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Determinants of Infant Mortality in Rural Kenya

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Abstract

Findings of 2008/09 Kenya Demographic and Health Survey reveal that one in every 19 live births dies before age one. The most striking observation is the reversal in infant mortality based on type of place of residence. The report indicates that, unlike what preceding surveys reported, infant mortality is high in urban than in rural Kenya. This study used Cox regression analysis to examine the determinants of infant mortality in rural Kenya. Analytical results show that region, maternal age, birth order/preceding birth interval, and source of drinking water are significantly related to post-neonatal mortality in rural Kenya. Further, occupation of the mother, region, birth order/preceding birth interval, and source of drinking water were found to be significantly related to infant mortality in rural Kenya. Unlike in the case of post-neonatal mortality where births in Nyanza were found to be 154 percent more likely to die relative to those in Central, the study found Nyanza residence not to be significantly related to infant mortality. The study findings indicate that health policy initiatives meant to kindle family planning methods that shall result in increased birth spacing and reduced higher order births are welcome in the quest to reduce infant mortality further. Seemingly, maternal education is losing grip on early childhood mortality. Future research should focus on bringing out an understanding of the role of maternal education on infant mortality.
Key words: post-neonate, infant, mortality, rural Kenya

1.0 Introduction

Infant mortality level is a measure of how well a society meets the needs of its people especially newborns, infants and pregnant women (Omedi, 2011). This level of death, before the infants celebrate their first birthday per 1,000 live births, varies from time to time based on changes in the socioeconomic, geographic, biologic, demographic, cultural and environmental factors. These are some of the factors known to influence the infant mortality (Mosley & Chen, 1984). Differences in levels of infant mortality are known to vary with race, ethnic background, parental education especially maternal education, regions, maternal age and place of residence among other factors. Various studies have emphasized the urban advantage on infant mortality compared to rural areas. In Kenya, for example, this has been the case for many years. However, contrary to previous studies and surveys, KNBS & ICF Macro (2010) reported high infant mortality in urban than rural areas. Of Kenya's 52 infant deaths for every 1,000 live births, the survey noted that infant mortality rate was 9 percent higher in urban than rural areas. Moreover, unlike the urban infant mortality that has seemingly stalled, infant mortality in rural areas dropped by 27 percent from 79 infant deaths per 1,000 live births in the 2003 KDHS to 58 infant deaths per 1,000 live births in the 2008/09 KDHS. This is at the backdrop of the notion that children growing up in rural settings within developing countries are most likely to experience poor health, a pattern generally attributed to socioeconomic disadvantage, poor health infrastructure and, as reported by Fox and Heaton (2012), the prevalence of certain reproductive norms, such as early maternal age at childbirth and short birth spacing. Therefore, this study sought to examine the determinants of infant mortality in rural Kenya so as to establish their effect on the survival status of infants in these areas.

Since information on mortality remain essential for planning and research, it is critical to further our understanding in this subject area for improved provision of services, health planning and population projection. For the purpose of deeper understanding of the determinants of infant mortality, the investigation was expanded to include both post-neonatal and infant mortality. The central question was whether the determinants are the same for these different levels of early childhood mortality. Post-neonatal mortality included deaths between 28 days and less than one year of life while infant mortality included all deaths between 0 days and less than one year of life.

1.1 Literature Review

Studies on the determinants of infant survival status have reported lower infant mortality among mothers with some education than their counterparts with no education (Kibet, 2010; Mustafa & Odimegwu, 2008; Gubhaju, 1987). Educated mothers are well aware of maternal and child health services and are able to make use of them when they are needed. They are also known to make independent decisions as pertain to their children which could contribute significantly towards their survival. Suwal (2001) explained that such mothers have improved child-care skills and more self-confidence, are more likely to marry late, take up well-paying jobs, to break traditional norms and practices that adversely affect the health and welfare of their children, and to be more exposed to media and other information with favourable impact on infant survival status. Economists, on their part, view maternal education to operate through the allocation of material time to market and non-market activities. By enhancing women's potential returns from work, increased education can stimulate labour force participation. In return, the working mother has less time to devote to child care although she increases the economic resources of the family which might favourably impact on infant and child health.

