# Sex differentials in childhood mortality revisited: evidence from sub-Saharan Africa


## By

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## Abstract

There is no consensus in the literature on male-female differentials in childhood mortality. Moreover, most of the relevant studies on this subject are now outdated. This gives credence to the need to examine the current data on sex differentials in childhood mortality. This study examines male-female differentials in under-five mortality in sub-Saharan Africa. Data for this study came from the latest Demographic and Health Surveys in eight sub-Saharan African countries. Analysis was restricted to births in the five years preceding the survey. Descriptive and inferential statistics were employed in data analysis. Cox proportional hazard regression was employed at the multivariate level. Results showed that risks of under-five death were significantly higher among males in Ethiopia (Hazard Ratio (HR): 1.36, confidence interval (CI):1.09-1.68, $p<0.05$), Nigeria (HR: 1.15, CI: 1.06-1.24, $p<0.05$), Zambia (HR:1.29, CI:1.07-1.56, $p<0.05$) and Zimbabwe (HR:1.37, CI: 1.08-1.73, $p<0.05$). Adjusted HR indicates a narrowed gender gap in childhood mortality in Congo DR and Zambia. Findings suggest that sex discrimination in childcare in favour of boys may be a key factor in these countries. Elimination of discrimination against female children is likely to lead to further reduction in childhood mortality in these countries.



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## Background

Paradoxical differences in males' and females' health outcomes have been recognized in the public health literature. While men tend to have lower life expectancy compared to women, morbidity is higher among females relative to males (Rieker & Bird, 2005). Similarly, available outdated studies on sex differentials in childhood mortality yield conflicting results. While some studies established that childhood mortality rates among males exceed those of females (Boco, 2010; Hill & Upchurch, 1995), other studies revealed that gender differentials in childhood mortality are driven by excess mortality among females (Basu, 1989; Muhuri & Preston, 1991; Svedberg, 1990).

Available evidence shows that male children enjoy a numerical advantage over females at the time of birth (Koenig & D'Souza, 1986). To reinforce this point, UNFPA (2012) report indicated that sex ratio for the world population as a whole is 101 males to 100 females, and this ratio is higher in favour of males in many countries. However, male children are thereafter susceptible to higher mortality risks either during childhood or later in life (D'Souza & Chen, 1980). Koenig and D'Souza (1986) noted that in all human populations, males have numerical superiority at birth while females have higher life expectancies at all ages compared to males. Pebley and Amin (1991) contend that higher mortality among males during childhood, adolescence or adulthood is attributable to greater degrees of biological vulnerability to diseases.

Specifically during childhood, mortality risks are higher for males than for females due to genetic factors (Basu, 1989; Koenig & D'Souza, 1986; Muhuri & Preston, 1991). A study which examined individual and community effects on childhood mortality found higher mortality among male children compared to females in 27 out of 28 sub-Saharan African countries (Boco, 2010). In contrast, Muhuri and Preston (1991) established that child mortality rates among females exceed those of males throughout South Asia. Pebley and

Amin (1991) observed excess mortality among female children in rural Punjab in India. Hill and Upchurch (1995) noted that child mortality is the main driver of excess female mortality among the Chinese population due to higher female mortality risks right from early ages.

Further, available evidence suggests that girl child disadvantage during childhood in a number of countries, particularly during ages 1 to 4, is mostly driven not by genetic factors but by discrimination in child care in favour of boys (Basu, 1989; Muhuri & Preston, 1991; Okojie, 1994; Svedberg, 1990). Obermeyer and Cardenas (1997) established discrimination in breastfeeding duration, immunization completeness and treatment of diarrheal disease in favour of boys in Tunisia. Literature shows that discriminations against girls in intra-household allocations of resources could be attributed to differences in parents' socio-economic position (Krishnan *et al.*, 2012; Obermeyer & Cardenas, 1997). In the absence of sex discrimination in child care, child immunization and food provision, child mortality risks are generally higher for boys than for girls due to genetic factors (Basu, 1989; Koenig & D'Souza, 1986; Muhuri & Preston, 1991).

Meanwhile, the global discourse on sex differentials in under-five mortality is yet inconclusive. In addition, and as earlier noted, most of the relevant studies on gender inequality in child health and survival are outdated and might not represent the current situation due to changes in socio-cultural, nutritional, environmental and health conditions. Therefore, there is a need to revisit the subject. Moreover, discrimination against girl children and preference for boys in parental care, intra-household distribution of food, resources and health care have been cited as behavioural mechanisms engendering higher mortality risks among female children in many parts of Asia and North Africa. It is reasonable, however, to posit that preference for sons and discrimination against daughters in parental care cannot be completely ruled out in sub-Saharan Africa – a region predominantly disposed to patriarchal values. Hence, this paper aims to (1) examine sex differentials in under-five mortality in sub-

Saharan Africa and (2) determine the extent to which maternal socio-economic characteristics and health-care related factors influence sex differences in childhood mortality in selected countries.

## Data and Method

### Data Source

Data for this study came from the latest Demographic and Health Surveys (DHS) in the selected eight sub-Saharan African countries, with two countries representing each of the four sub-regions in the sub-Saharan Africa – Cameroon and Democratic Republic of Congo (DR Congo) (Central Africa), Ethiopia and Kenya (East Africa), Ghana and Nigeria (West Africa), as well as Zambia and Zimbabwe (Southern Africa). The selected datasets came from 2011 Cameroon DHS (CDHS), 2007 Congo DR DHS (CDRDHS), 2011 Ethiopia DHS (EDHS), 2008-09 Kenya DHS (KDHS), 2008 Ghana DHS (GDHS), 2008 Nigeria DHS (NDHS), 2007 Zambia (ZDHS), and 2010-11 Zimbabwe DHS.

