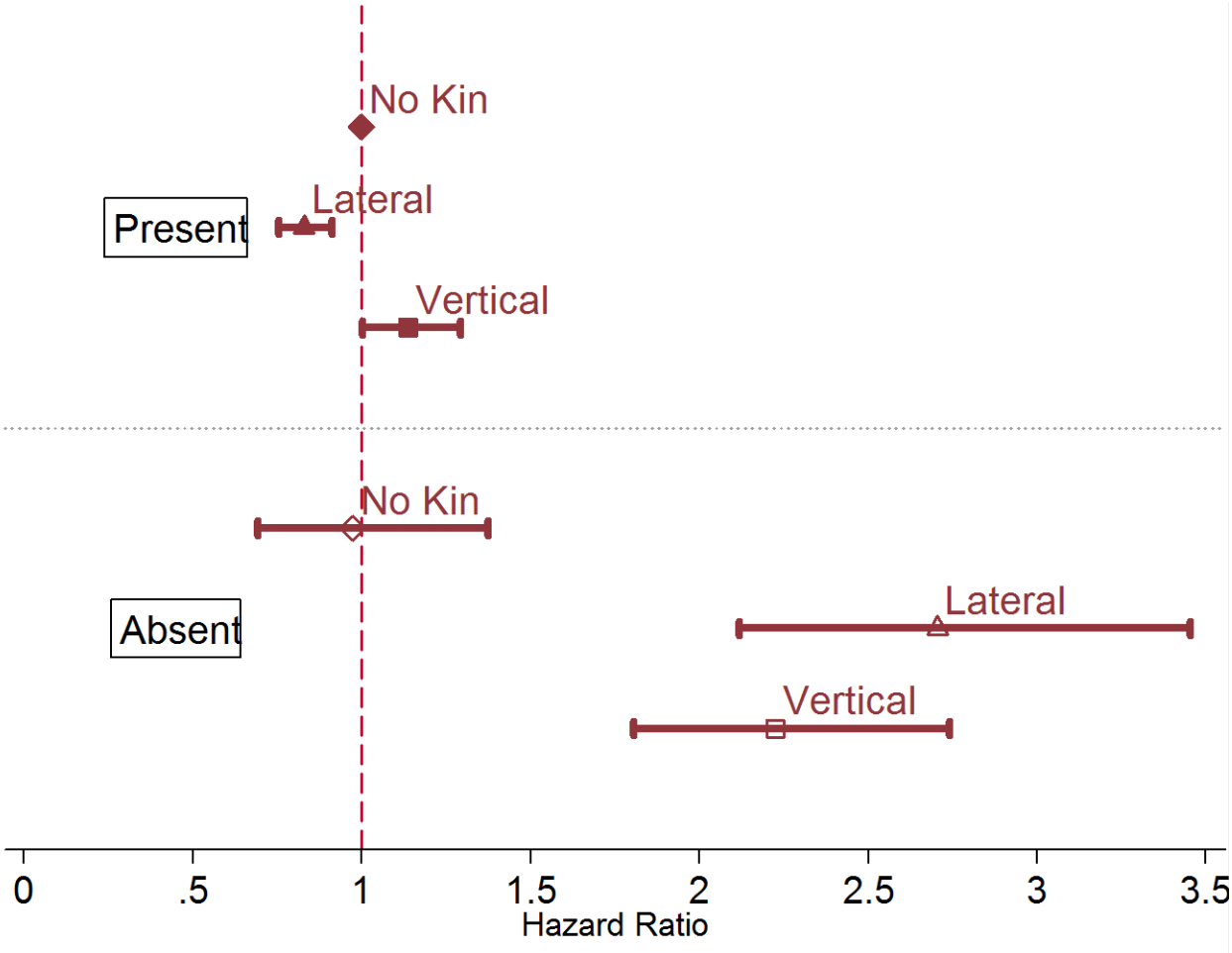

Figure 8. Hazard Ratio Extended Kin by Type and Paternal Co-residence