According to Case et al. (2002), children from lower income households with chronic conditions have worst health than those from higher income households. Fotso et al. (2007) reported that the poor have almost three times more children than the rich, three times less likely to use contraception and three times more likely to have unmet need for family planning. Such poor reproductive health outcomes could further worsen infant and child health outcomes among the poor. Their findings suggest that the high fertility of the poor may be largely unplanned or unwanted. With growing poverty and growing poor-rich fertility gap, greater proportions of children are increasingly born to poor families (Brockerhoff & Brennan, 1998) yet the relationship between fertility and mortality is well known.

Regional variations in childhood mortality have been strongly depicted in Central, Coast and Nyanza provinces by various studies in Kenya. Possible arguments for high childhood mortality in the Coast and Nyanza regions are the facts that the latter two areas are malaria-endemic, including significantly high poverty levels. Often also, the effects of HIV on infant survival which often has two-way pathway have been highlighted. The death or frequent illness of the mother, a child's primary caregiver, unexplained trauma and the depletion of household resources in search of medication elevates the risk of infant and child death. Second, perinatal transmission in which a mother passes the virus to the child during pregnancy, delivery or breastfeeding leaves the child with a weak immune system, making the body susceptible to, and unable to recover from other opportunistic diseases that lead to death. KNBS & ICF Macro (2010) reported that, out of the overall 6.3 percent HIV prevalence rate among the Kenyan adults, Nyanza province had a high of 13.9 percent.

Regarding age of the mother at the birth of her baby, the risk of dying is high among the younger and older mothers. Children born to very young mothers tend to exhibit high mortality risks because of the physiological immaturity combined with the social and psychological stress that accompanies it. High mortality risk in older ages is due to depletion associated with pregnancy complications and repeated child births.

The risk of death is known to be higher for first order births, decreases for second and third order births, and rises gradually thereafter (Gyimah, 2002). Kibet (2010) found markedly high infant mortality for first order births and higher order births. He concluded that the higher risk of dying among first order births is due to the (younger) age of the mother, birth complications, and the inexperience of the mother in looking after the infant. He further noted that the total number of children in a household is likely to limit the attention that would be granted each child, especially when they are sick. Koenig et al. (1990) concluded that high order births increased infant mortality for two reasons: physiologically, because women who have had many pregnancies are more likely to be physically depleted, and behavioural, particularly where birth spacing is shorter, due to constraints on household resources.

Sufficient birth spacing is beneficial for the health and wellbeing of both the mother and her child. Becher et al. (2004) found that educating a family on the importance of sufficient birth spacing would have a large impact in reducing childhood mortality in the still highly fertile populations of Africa. Rural Kenya lies in this category with a total fertility rate of 5.2 births per woman, while wanted fertility rated stands at 3.7 (KNBS & ICF Macro, 2010). According to this KDHS, the gap between wanted and observed fertility was greatest among poor women, residents of Western province and those with less than secondary educational qualifications. Becher et al. (2004) found a 50 percent increased risk of death for a child if the next sibling was born within 18 months.

Household environmental conditions reflect the level of environmental contamination which determines the transmission of infectious agents to children (Mosley & Chen, 1984). The source of water measures the level of water contamination while the type of toilet facility measures faecal contamination. It is estimated that almost half of the people in developing countries have one of the main diseases related to inadequate water supply and sanitation, and that about 90 percent of diarrhoeal diseases- the second leading cause of death among children aged below five years- is attributed to unsafe drinking water, inadequate sanitation and poor hygiene (Mohan, 2005; Wagstaff & Bustreo, 2004).

2.0 Methodology

The data used in analysis was obtained from 2008/09 KDHS child file and analysed using the Statistical Package for Social Sciences for windows version 13.0. The study sample was based on 4,612 live births out of which 112 died in post-neonatal and 249 died in infant stages in the five- year period that preceded the survey.