The Demographic and Health Surveys are routinely conducted by Measure DHS in several countries using similar methodology. Primary sampling unit (PSU) is regarded in the DHS as a cluster and this is defined on the basis of Enumeration Areas (EAs). Under the DHS programme, samples for the selected surveys were drawn using stratified two-stage cluster design consisting of 580 clusters in Cameroon, 300 clusters in Congo DR, 650 clusters in Ethiopia, 412 clusters in Ghana, 400 clusters in Kenya, 888 clusters in Nigeria, 320 clusters in Zambia, and 406 clusters in Zimbabwe. Nationally representative households were selected in each country and all women age 15-49 in those households were interviewed.. The relevant data for this study (women age 15-49 years who had at least one live birth within the five years preceding the survey) were extracted from the whole dataset of each country.

Births recode data of the Demographic and Health Survey was utilized for each of the 8 selected countries. Analysis was restricted to births in the five years preceding the survey purposely to obtain the current male-female differentials in childhood mortality in the selected countries. Sample sizes for the 8 countries are – 11,191 children (Cameroon), 8,702 children (Congo DR), 11,301 children (Ethiopia), 5,895 children (Kenya), 2,860 children (Ghana), 27,685 children (Nigeria), 6,134 children (Zambia), and 5,419 children (Zimbabwe). Multiple births were excluded from the present analysis.

Weighting factors were applied in the analysis to adjust for oversampling or under sampling of some locations in the selected countries.

**Ethical Considerations**

This paper was based on analysis of secondary dataset with all participant identifiers removed. The ethical approval for the survey was granted by the Ethics Committee of the Opinion Research Corporation of the Macro International Inc., Calverton, MD, USA; and by the National Ethics Committee of the respective countries. Permission to use the datasets of the selected countries for this study was obtained from ICF Macro Inc.

## Variable Measurements

### Outcome Variable

The outcome variable for this study is under-five mortality. This is defined in this study as the risk of death between birth and the age of five. The outcome variable was measured as the duration of survival since birth in months. The children's survival status and the age at death in months (if the child had died) or the last month they were known to be alive (if child was still living at the time of the survey) were combined to generate the outcome variable for the survival analysis. Children known to have died (i.e. non-censored observation) were regarded as the cases, whereas children who were still alive at the time of the survey were treated as right-censored.

### Explanatory Variables

The key explanatory variable in this study is child's sex – categorized as (1) male (2) female. Adjustments were also made in the analysis for the effects of characteristics that are established in the literature as important predictors of childhood mortality in the developing world. These include maternal education [categorized as (1) none (2) primary (3) secondary or higher]; wealth index [grouped as (1) low (2) middle (3) high]; maternal occupation [categorized as (1) not working (2) professional (3) sales/business (4) agriculture employees (5) manual/artisan]; place of residence [categorized as (1) urban (2) rural]; marital status (grouped as (1) currently married (2) not currently married]; religion [categorized as (1) Christianity (2) Islam (3) others]; place of delivery [categorized as (1) home (2) health facility]; and maternal age at childbirth [grouped as (1) <18 years (2) 18-35 years (3) 36 years

and above. Others are maternity characteristics – such as antenatal care, skilled delivery, and administration of tetanus toxoide injection during pregnancy.

**Statistical Analysis**

Descriptive and inferential statistics were employed in data analysis. Frist, percentage distributions of children were presented by gender. Second, at the bivariate level, cross-tabulation was done and Pearson's chi-square test was performed to examine relationship between the outcome variables and child's sex. Third, at the multivariate level, Cox proportional hazard models were employed to examine the sex differentials in childhood mortality. Four models were fitted at the third level of analysis. Model 0 is the univariate model which examines relationship between child's sex and under-five mortality, independent of other factors. Model 0 further examines the relationship between the outcome variable and other selected explanatory variables. Model 1 examines the effect of child's sex on under-five mortality, adjusting for the effects of selected background characteristics. Model 2 achieves similar objective, but adjusts for the effects of maternity characteristics. Model 3 is the full model that considered all the selected variables in the analysis.

**Survival Analysis**

Cox proportional regression analysis was employed at the multivariate level. The Cox regression model is useful in analysing survival data. This is because censoring problem usually arises in analysis of survival data due to the fact that not all children are fully exposed to the mortality risk. In social science and medical research, an observation is said to be censored when the outcome of interest has not occured. Cox regression model takes care of the censoring problem and allows for the inclusion of the censored observation. The

technique models time-until-event data as a dependent variable where it can be assumed that the covariates have a multiplying effect on the baseline hazard. Under-five mortality was treated in this paper as the time between birth and death of a child under age five or until the observation is censored.

Using Cox proportional hazards regression analysis, both the occurrence of childhood mortality and the time when the child died were combined to generate the outcome variable. The probability of childhood death is regarded as the hazard. The hazard was modelled using the following equation:

$$H(t) = H_0\,(t)exp.\,(b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_kX_k \quad \text{..... (1)}$$

Where $X_1$ ... $X_k$ are a collection of explanatory variables and $H_0(t)$ is the baseline hazard at time t, representing the hazard for a person with the value 0 for all the explanatory variables. By dividing both sides of equation 1 by $H_0(t)$ and taking logarithms, the equation 1 becomes:

$$\ln(\frac{H(t)}{H_0(t)} = b_1X_1 + b_2X_2 + \ b_3X_3 + \cdots + b_kX_k \quad \text{..... (2)}$$

Where $H(t)/H_0(t)$ is regarded as the hazard ratio. The coefficients $b_i...b_k$ are estimated by Cox regression.

Data were analysed using Stata (version 11.1).

