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Extended abstract

Background: The reduction of maternal mortality is widely acknowledged as a global public health priority, an urgent social justice and human rights issue, and essential to social and economic development. One critical impact of maternal death is the consequent drop in survival probabilities for motherless children under the age of 5 years. Though research on the detrimental effect of maternal mortality on child survival has been plagued with small numbers and methodological issues, still, a number of multivariate studies across the developing world document the significance of this relationship even after controlling for other factors that could influence infant or child survival. In one example, a study from rural Haiti found that a family with a maternal death has 55% higher odds of experiencing a death to a child under age 12 years. Multiple studies from Bangladesh also have demonstrated similar effects of maternal death on child survival. Some found, moreover, that the death of a mother has stronger effects on child survival than that of a father. In at least one study, the effects of the maternal death on lowering survival odds persisted till a child reached age 10 years.

This paper contributes to the growing body of evidence on the consequences of maternal death for child survival by examining (a) which children have the highest risks: that is, those whose mothers die before age 5 vs. children in a matched control group with mothers who are alive, as well as how the two groups’ risks differ for neonates, infants and older children under-5; and, (b) why high-risk children face these higher risks: that is, what are the specific factors that influence motherless children’s risks of death, and whether and how these differ from factors for mortality risks faced by non-orphaned children in a matched control group.

This paper is part of a larger study on the financial, social, emotional and other consequences of maternal mortality in Kenya. The study, which ran from 2010-2014, was a collaborative effort between Family Care International, the International Center for Research on Women (ICRW), and the KEMRI/CDC Research and Public Health Collaboration, which was a longstanding collaboration between the Kenya Medical Research Institute and the U.S. Centers for Disease Control and Prevention (CDC). The study was based in Western Kenya, in Siaya, Gem and Rarieda sub-counties, an area with a maternal mortality rate at the time of approximately 600 per 100,000 (KEMRI/CDC HDSS data, unpublished).

Key questions: Our main questions are:

i) How does a maternal death influence the probability of survival for children under the age of 5 when compared with children whose mothers are alive?

ii) How do the two groups’ probabilities of survival differ between neonates (ages 0-28 days), infants (29 days to less than 365.25 days) and children between the ages of 1 and 5 years?

Our secondary questions are:

iii) Which risk factors have the largest, statistically significantly independent influence on mortality probabilities for motherless children under the age of 5 years?
iv) How do these factors differ in importance for the survival of motherless children versus a control group of children under the age of 5 years whose mothers are alive?

v) What are the policy implications for minimizing risks of mortality among these subgroups, particularly for the more vulnerable group of motherless children?

Data and methods: We use data from KEMRI/CDC’s Health and Demographic Surveillance System (HDSS), established in 2001. At the start of the larger study of which this paper is a part, the HDSS included a total population of 220,000 individuals in Asembo (Rarieda District) and Gem and Karemo (Siaya District) who were visited quarterly. Families in these areas typically live in compounds; each compound was mapped using Geographic Information System (GIS) coordinates and each individual was given a unique identification number as part of the HDSS. Information was collected on births, deaths, causes of death (through verbal autopsy), pregnancy, pregnancy outcomes, morbidity, migration, education, and socioeconomic status.

For this paper, we include data from 2003-2012. We identified 1700 children who were under 5 years of age at the time their mothers died (cases) and 1681 controls, defined as children of the same age as cases whose mothers are alive at least until they are five years of age. Controls were matched to cases by date of birth such that controls had the same date of birth as cases. Among cases, 239 children died and 41 controls died.

Analysis is ongoing for this paper. To answer questions (i) and (ii) above, we will follow study children from the time their mothers died to the time they turn five years old, die or are censored out of the sample. We will use Kaplan-Meier survival curves to calculate the probabilities of survival by mother’s survival status for all children up to age 5 years, as well as separately for (a) neonates, (b) infants, and (c) children ages 1-5 years.

To answer questions (iii) and (iv) above, we will use either Cox proportional hazards models or logit models (whichever is found to be more appropriate to the data) to examine the significance of individual risk factors influencing the probability of survival for the sample of motherless children under the age of 5 to determine which variables significantly contribute to their (higher) risk of mortality. We will include the same set of variables for our analysis of determinants of mortality for control children, so as to compare differences in importance of individual risk factors across these two sub-samples of children. The comparison may also shed further light on why motherless children had higher risks of mortality than children whose mothers were alive. Risk factors for these analyses will include child (such as age, sex, siblings), mother (such as age and education), household (such as socio-economic status, size, composition) and environmental (such as water and sanitation) covariates considered in the literature to be key determinants of child mortality.

Expected findings and study contributions: We expect to find that the probabilities of survival are significantly lower for motherless children under age 5 than for children whose mothers were still alive. We also expect to enrich existing analyses of the consequences of maternal death for child survival through our efforts to identify which specific factors increase the risks or are protective for motherless children, which are significant for children whose mothers are alive, and what are the differences between the key risk factors for the two sets of children. Our findings are intended to inform policy and programmatic inputs that aim to prevent child mortality by isolating whether there are particular factors that can be targeted to improve survival odds specifically for the vulnerable children whose mothers die before they reach age five years. More broadly, our findings are intended to contribute to the ongoing efforts to harness the additional international development assistance needed to make substantial progress toward the Millennium Development Goals of reduced maternal and child mortality.