The study employed survival analysis, basically Cox regression analysis, to examine the risk of death in infancy stages, measured as the duration of survival since birth in months. The analysis offers several regression models for estimating the relationship of continuous variables to survival times. Further, Cox's proportional hazards model accounts for censoring in the estimation of exposure time since it allows for the incorporation of both the censored and uncensored survival cases in the data set. Censored observations arise whenever the dependent variable of interest represents the time to a terminal event, and the duration of the study is limited in time. Thus, the infants who were still alive by the time of survey represent the censored events with those who were dead representing the uncensored events.

Cox's proportional hazards regression model is given by:

$h(t) = h_0(t)* exp\ (\beta_1 x_1 + ... + \beta_n x_n)$ where: h(t) is the hazard rate; $h_0(t)$ is the baseline hazard; and $\beta_1....\beta_n$ are the associated coefficients for the respective cases $(x_{1....}x_n)$

When we divide both sides of the above equation by $h_0(t)$ and take natural logarithms of both sides, we obtain:

$ln\{h(t)/h_0(t)\}= \beta_1 x_1 + ... + \beta_n x_n$ where: $h(t)/h_0(t)$ is the hazard ratio

The regression coefficient indicates the relative effect of the covariate on the hazard function. A positive coefficient, in this study, indicated a greater probability of the risk of infant death and a negative coefficient indicated a lesser risk of infant death. The hazard function makes it easy to calculate the relative risk of certain groups in relation to the reference categories by the exponentiation of the coefficient so as to obtain the odds ratio. Since the relative risk for the reference category is one, odds ratios greater than one indicate a greater relative risk of dying for the specified group with respect to the reference group whereas odds ratios less than one indicate a lesser risk.

The analysis entailed estimation of four models. Model I looked at the relationships of post-neonatal mortality and infant mortality with socioeconomic and geographic factors; Model II looked at the relationships post-neonatal mortality and infant mortality with socioeconomic, bio-demographic and household environmental factors; Model III considered the same relationships with regard to geographic and bio-demographic factors; while Model IV incorporated all the variables so as to estimate the independent effect of each variable when other variables were controlled for. The results brought out a clear picture of the significant variables in the discussion of rural post-neonatal and infant mortality in Kenya.

3.0 Findings of the Study

3.1 Characteristics of the Study Population

Descriptive analysis was done to bring out the distribution of post-neonate and infant deaths based on the study variables. Socioeconomically, majority of deaths occurred to women who had primary educational qualifications, who were working in non-agricultural sectors and in low wealth quintile households. On the geographical perspective, Nyanza recorded majority of post-neonate and infant deaths, while Coast and Western regions had similar proportions of infants dying in the five year period that preceded the survey. Bio-demographically, mothers aged 20-34 reported majority of deaths with teenagers reporting the least number of deaths. This can be a reflection of the a few teens in marriages as majority of them are still in schools at such ages. A high proportion of deaths were of order four and above and of at least two years' preceding birth intervals. Based on household environmental factors, households with a toilet facility present and which use surface water experienced majority of deaths.

Table 3.1.1 Distribution of post-neonate and infant deaths based on selected covariates

Variable name	Post-neonate		Infant	
Level of education of the mother	(n=112)	Percent	(n=249)	Percent
Secondary and higher	16	14.29	39	15.66
None	23	20.54	59	23.69
Primary	73	65.18	151	60.64
Occupation of the mother				
Agriculture	35	31.25	81	32.53
Not working	37	33.04	84	33.73
Non-agriculture	40	35.71	84	33.73
Wealth index				
High	24	21.43	41	16.47
Low	66	58.93	149	59.84
Medium	22	19.64	59	23.69
Region				
Central	8	7.14	26	10.44
Coast	11	9.82	35	14.06
Eastern	5	4.46	20	8.03
Nyanza	43	38.39	75	30.12
Rift Valley	16	14.29	34	13.65
Western	20	17.86	35	14.06
North Eastern	9	8.04	24	9.64
Maternal age				
20-34	80	71.43	180	72.29
<20	5	4.46	15	6.02
35 and above	27	24.11	54	21.69
Birth order/Preceding birth interval				
2-3 & ≥24 months	24	21.43	52	20.97
2-3 & <24 months	12	10.71	29	11.69
4+ & <24 months	19	16.96	41	16.53
4+ & ≥24 months	40	35.71	79	31.85
First births	17	15.18	47	18.95
Source of drinking water				
Pipe/Tap	27	24.11	47	18.88
Borehole	11	9.82	35	14.06
Well	13	11.61	36	14.46
Surface	55	49.11	119	47.79
Other	6	5.36	11	4.42
Presence of toilet facility				
Present	64	57.14	155	62.25
Absent	48	42.86	94	37.75