## Results

### Description of study sample

The percentage distribution of single live births and the number of under-five deaths in the 8 selected countries are presented in Table 1. The number of single live births in the five years preceding each survey ranged from 2,860 in Ghana to 27,685 in Nigeria. A higher proportion of deaths was reported among male children across all the countries with Nigeria and Kenya having the highest and lowest proportions respectively.

**Multivariate results**

The results from the simple (univariate) and multiple Cox hazard regressions are presented for each of the selected countries: Cameroon (Table 2), Congo DR (Table 3), Ethiopia (Table 4), Ghana (Table 5), Kenya (Table 6), Nigeria (Table 7), Zambia (Table 8) and Zimbabwe (Table 9). The univariate models showed higher male under-five mortality risks in all the eight countries. Hazard Ratios (HRs) of male vs female mortality risks ranged from 1.04 (CI: 0.89-1.20) in Cameroon to 1.37 (CI: 1.08-1.73) in Zimbabwe. The HRs attained statistical significance only in Ethiopia (HR: 1.36, CI: 1.09-1.68), Nigeria (HR: 1.15, CI: 1.06-1.24), Zambia (HR: 1.29, CI: 1.07-1.56) and Zimbabwe (HR: 1.37, CI: 1.08-1.73). In addition, children of mothers with secondary or higher education had lower risks of death in all countries except Zimbabwe where the risk was 5% higher (HR: 1.05, CI: 0.44-2.50). This education advantage was significant in 3 countries (Cameroon, Nigeria and Congo DR). In the same countries, the effects of wealth index were similar to that of maternal education. Concerning mothers' occupation, children of women in professional/technical/managerial category of occupation had lower risks of dying before age five in all the countries except in Kenya where such children had a 28% higher risks.

The urban advantage for children survival was re-echoed in all countries apart from Zambia. Also, children of women in marital union had lower risks of under-five mortality in 5 of the 8 countries. Religious differentials were also found between Christians versus Muslims and other religions in Nigeria, Congo DR, Cameroon and Ghana. Health care related factors such as antenatal care, skilled delivery attendance, tetanus toxoide injection in pregnancy were protective against under-five mortality.

Model I in Tables 2-9 included gender and also controlled for other socio-economic and demographic characteristics. The results were very similar for most of the countries. Generally, the control variables in Model 1 did not influence the sex-differentials in all the countries as there were virtually no changes in the HRs for males relative to females. Likewise, the lower under-five mortality among children of women with secondary/higher education persisted except in Zimbabwe. For this second set of models, Zambia was the only country where there was a negative association between wealth index and under-five mortality. Unlike other countries, Kenya was the only country where children of mothers who were not working seems to have enjoyed a better survival advantage than other women in different occupations. In four countries (Cameroon, Ethiopia, Zimbabwe and Kenya), mortality risks were higher in urban areas when other demographic varaibles were controlled for. Being in a marital union for a woman also retained its protective effects against death of under-five children except in Ghana where such children have 17% higher risks.

Model II controlled for the possible effects of healthcare related factors on sex differentials in under-five mortality. The results showed that the male-female gap in under-five mortality got widened by varying degrees in some countries (Nigeria, Cameroon and Ethiopia). In contrast, the gap was narrowed in Congo DR, Zambia and Zimbabwe. Further explorations of the roles of the variables in this model (results not shown) revealed that antenatal care is the most implicated in altering the HRs. The direction of effects of these other variables were however largely the same as reported for the univariate models though with reduced magnitude.

In the final model (Model III), all the covariates were entered into the models to see how they influence sex differentials in under-five mortality risks. Inspite of controlling for these variables, higher risks of under-five deaths among males remained significant in Nigeria and Ethiopia. Although, HRs were in exceess of 1.0 in Congo DR, Cameroon, Ghana, Zimbabwe

and Kenya but they were not statistically significant. Zambia stood out as the only country where a substantial proportion of the gender gap was explained by the health care related factors.

**Discussion and Conclusion**

The discourse on sex differences in child survival is yet inconclusive, and previous efforts at identifying the mechanisms responsible for these differences have yielded conflicting findings. Besides, there is scanty current information on the subject, as available studies on sex differentials in under-five mortality are really old (e.g. Basu, 1989, Hill and Upchurch 1995; Muhuri and Preston 1991). Hence, this paper revisits the topic and documented the current pattern of differentials in childhood mortality in sub-Saharan Africa.

Results of the present analysis revealed higher under-five mortality risks for males in all the selected eight countries. This result confirms the biological theory that stresses male disadvantage in early life (Boco, 2010), with excess mortality among male children bringing about the gender gap in childhood mortality in the selected countries. These differences in male-female mortality risks were significant in 4 of the selected eight countries (i.e. Ethiopia, Nigeria, Zambia and Zimbabwe).

The present study thus established higher death rates for males in sub-Saharan Africa. In the absence of the effects of other factors, our findings suggest that the pattern of sex differences in childhood mortality appears to be the same across the four sub-regions in the sub-Saharan Africa. Although, our results showed that the difference in mortality risks between male and female children was not statistically significant in Cameroon, Congo DR, Ghana and Kenya, findings of this study indicate an elevated risk of under-five death for males compared to females in all the countries selected for this study, perhaps due to genetic reasons.

To consider other factors that could influence sex differences in childhood mortality, Mosley-Chen (1984) model (as published by WHO, 2003), and Sastry (1997) framework suggests the mechanism through which sex differences in childhood mortality could be altered to bring about higher mortality of girls relative to boys. As earlier noted, UNFPA (2012) attributed the excess female mortality in parts of Asia to discrimination against female children.