3.2 Determinants of Post-Neonatal Mortality

The analytical findings in Table 3.2.1's model I where the only the socio-economic and geographic variables were included and bio-demographic and environmental variables left out, shows that only the region

variable was significantly related to post-neonatal mortality. The statistical significance at the 0.05 level indicated that children of women residing in Nyanza province were 1.52 times more likely, to experience post-neonate deaths compared to children of women residing in Central province. In model II, where all the variables except geographic were included, the findings showed that only one category of the birth order and preceding birth interval, the source of drinking water and presence of a toilet facility were statistically related to post-neonatal mortality. The higher order births with shorter preceding birth intervals of less than 24 months had a higher risk of death. The results in model II found post-neonates in the 4+/<24 months birth order/preceding birth interval to have a 0.98 higher chance of dying compared to those in the 2-3/≥24 months birth order/preceding birth interval at 0.05 level of significance. Further, contrary to expectations, with reference to source of drinking water, post-neonates in households which source well and surface water were 0.64 and 0.46 times respectively, less

Table 3.2.1 Determinants of Post-Neonatal Mortality in Rural Kenya

Variable name	Model I	Model II	Model III	Model IV
Level of education of the mother				
Secondary and higher	1.000	1.000		1.000
None	1.862	0.644		1.248
Primary	1.334	1.133		1.222
Occupation of the mother				
Agriculture	1.000	1.000		1.000
Not working	0.779	0.732		0.764
Non-agriculture	1.077	1.128		1.014
Wealth index				
High	1.000	1.000		1.000
Low	0.787	0.842		1.092
Medium	0.779	0.946		1.371
Region				
Central	1.000		1.000	1.000
Coast	0.935		0.910	0.719
Eastern	0.343		0.324*	0.306*
Nyanza	2.518*		2.228*	2.450*
Rift Valley	0.811		0.767	0.734
Western	1.686		1.410	2.232
North Eastern	0.842		0.817	0.731
Maternal age				
20-34		1.000	1.000	1.000
<20		0.867	1.148	0.809
35 and above		1.085	1.607	1.256
Birth order/Preceding birth interval				
2-3 & ≥24 months		1.000	1.000	1.000
2-3 & <24 months		1.550	1.417	1.467
4+ & <24 months		1.870*	1.794	1.715
4+ & ≥24 months		1.243	1.110	1.153
First births		1.038	0.895	1.040
Source of drinking water				
Pipe/Tap		1.000		1.000
Borehole		0.487*		0.455*
Well		0.364***		0.267***
Surface		0.544**		0.395***
Other		0.666		0.402*

Presence of a toilet facility		
Present	1.000	1.000
Absent	1.468*	2.121**

* ρ <0.05; **ρ <0.01; ***ρ <0.001

likely to die than those in households with piped/tapped water. Households with no toilet facility were 0.47 times more likely to experience a post-neonate death than those with a toilet facility.

The results in model III where socio-economic and environmental factors were left out, only region – Eastern and Nyanza - was statistically related to post-neonatal mortality at 0.05 level. The births of women residing in Eastern province had a 0.68 lower risk, while those residing in Nyanza had a 1.23 higher risk, of dying during post-neonatal stage compared to births of those residing in Central province.

Findings in the full model indicated that the significant region effects in Eastern and Nyanza persisted in the same direction as in Model III net the effect of all other variables. Thus, while births of women residents of Eastern province were 0.69 times less likely die as post- neonates, those in Nyanza were 1.45 times more likely to die compared to Central province. The observed significant effect of birth order/preceding birth interval in model II did not re-appear in the full model as in the case of model III. But the strong effect of the source of drinking water in the rural areas persisted as in model III. In fact, the suppressed significance of the effects of the categories of well and surface water sources compared to piped/tapped water sources at 0.001 level of significance was observed in the full model. It is likely that the piped/tapped water in rural areas may reflect other issues other than living standards. Further, post-neonates in households with no toilet facility experience a more than double death risk compared to their counterparts in households with a toilet facility.

3.3 Determinants of Infant Mortality

Results of analysis in Table 3.3.1 in all the four models indicate education was not a significant determinant of infant mortality in rural Kenya net all other factors. In fact in model I where only socio-economic and geographic factors were analysed, only region was statistically related to infant mortality. Unlike in the case of the post-neonates where Nyanza province experienced high post-neonatal deaths compared to Central province in all the models, in the case of infant mortality, the strong and negative effects in Eastern and Rift Valley provinces persisted compared to Central province. In model I, it was observed that births to women residing in Eastern and Rift Valley provinces were 0.58 and 0.48 times respectively, less likely to experience infant deaths as compared to births to women residing in Central province. These relationships had respective levels of significance at 0.01 and 0.05. Still on the geographic factor, the results indicated that in models III and IV the statistical strength of the effect of infant mortality in Eastern province compared to Central increased to 0.001 level.

Turning to the occupation of the mother, we observed interesting results. Contrary to expectations where in urban areas working would be beneficial, in rural areas births to women who did not work were 0.25 less likely to experience infant mortality compared to those of women working in agriculture. The significant effect at 0.05 level persisted in Model IV net the effect of all factors.

Table 3.3.1 Determinants of Infant Mortality in Rural Kenya

Variable name	Model I	Model II	Model III	Model IV
Level of education of the mother				
Secondary and higher	1.000	1.000		1.000
None	1.268	0.825		1.105
Primary	1.020	0.984		1.000
Occupation of the mother				
Agriculture	1.000	1.000		1.000
Not working	0.745	0.671*		0.716*
Non-agriculture	1.025	1.029		1.004
Wealth index				
High	1.000	1.000		1.000
Low	1.185	1.216		1.195
Medium	1.380	1.492*		0.832
Region				
Central	1.000		1.000	1.000

Coast	0.920		0.895	0.804
Eastern	0.422**		0.408***	0.410***
Nyanza	1.238		1.181	1.239
Rift Valley	0.522*		0.513*	0.506*
Western	0.819		0.748	0.908
North Eastern	0.731		0.678	0.612
Maternal age				
20-34		1.000	1.000	1.000
<20		1.076	1.143	1.059
35 and above		1.048	1.428	1.101
Birth order/Preceding birth interval				
2-3 & ≥24 months		1.000	1.000	1.000
2-3 & <24 months		1.697*	1.638*	1.704*
4+ & <24 months		1.927**	1.865***	1.834**
4+ & ≥24 months		1.153	1.072	1.105
First births		1.276	1.169	1.307
Source of drinking water				
Pipe/Tap		1.000		1.000
Borehole		0.968		0.892
Well		0.584*		0.482***
Surface		0.698*		0.578***
Other		0.732		0.562
Presence of a toilet facility				
Present		1.000		1.000
Absent		1.174		1.335

* ρ <0.05; **ρ <0.01; ***ρ <0.001

As regards to bio-demographic factors, the significance of birth order and preceding birth interval was observed. In all the models that the interactive effect was included, a persistent statistically significant positive influence on infant mortality compared to the reference category was observed. In model II, it was noted that infants in the 2-3/<24 months and 4+/<24 months birth order/preceding birth interval categories were 70 percent and 93 percent more likely to die than those infants in the 2-3/≥24 months birth order/preceding birth interval category. Although the risk reduced somewhat in the subsequent models (III and IV), it was clear that the effect of birth order and preceding birth interval was important explanatory variable for infant mortality. Higher order births born in birth interval of less than or equal to 24 months were at higher risk of death compared to those born in the 2-3/≥24 months births order/preceding birth interval.