Evidence shows that equitable care for sons and daughters among educated women tend to work to the advantage of their children (Cleland. & Ginneken., 1988; Kravdal, 2004). To examine the extent to which women's socio-economic characteristics (in term of mother's level of education and other characteristics) influence sex differentials in childhood mortality, adjustments were made for the effects of such factors like maternal education, wealth status, maternal occupation, place of residence, religion and maternal age. The selected mother's characteristics appear not to play significant roles in sex differences in childhood mortality in the selected countries. Although, our findings suggest that maternal education and other socio-economic characteristics appear to significantly influence childhood mortality itself, sex differences in childhood mortality were not influenced by these factors. Plausible explanation for this is that, although differences exist between survival chances of children of women with different socio-economic characteristics, the socio-economic position of the mothers does not affect the two sexes differentially. This suggests there was no evidence of discrimination against a particular sex between the members of the same household, perhaps with respect to intra-household distribution of food and resources.

However, after adjustments were made for the effects of healthcare related factors on sex differences in childhood mortality, the male-female differentials in under-five mortality became more pronounced in Cameroon, Ethiopia and Nigeria, while the gender gap in childhood mortality between the two sexes became narrowed in Congo DR, Ghana and Zambia. These results suggest that the two sexes are treated differentially; with respect to

benefits from healthcare related factors such as hospital delivery and antenatal visit. Since improvement in medical technology now enables the would-be parents to know the sex of their child, evidence from Congo DR, Ghana and Zambian data suggests that males and females are treated differentially regarding healthcare services utilization for children before and after birth. Hence, the protective advantage offered by healthcare factors seems to be to the benefit of male children in these countries. This finding suggests that sex discrimination in childcare in favour of boys may be a key factor in these countries.

Though the gender gap in child survival appears to vary from one country to the other, findings of this study established that childhood mortality risks are generally higher for males than for females in the sub-Saharan Africa. Findings of this study suggest that elimination of discrimination against girl child is likely to lead to further reduction in childhood mortality. Further research is needed to better understand the mechanisms responsible for differences in childhood mortality in the sub-Saharan Africa.

**Limitations and strengths of the study**

This study has some limitations. First, the study involved analysis of secondary datasets; hence the major limitation of the study is the non-availability of important factors (such as feeding practice, childcare practice, hygienic practice and others) in the DHS datasets. Further studies on sex differences in child survival are needed in the region. Second, reporting bias may likely vary between the two sexes and this might slightly influence the results of this study. Thirdly, due to the cross-sectional nature of the DHS data, a cause-effect relationship could not be established in this paper. This paper also has its strengths. The major strength of the paper lies in the fact that international comparisons of results are possible because the DHS surveys adopt similar methodology and instruments across

countries. Similarly, DHS data are nationally representative and generalization of findings is possible.

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**Table 1**: Percentage distribution of single live births and under-five deaths in selected SSA countries according to gender

| **Country** | **Total** | **Male** | | | **Female** | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Births** | **Deaths** | **% deaths** | **Births** | **Deaths** | **% deaths** | **$X^2$** | **p-value*** |
| Nigeria | 27685 | 14115 | 1611 | 11.4 | 13570 | 1332 | 9.8 | 18.59 | 0.000 |
| Congo DR | 8702 | 4338 | 473 | 10.9 | 4364 | 437 | 10.0 | 1.84 | 0.175 |
| Cameroun | 11191 | 5537 | 457 | 8.3 | 5654 | 422 | 7.5 | 2.41 | 0.120 |
| Ethiopia | 11301 | 5809 | 419 | 7.2 | 5492 | 328 | 5.9 | 7.04 | 0.008 |
| Ghana | 2860 | 1456 | 94 | 6.5 | 1404 | 81 | 5.8 | 0.587 | 0.444 |
| Zambia | 6134 | 3047 | 276 | 9.1 | 3087 | 217 | 7.0 | 8.54 | 0.003 |
| Zimbabwe | 5419 | 2748 | 184 | 6.7 | 2671 | 142 | 5.3 | 4.56 | 0.033 |
| Kenya | 5895 | 3041 | 191 | 6.3 | 2854 | 143 | 5.0 | 4.45 | 0.035 |

% death - percentage of total single live births who died before age 5 years

* comparing the proportion of deaths between males and females

Table 2: Effects of selected factors on sex differentials in under-five mortality, Cameroon, 2011

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.04 | 0.89-1.20 | 1.04 | 0.90-1.21 | 1.16 | 0.92-1.45 | 1.15 | 0.92-1.45 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 0.64 | 0.55-0.77* | 0.76 | 0.62-0.92* | | | 0.73 | 0.53-1.01 |
| Secondary and higher | 0.43 | 0.36-0.53* | 0.61 | 0.46-0.79* | | | 0.54 | 0.35-0.82 |
| **Wealth index** | | | | | | | | |
| Low | 1.92 | 1.61-2.30* | 1.55 | 1.16-2.08* | | | 1.62 | 1.01-2.57 |
| Medium | 1.32 | 1.05-1.66* | 1.16 | 0.90-1.50 | | | 1.31 | 0.90-1.89 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.70 | 0.43-1.16 | 1.15 | 0.68-1.94 | | | 1.20 | 0.64-2.27 |
| Sales/Business | 0.92 | 0.74-1.16 | 1.02 | 0.81-1.28 | | | 0.99 | 0.69-1.42 |
| Agric employee | 1.24 | 1.02-1.50* | 1.17 | 0.95-1.44 | | | 1.12 | 0.81-1.55 |
| Manual/ Artisan | 0.88 | 0.68-1.16 | 0.99 | 0.76-1.31 | | | 1.10 | 0.75-1.62 |
| **Urban residence** | 0.66 | 0.57-0.78* | 1.14 | 0.90-1.45 | | | 1.38 | 0.95-1.99 |
| **Marital status** | | | | | | | | |
| Currently in union | 1.11 | 0.89-1.40 | 0.90 | 0.71-1.14 | | | 0.71 | 0.52-0.95* |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | 1.58 | 1.34-1.86* | 1.31 | 1.08-1.59* | | | 1.16 | 0.86-1.56 |
| Others | 1.12 | 0.86-1.46 | 0.93 | 0.71-1.22 | | | 0.87 | 0.54-1.38 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.60 | 0.45-0.80* | | | 0.77 | 0.51-1.15 | 1.01 | 0.64-1.59 |
| Skilled delivery | 0.30 | 0.24-0.39* | | | 0.51 | 0.27-0.97* | 0.62 | 0.34-1.10 |
| TT injection in pregnancy | 0.69 | 0.54-0.90* | | | 0.95 | 0.67-1.36 | 0.94 | 0.65-1.35 |
| Facility vs home delivery | 1.02 | 1.01-1.02 | | | 1.02 | 1.01-1.03* | 1.02 | 1.02-1.03* |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.31 | 1.02-1.70* | | | 1.60 | 1.11-2.32* | 1.45 | 0.99-2.11 |
| 18 - 35 years | | | | | 1.00 | | 1.00 | |
| 36 years and above | 0.94 | 0.73-1.20 | | | 1.10 | 0.79-1.52 | 1.04 | 0.75-1.45 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 3: Effects of selected factors on sex differentials in under-five mortality, Congo DR, 2010-2011

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.21 | 1.00-1.46 | 1.22 | 1.01-1.48* | 1.09 | 0.81-1.48 | 1.10 | 0.82-1.49 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 0.78 | 0.62-0.98* | 0.82 | 0.65-1.03 | | | 0.86 | 0.58-1.29 |
| Secondary and higher | 0.52 | 0.40-0.66* | 0.57 | 0.43-0.76* | | | 0.71 | 0.44-1.15 |
| **Wealth index** | | | | | | | | |
| Low | 1.47 | 1.20-1.81* | 1.10 | 0.83-1.47 | | | 0.93 | 0.56-1.53 |
| Medium | 1.13 | 0.87-1.48 | 0.91 | 0.67-1.25 | | | 0.77 | 0.46-1.29 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.69 | 0.54-0.89 | 0.93 | 0.50-1.73 | | | 0.79 | 0.34-1.84 |
| Sales/Business | - | | - | | | | - | |
| Agric employee | - | | - | | | | - | |
| Manual/ Artisan | 0.91 | 0.57-1.45 | 1.23 | 0.55-2.73 | | | 1.14 | 0.36-3.57 |
| **Urban residence** | 0.72 | 0.59-0.88* | 0.96 | 0.73-1.25 | | | 0.93 | 0.61-1.44 |
| **Marital status** | | | | | | | | |
| Currently married | 0.75 | 0.56-1.02 | 0.73 | 0.54-0.99* | | | 0.63 | 0.42-0.94* |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | - | | - | | | | - | |
| Others | 0.73 | 0.58-0.92* | 0.88 | 0.46-1.67 | | | 1.20 | 0.48-2.99 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.74 | 0.49-1.11 | | | 0.98 | 0.56-1.69 | 1.02 | 0.59-1.79 |
| Skilled delivery | 0.79 | 0.40-1.59 | | | 1.17 | 0.36-3.81 | 1.20 | 0.37-3.91 |
| TT injection in pregnancy | 0.63 | 0.52-0.77* | | | 1.00 | 0.69-1.44 | 1.02 | 0.71-1.46 |
| Facility vs home delivery | 0.61 | 0.50-0.76* | | | 0.57 | 0.38-0.84* | 0.60 | 0.40-0.90* |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 0.85 | 0.56-1.28 | | | 0.40 | 0.19-0.84* | 0.36 | 0.17-0.77* |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.03 | 0.78-1.37 | | | 1.29 | 0.89-1.89 | 1.28 | 0.87-1.88 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 4: Effects of selected factors on sex differentials in under-five mortality, Ethiopia, 2011

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.36 | 1.09-1.68* | 1.37 | 1.10-1.70* | 1.74 | 1.27-2.40* | 1.80 | 1.30-2.50* |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 0.89 | 0.70-1.14 | 0.98 | 0.76-1.27 | | | 1.20 | 0.83-1.73 |
| Secondary and higher | 0.41 | 0.16-1.03 | 0.43 | 0.13-1.38 | | | 0.40 | 0.09-1.77 |
| **Wealth index** | | | | | | | | |
| Low | 1.54 | 1.20-1.99* | 1.54 | 1.14-2.09* | | | 1.39 | 0.89-2.18 |
| Medium | 1.25 | 0.91-1.73 | 1.26 | 0.87-1.80 | | | 0.96 | 0.56-1.66 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.72 | 0.28-1.86 | 1.42 | 0.44-4.64 | | | 2.08 | 0.63-6.93 |
| Sales/Business | 0.83 | 0.60-1.14 | 0.87 | 0.63-1.20 | | | 0.68 | 0.40-1.17 |
| Agric employee | 1.15 | 0.90-1.47 | 1.13 | 0.87-1.46 | | | 1.40 | 0.96-2.05 |
| Manual/ Artisan | 1.07 | 0.69-1.65 | 1.13 | 0.73-1.75 | | | 1.13 | 0.62-2.06 |
| **Urban residence** | 0.82 | 0.58-1.16 | 1.25 | 0.84-1.86 | | | 1.40 | 0.79-2.45 |
| **Marital status** | | | | | | | | |
| Currently in union | 1.03 | 0.69-1.55 | 0.99 | 0.66-1.50 | | | 0.79 | 0.49-1.28 |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | 1.09 | 0.87-1.36 | 1.10 | 0.87-1.38 | | | 1.18 | 0.82-1.68 |
| Others | 0.70 | 0.23-2.13 | 0.61 | 0.20-1.84 | | | 1.13 | 0.35-3.70 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.92 | 0.67-1.26 | | | 1.00 | 0.73-1.38 | 1.05 | 0.75-1.48 |
| Skilled delivery | 0.85 | 0.53-1.36 | | | 0.89 | 0.41-1.95 | 0.87 | 0.42-1.82 |
| TT injection in pregnancy | 0.86 | 0.63-1.18 | | | 0.90 | 0.66-1.24 | 0.91 | 0.66-1.25 |
| Facility vs home delivery | 1.02 | 1.01-1.03 | | | 1.02 | 0.99-1.03 | 1.01 | 0.99-1.03 |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.60 | 1.07-2.39* | | | 1.73 | 0.87-3.42 | 1.60 | 0.80-3.19 |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.20 | 0.89-1.62 | | | 1.57 | 1.07-2.31* | 1.49 | 0.99-2.22 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 5: Effects of selected factors on sex differentials in under-five mortality, Ghana, 2008