In relation to environmental factors, and as in the case of the post-neonates, source of drinking water remained a significant explanatory factor even with infant mortality. In model II where socio-economic, bio-demographic and environmental factors were included, it was observed that the well and surface as sources of drinking water had 0.42 and 0.30 lower chances respectively, of infant deaths compared to households which accessed pipe/tap water both at 0.05 statistical significance level. In the full model (model IV), the significant effect of these two categories persisted at 0.001 significance level net the effect of all the other variables compared to the reference category of pipe/tap water.

4.0 Discussion

The intention of this study was to examine the determinants of infant mortality in rural Kenya. Wide variations have been found in the level of post-neonatal and infant mortality in the rural areas of the country. For instance, the risk of post-neonatal mortality was 0.69 times lower in Eastern and 1.45 times higher in Nyanza with reference to Central region. In their study in which they found Nyanza infants to be 282 percent more likely to die than Central infants, Mustafa and Odimegwu (2008) concluded that this may be attributed to socio-economic disparity between these regions and the very high prevalence of HIV in Nyanza region.

The occupation of the mother determines the amount of time and care she can offer her baby. It can also determine the amount of resources available to the mother and as such her access to various goods and services.

Women in non-agricultural labour force and to some extent the quite involving agricultural labour force practice short duration of, or totally avoid, exclusive breastfeeding which is supposed to go for the first six months of life due to limited maternity leaves. The results in the full model indicate that infants born to women who were not working were 0.28 times less likely to die as compared to their counterparts born to mothers who were involved in an agricultural activity. This shows that much as the earnings of working women can be used to improve the nutritional status and general welfare of the child, it is not as satisfactory as the adequate time spent with the child, a mother being the primary caretaker of her baby.

Household wealth level affects infant survival status through the interaction of socio-economic, bio-demographic and household environmental factors. A wealthy household enables the mother to afford the charges for antenatal and postnatal care services, even at private health centres, and delivery not only in a hospital facility but also with the assistance of skilled personnel. Part of the major reasons for low hospital deliveries in rural Kenya are long distances to the health facility that attracts high fares especially during rainy seasons and the high charges at the facility. A wealthy family is able to manage these. At a statistical significant level of 0.05, the study found infants in the medium wealth quintile households to be 49 percent more likely to die than those in the high wealth quintile.

Births to older mothers are known to suffer higher risks of experiencing death before the celebration of their first birthdays. Such mothers suffer anaemia, malnutrition, damage to their reproductive systems from earlier births and sheer physical depletion associated with frequent child bearing that increases chances of infant death. Ageing of women makes their mammary glands lose the ability to produce adequate milk for their babies thus premature weaning. Consistent with the findings of other studies (example, Omedi, 2014; Mustafa & Odimegwu, 2008), this study found higher risk of infant death among mothers aged 35 and above years.

High order births and short preceding birth intervals were found to increase the chances of death during infancy. The study noted an increase in the risk of a child dying with an increase in the order of the index birth. For instance, the model that considered the association of infant mortality with geographic and bio-demographic factors found a 36 percent increase in the risk of an infant death from the 2-3 birth order category to the 4 and above birth order category keeping the birth interval constant.

It is well documented that children born in households which use pipe or tap water for drinking, bathing and cleaning utensils are more likely to survive through infancy unlike those born in those households that use borehole/well/surface water. Counter-intuitively, this study found a lower risk of post-neonate and infant death in households that source borehole/well/surface/other water relative to households that use pipe or tap water. This is quite interesting, especially given the fact that most of the rural residents have no access to either pipe or tap water, leaving only a smaller proportion of births in such households that source pipe/tap water. Possibly, the supposedly clean water sources like pipe and tap water may not be uncontaminated. Water might also be clean at the source but be contaminated during collection, storage and usage at home (Omedi, 2014).

Like the findings of a study done in Tanzania by Mturi and Curtis in 1995, this study did not find statistical association of infant mortality with maternal education. Mturi and Curtis explained this to be artefact of the government of Tanzania's successful policies on developing rural areas through provision of health, primary education and clean water supply. Other researchers have argued that the presence of health facilities and safe water and sanitation in a community could make the effect of maternal education insignificant (Basu, 2000) since when available, they benefit every community member (Omedi, 2011).