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.17 | 0.85-1.63 | 1.15 | 0.83-1.58 | 1.19 | 0.73-1.94 | 1.15 | 0.71-1.86 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 1.02 | 0.69-1.53 | 1.04 | 0.69-1.56 | | | 1.25 | 0.65-2.40 |
| Secondary and higher | 0.70 | 0.48-1.03 | 0.74 | 0.47-1.17 | | | 0.64 | 0.32-1.29 |
| **Wealth index** | | | | | | | | |
| Low | 0.94 | 0.64-1.37 | 0.61 | 0.33-1.13 | | | 0.43 | 0.18-1.06 |
| Medium | 1.43 | 0.91-2.26 | 1.28 | 0.78-2.11 | | | 1.03 | 0.51-2.11 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.52 | 0.24-1.09 | 0.58 | 0.27-1.23 | | | 0.53 | 0.19-1.49 |
| Sales/Business | 0.78 | 0.46-1.34 | 0.74 | 0.43-1.27 | | | 0.57 | 0.27-1.18 |
| Agric employee | 0.80 | 0.47-1.36 | 0.82 | 0.46-1.46 | | | 0.56 | 0.23-1.34 |
| Manual/ Artisan | 0.59 | 0.27-1.26 | 0.58 | 0.27-1.23 | | | 0.63 | 0.23-1.72 |
| **Urban residence** | 0.99 | 0.71-1.40 | 0.88 | 0.54-1.43 | | | 0.63 | 0.32-1.25 |
| **Marital status** | | | | | | | | |
| Currently in union | 1.21 | 0.68-2.15 | 1.17 | 0.65-2.10 | | | 1.19 | 0.55-2.58 |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | 1.45 | 0.98-2.15 | 1.37 | 0.91-2.06 | | | 1.1 | 0.55-2.18 |
| Others | 1.80 | 1.18-2.74* | 1.87 | 1.20-2.91* | | | 2.11 | 1.06-4.23* |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.67 | 0.23-2.01 | | | 0.81 | 0.18-3.65 | 0.83 | 0.17-4.05 |
| Skilled delivery | 1.17 | 0.44-3.10 | | | 0.81 | 0.22-2.90 | 0.93 | 0.24-3.56 |
| TT injection in pregnancy | 1.06 | 0.50-2.28 | | | 1.24 | 0.49-3.19 | 1.35 | 0.51-3.58 |
| Facility vs home delivery | 0.97 | 0.70-1.35 | | | 1.45 | 0.83-2.52 | 1.48 | 0.72-3.04 |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.79 | 0.86-3.74 | | | 0.47 | 0.06-3.41 | 0.48 | 0.06-3.41 |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.61 | 1.08-2.40* | | | 2.10 | 1.23-3.61* | 2.07 | 1.17-3.66* |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 6: Effects of selected factors on sex differentials in under-five mortality, Kenya, 2008.

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.30 | 0.98-1.72 | 1.31 | 0.99-1.73 | 1.32 | 0.88-1.97 | 1.32 | 0.88-1.98 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 1.03 | 0.72-1.49 | 0.85 | 0.57-1.26 | | | 0.90 | 0.47-1.70 |
| Secondary and higher | 0.78 | 0.49-1.23 | 0.67 | 0.41-1.10 | | | 0.80 | 0.37-1.75 |
| **Wealth index** | | | | | | | | |
| Low | 1.24 | 0.91-1.71 | 1.24 | 0.85-1.82 | | | 1.14 | 0.63-2.04 |
| Medium | 1.42 | 0.96-2.08 | 1.38 | 0.90-2.11 | | | 1.88 | 1.04-3.39* |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 1.28 | 0.87-1.88 | 1.37 | 0.93-2.01 | | | 1.77 | 1.06-2.94* |
| Sales/Business | 1.55 | 0.93-2.57 | 1.54 | 0.92-2.56 | | | 2.11 | 1.01-4.43* |
| Agric employee | 1.40 | 0.98-1.98 | 1.33 | 0.93-1.91 | | | 1.20 | 0.68-2.11 |
| Manual/ Artisan | 1.50 | 0.94-2.41 | 1.44 | 0.89-2.33 | | | 1.69 | 0.86-3.32 |
| **Urban residence** | 0.85 | 0.59-1.21 | 1.10 | 0.72-1.70 | | | 0.94 | 0.50-1.75 |
| **Marital status** | | | | | | | | |
| Currently in union | 0.79 | 0.56-1.12 | 0.81 | 0.56-1.15 | | | 0.84 | 0.51-1.41 |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | 0.77 | 0.54-1.10 | 0.75 | 0.48-1.15 | | | 0.47 | 0.25-0.91* |
| Other religions | 0.59 | 0.27-1.30 | 0.50 | 0.23-1.08 | | | 0.55 | 0.17-1.73 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.63 | 0.31-1.29 | | | 0.91 | 0.36-2.27 | 0.89 | 0.34-2.32 |
| Skilled delivery | 0.67 | 0.42-1.06 | | | 0.76 | 0.39-1.51 | 0.79 | 0.39-1.56 |
| TT injection in pregnancy | 0.64 | 0.36-1.14 | | | 0.77 | 0.36-1.66 | 0.78 | 0.36-1.70 |
| Facility vs home delivery | 1.03 | 1.02-1.03* | | | 1.03 | 1.02-1.04* | 1.04 | 1.022-1.05* |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.44 | 0.78-2.63 | | | 0.89 | 0.36-2.18 | 0.90 | 0.34-2.37 |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.58 | 1.05-2.38* | | | 1.73 | 1.05-2.86* | 1.63 | 0.96-2.77 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 7: Effects of selected factors on sex differentials in under-five mortality, Nigeria, 2008

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.15 | 1.06-1.24* | 1.15 | 1.06-1.24* | 1.19 | 1.05-1.35* | 1.19 | 1.05-1.35* |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | | | | | | |
| Primary | 0.82 | 0.75-0.90* | 0.93 | 0.83-1.04 | | | 0.87 | 0.72-1.05 |
| Secondary and higher | 0.62 | 0.56-0.69* | 0.84 | 0.73-0.96* | | | 0.90 | 0.72-1.12 |
| **Wealth index** | | | | | | | | |
| Low | 1.72 | 1.56-1.90* | 1.37 | 1.20-1.57* | | | 1.22 | 0.97-1.54 |
| Medium | 1.48 | 1.31-1.67* | 1.28 | 1.12-1.47* | | | 1.29 | 1.03-1.61* |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.72 | 0.60-0.87* | 1.00 | 0.82-1.22 | | | 1.05 | 0.78-1.41 |
| Sales/Business | 0.95 | 0.86-1.05 | 1.03 | 0.94-1.14 | | | 0.97 | 0.83-1.14 |
| Agric employee | 0.99 | 0.89-1.11 | 0.95 | 0.84-1.07 | | | 0.84 | 0.69-1.02 |
| Manual/ Artisan | 1.06 | 0.93-1.21 | 1.13 | 0.99-1.28 | | | 1.06 | 0.85-1.32 |
| **Urban residence** | 0.64 | 0.58-0.71* | 0.80 | 0.71-0.90* | | | 0.74 | 0.61-0.90* |
| **Marital status** | | | | | | | | |
| Currently married | 0.82 | 0.69-0.97* | 0.75 | 0.63-0.89* | | | 0.64 | 0.51-0.82 |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Christianity | 1.00 | | 1.00 | | | | 1.00 | |
| Islam | 1.29 | 1.19-1.39* | 1.06 | 0.95-1.17 | | | 1.02 | 0.87-1.21 |
| Others | 1.10 | 0.84-1.44 | 0.92 | 0.70-1.20 | | | 1.12 | 0.73-1.70 |
| ***Health-related factors*** | | | | | | | | |
| Antenatal care | 0.70 | 0.62-0.79* | | | 0.77 | 0.63-0.95* | 0.84 | 0.68-1.03 |
| Skilled delivery | 0.80 | 0.73-0.88* | | | 1.07 | 0.91-1.26 | 1.12 | 0.94-1.32 |
| TT injection in pregnancy | 0.73 | 0.65-0.83* | | | 0.95 | 0.77-1.16 | 1.02 | 0.82-1.25 |
| Facility vs home delivery | 0.69 | 0.63-0.75 | | | 0.89 | 0.75-1.06 | 1.03 | 0.86-1.25 |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.49 | 1.30-1.71 | | | 1.16 | 0.87-1.53 | 1.07 | 0.80-1.42 |
| 18 - 35 years | 1.00 | | | | | | 1.00 | |
| 36 years and above | 1.18 | 1.06-1.31 | | | 1.34 | 1.16-1.56* | 1.35 | 1.15-1.57* |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 8: Effects of selected factors on sex differentials in under-five mortality, Zambia, 2007