5.0 Conclusions

As observed, post-neonatal and infant mortality in rural areas of Kenya were explained by occupation of the mother, household's wealth index, region of residence, maternal age, birth order/preceding birth interval, source of drinking water and presence of a toilet facility in a household. Maternal level of education was not found to be significantly related to either post-neonatal or infant mortality in rural Kenya. There is need to further understand this, more so with the existing abundant literature on the role of female education on child survival. A major surprise is the finding that households which use borehole/well/surface water were less likely to experience post-neonatal and infant deaths when compared to those households which use either pipe or tap water. Further investigation should be done to bring out a clear understanding of this reversal from what previous studies have reported.

References

Basu, A. M. (2000). Gender in Population Research: Confusing Implications for Health Policy. *Population Studies*, 54.

Becher, H., Muller, O., Jahn, A., Gbangou, A., Kynast-Wolf, G. & Kouyate, B. (2004). Risk Factors of Infant and Child Mortality in Rural Burkina Faso. *Bulletin of the WHO*, 82 (4).

Brockerhoff, M. & Brennan, E. (1998). The Poverty of Cities in Developing Countries. *Population and Development Review*, 24.

Fotso, J., Ezeh, A. C., Madise, N. J. & Ciera, J. (2007). Progress towards the Child Mortality Millennium Development Goal in Urban Sub-Saharan Africa: The Dynamics of Population Growth, Immunisation and Access to Clean Water. *BMC Public Health*.

Fox, Kiira, and Tim B Heaton. (2012). "Child Nutritional Status by Rural/Urban Residence: A Cross-national Analysis." *The Journal of Rural Health* 28(4):380–91.

Gubhaju, B. B. (1987). Urban-Rural Differentials in Infant and Child Mortality in Nepal. *Contributions to Nepalese Studies*, *CNAS*, Tribhuvan University, Volume 14 (2).

Gyimah, S. O. (2002). Ethnicity and Infant Mortality in Sub-Saharan Africa: The Case of Ghana. *Discussion Paper* No. 02-10.

Kenya National Bureau of Statistics and ICF Macro (2010). *Kenya Demographic and Health Survey 2008/09.* Calverton, Maryland: KNBS and ICF Macro.

Kibet, M. S. (2010). Comparative Study of Infant and Child Mortality: The Case of Kenya and South Africa. *African Population Studies,* Volume 24.

Koenig, M. A., Phillips, J. F., Campbell, O. M. & D'Souza, S. (1990), Birth Intervals and Childhood Mortality in Rural Bangladesh. *Demography*, Vol. 27, No. 2.

Mohan, P. (2005). Inequalities in Coverage of Preventive Child Health Intervention: The Rural Drinking Water Supply Programme and the Universal Immunisation Programme in Rajastahn, India. *American Journal of Public Health*, 95.

Mosley, W. H. & Chen, L. C. (1984). An analytical framework for the study of child survival in developing countries. *Population and Development Review*, 10 (Supplement): 25–45.

Mturi, A. J. & Curtis, S. L. (1995). The Determinants of Infant and Child Mortality in Tanzania. *Health Policy Plan*, 10: 384-394.

Mustafa, H. E. & Odimegwu, C. (2008). Socioeconomic Determinants of Infant Mortality in Kenya: Analysis of Kenya DHS 2003. *Journal of Humanities & Social Sciences*, Vol. 2, Issue 2.

Omedi, G. (2014). Factors Influencing Infant Mortality in Kenya and Tanzania. *Southern Social Science Journal*, Vol. 1, No. 1, 2014.

Omedi, M. G. (2011). A Comparative Study of Infant Mortality: The Case of Kenya and Tanzania. *Master of Arts Thesis*, PSRI, University of Nairobi.

Suwal, J. V. (2001). The Main Determinants of Infant Mortality in Nepal. *Social Science and Medicine,* Volume 53.

Wagstaff, A. & Bustreo, F. (2004). Child Health: Reaching the Poor. *American Journal of Public Health*, 94.

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