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.29 | 1.07-1.56* | 1.28 | 1.06-1.55* | 1.03 | 0.78-1.37 | 1.04 | 0.78-1.38 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 1.05 | 0.79-1.40 | 0.99 | 0.74-1.32 | | | 0.97 | 0.61-1.53 |
| Secondary and higher | 0.99 | 0.71-1.38 | 0.85 | 0.60-1.20 | | | 1.04 | 0.63-1.74 |
| **Wealth index** | | | | | | | | |
| Low | 0.82 | 0.66-1.02 | 0.83 | 0.60-1.14 | | | 0.78 | 0.47-1.29 |
| Medium | 0.85 | 0.66-1.10 | 0.86 | 0.64-1.18 | | | 0.96 | 0.59-1.55 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.79 | 0.45-1.41 | 0.74 | 0.41-1.32 | | | 0.58 | 0.26-1.29 |
| Sales/Business | 0.98 | 0.75-1.30 | 0.92 | 0.69-1.22 | | | 1.08 | 0.73-1.61 |
| Agric employee | 0.93 | 0.75-1.16 | 1.01 | 0.81-1.28 | | | 1.08 | 0.75-1.56 |
| Manual/ Artisan | 1.37 | 0.88-2.12 | 1.37 | 0.88-2.12 | | | 2.10 | 1.19-3.69* |
| **Urban residence** | 1.21 | 0.99-1.48 | 1.12 | 0.82-1.54 | | | 1.14 | 0.71-1.84 |
| **Marital status** | | | | | | | | |
| Currently in union | 0.86 | 0.68-1.11 | 0.86 | 0.67-1.10 | | | 0.88 | 0.61-1.26 |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Catholic | 1.00 | | 1.00 | | | | 1.00 | |
| Protestant | 1.14 | 0.89-1.46 | 1.16 | 0.90-1.49 | | | 1.24 | 0.85-1.81 |
| Other religions | 1.01 | 0.50-2.05 | 1.01 | 0.50-2.05 | | | 1.33 | 0.44-4.00 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.92 | 0.32-2.65 | | | 0.59 | 0.18-1.93 | 0.63 | 0.19-2.08 |
| Skilled delivery | 1.37 | 0.83-2.25 | | | 1.30 | 0.60-2.81 | 1.31 | 0.60-2.87 |
| TT injection in pregnancy | 1.37 | 0.94-2.02 | | | 1.46 | 0.94-2.29 | 1.45 | 0.93-2.27 |
| Facility vs home delivery | 1.10 | 0.91-1.34 | | | 1.37 | 1.02-1.84* | 1.18 | 0.82-1.68 |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.90 | 1.37-2.64* | | | 1.37 | 0.79-2.36 | 1.34 | 0.74-2.44 |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.07 | 0.80-1.45 | | | 1.48 | 0.99-2.20 | 1.49 | 1.00-2.21 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics

Table 9: Effects of selected factors on sex differentials in under-five mortality, Zimbabwe, 2010-2011.

| **Characteristics** | **Univariate model** | | **Model I[a]** | | **Model II[b]** | | **Model III[c]** | |
|---|---|---|---|---|---|---|---|---|
| | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** | **HR** | **95% CI** |
| Male vs female gender | 1.37 | 1.08-1.73* | 1.36 | 1.07-1.72* | 1.30 | 0.94-1.80 | 1.30 | 0.94-1.79 |
| **Maternal Edu** | | | | | | | | |
| None | 1.00 | | 1.00 | | | | 1.00 | |
| Primary | 1.23 | 0.51-2.97 | 1.23 | 0.51-2.98 | | | 1.41 | 0.42-4.69 |
| Secondary and higher | 1.05 | 0.44-2.50 | 1.16 | 0.48-2.81 | | | 1.18 | 0.35-4.00 |
| **Wealth index** | | | | | | | | |
| Low | 1.27 | 0.97-1.66 | 1.21 | 0.78-1.89 | | | 1.10 | 0.58-2.09 |
| Medium | 1.26 | 0.90-1.76 | 1.24 | 0.81-1.90 | | | 1.03 | 0.55-1.93 |
| High | 1.00 | | 1.00 | | | | 1.00 | |
| **Maternal occupation** | | | | | | | | |
| Not working | 1.00 | | 1.00 | | | | 1.00 | |
| Professional | 0.19 | 0.05-0.58* | 0.24 | 0.07-0.85* | | | 0.24 | 0.05-1.23 |
| Sales/Business | 1.10 | 0.81-1.51 | 1.12 | 0.82-1.54 | | | 1.23 | 0.80-1.87 |
| Agric employee | 0.82 | 0.55-1.22 | 0.78 | 0.52-1.17 | | | 1.08 | 0.65-1.80 |
| Manual/ Artisan | 0.96 | 0.65-1.41 | 0.94 | 0.64-1.38 | | | 1.07 | 0.64-1.78 |
| **Urban residence** | 0.90 | 0.69-1.18 | 1.10 | 0.73-1.68 | | | | |
| **Marital status** | | | | | | | 1.18 | 0.65-3.13 |
| Currently in union | 0.75 | 0.55-1.02 | 0.72 | 0.53-0.98* | | | 0.58 | 0.39-0.85* |
| Not currently married | 1.00 | | 1.00 | | | | 1.00 | |
| **Religion**: Apostolic Sect | 1.00 | | 1.00 | | | | 1.00 | |
| Other christians | 0.69 | 0.54-0.88* | 0.73 | 0.56-0.94* | | | 0.82 | 0.58-1.16 |
| Other religions | 0.92 | 0.59-1.43 | 0.92 | 0.59-1.45 | | | 1.01 | 0.54-1.89 |
| ***Maternity Characteristics*** | | | | | | | | |
| Antenatal care | 0.43 | 0.29-0.66* | | | 0.56 | 0.34-0.94* | 0.60 | 0.36-1.02 |
| Skilled delivery | 0.86 | 0.45-1.65 | | | 0.73 | 0.35-1.55 | 0.77 | 0.37-1.62 |
| TT injection in pregnancy | 0.55 | 0.38-0.78* | | | 0.73 | 0.47-1.12 | 0.75 | 0.48-1.17 |
| Facility vs home delivery | 0.99 | 0.97-1.00 | | | 0.98 | 0.96 - 1.01 | 0.98 | 0.96-1.01 |
| **Maternal age at childbirth** | | | | | | | | |
| < 18 years | 1.43 | 0.91-2.26 | | | 1.33 | 0.65-2.72 | 1.20 | 0.58-2.46 |
| 18 - 35 years | 1.00 | | | | 1.00 | | 1.00 | |
| 36 years and above | 1.10 | 0.73-1.68 | | | 1.41 | 0.86-2.30 | 1.43 | 0.87-2.35 |

HR: Hazard Ratio, CI: Confidence Interval; * p<0.05

[a] : gender+ background characteristics; [b]: gender + maternal characteristics;

[c]: gender+background + maternal characteristics