

*Full length Research Paper*

# Child health in peri-urban communities of Kenya: Determinants and challenges

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**Infant and child death in developing countries constitute the largest age category of mortality. This is because children under the age of five years are the group most vulnerable to diseases caused by inadequate child care, health risks, and poor environmental conditions. The overall aim of this study was to explore the demographic, environmental, socio-economic and health seeking behavioural factors contributing to childhood mortality in peri-urban communities. A cross-sectional analytical study was undertaken between January and May 2007 adopting both quantitative and qualitative approaches. Quantitative data was collected using a semi-structured questionnaire administered to 384 mothers aged 15 - 49 years and having children aged below five years alive or dead. Qualitative data was collected through focus group discussions and key informant interviews with selected participants. The main outcome measure was identification of the main determinants of childhood mortality at household level in the peri-urban communities based on proportions of children dead, correlation coefficients and multiple regression analysis. The study revealed that the main determinants of child health in peri-urban communities are maternal occupation and immunizations uptake ( $t = -5.094$ ,  $P = 0.000$  and  $t = -3.888$ ,  $P = 0.012$  respectively). Treatment of drinking water, source of drinking water and maternal age also had strong influence on child health ( $t = -3.647$ ,  $P = 0.028$  and  $t = -3.111$ ,  $P = 0.034$  respectively). Maternal occupation emerged as the main determinant of child health in peri-urban communities. Overindulgence of mothers in small scale businesses and casual work in urban centers compromises child care hence the high infant and child morbidity and mortality reported in peri-urban settings. This calls for focused health education and services targeting the mothers.**

**Key words:** Infant, child, mortality, morbidity, determinants, peri-urban.

## INTRODUCTION AND BACKGROUND

Despite technological advances in modern sciences, 12 million children under the age of five die every year in developing countries from preventable diseases. Of these deaths, over 70% can be attributed to just five primary causes: pneumonia, diarrhea, malaria, measles and malnutrition. In many developing countries, 20 to 25% of the children die before reaching their fifth birthday,

resulting in an estimated 15 million deaths annually (AMREF, 1996). Infant and child death in developing countries constitute the largest age category of mortality. This is because children under the age of five years are the group most vulnerable to diseases caused by health risks and poor environmental conditions (UNICEF/GOK, 1998). Children under five years make up 14% of the population in Africa, but account for up to 50% of all deaths annually (Kessel, 2000).

In response to the above mentioned concerns, in the early 1990s WHO and UNICEF led the development and promotion of the integrated management of childhood

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illness (IMCI) strategy (UNICEF, 1999). This initiative aimed at significantly reducing mortality and morbidity associated with the five major causes of disease in children aged below 5 years, and to contribute to their healthy growth and development.

According to the Kenya Demographic and Health Survey of 2003, the infant and under five mortality rates steadily increased in Kenya during the period 1998 to 2003 (KDHS, 2003). The observed annual increase in the mortalities, though minimal, was predictive of other possible determinants of infant and child mortality within the child's holistic environment. Whether gauged from a psychological, social or economic perspective, the death of an infant or a child represents one of the most costly human experiences. Every human birth is a unique event and the cost of death of a child to the family and friends in psychological terms is of course inestimable (Jelliffe, 1997). This brings out the urgency of improving our understanding of the determinants of child health particularly at household level.

## OBJECTIVES OF THE STUDY

This study aimed at exploring the main factors that influence infant and child morbidity and mortality in the peri-urban communities of Kisumu City, in Kenya. Specifically, the study sought to: i) identify the main demographic, socio-economic, socio-cultural, environmental health and food/dietary factors that contribute to infant and child morbidity and mortality at household level; ii) examine the combined effect of the above factors on infant and child mortality at household level; and iii) determine people's knowledge and attitudes towards factors that contribute to infant and child morbidity and mortality.

## MATERIALS AND METHODS

### Study area and design

This cross-sectional analytical study that employed both quantitative and qualitative techniques was conducted between January and May 2007. The study examined demographic, socio-economic, socio-cultural, environmental health and health seeking behaviour factors as independent factors while infant and child death was examined as the dependent factor.

### Study population

The primary respondents were mothers aged 15 - 49 years with children aged five years and below, alive or dead. The mothers were required to have resided in the study area for a period not less than six months. Secondary respondents included health workers, community administrative and opinion leaders, community health workers, women group leaders, selected men and women from the community, staff of non-governmental organizations working in the study area and staff of other related government of Kenya departments in the study area.

### Data collection

Quantitative data was collected using a semi-structured questionnaire which was administered to 384 randomly sampled mothers of children aged below five years. Information gathered included: demographic, socio-economic, socio-cultural and environmental health. Qualitative data was collected through 8 focus group discussions (FGDs) and 16 key informant interviews (KIIs) with selected respondents including health workers, community leaders, community health workers, women group leaders and selected men and women from the community.

### Variables used in the study

The data collected was thematically based on the study objectives listed above, with each having a set of variables. The dependent variable of child mortality was represented by calculated proportions of dead children a measure of children dead (CD) divided by children ever born (CEB). Summarily the following independent variables were considered:

- i) Age of the mothers/caregiver;
- ii) Level of education: divided into four categories namely, none, primary class 1 - 4, primary class 5 - 8, and  $\geq$ secondary school;
- iii) Maternal occupation:- categorized into 'no occupation'- meaning no source of income, 'small-scale businesses'- meaning vending of food or cash crops on minimal scale, 'casual work'- meaning informal short-term assignments drawing wages on daily or weekly basis, and 'salaried employment'- meaning formal employment drawing monthly salary;
- iv) Source of drinking water for the children;
- v) Method of water treatment;
- vi) Frequency of antenatal clinic attendance during the last pregnancy;
- vii) Place of delivery of the last child;
- viii) Attendant at birth during last delivery;
- ix) Immunization status of the last child aged below five years;
- x) History of illness in the last two weeks (malaria, diarrhea, upper respiratory tract infection) among the children under five; and
- xi) Action taken during illness (took child to a health facility, took child to a community health worker, bought medicine from the shop, gave herbal medicine, did nothing).

### Data management and analysis

Qualitative data was descriptively summarized and categorized into themes based on the study objectives. The results were presented as textual summaries with verbatim reporting where necessary. Quantitative data was analyzed with the aid of the Statistical Package for Social Sciences (SPSS) version 12. As a preliminary, the data was descriptively analyzed using frequencies and proportions. The data was then subjected to bi-variate analysis using Pearson Product-Moment Correlation ( $r$ ); a non-parametric inferential suitable for continuous categorical variables (Mugenda and Mugenda, 1999). The computation of a correlation yields a statistic called correlation coefficient ( $r$ ) that ranges from -1 to +1; the larger the coefficient (absolute value), the stronger the relationship. The direction of the relationship between the two variables is indicated by the positive or negative  $r$ -value. Statistically significant correlations were measured using probability value ( $P$ ) where a  $P > 0.05$  were considered not statistically significant, based on the 95% confidence level set for this study.

Last but not least, variables that showed significant correlation to the independent variable were subjected to further analysis that tested the combined effect of the significant independent variables on infant and child death (dependent factors) through use of

**Table 1.** Proportion of children mortality by maternal age.

	15 - 19 yrs	20 - 24 yrs	25 - 29 yrs	30 - 34 yrs	35 - 39 yrs	40 - 44 yrs	45 - 49 yrs
FPOP	30	102	78	70	49	38	6
CEB	34	213	238	339	293	303	44
CD	2	24	30	37	37	68	12
Proportion dead (CD/CEB)	0.059	0.113	0.126	0.109	0.126	0.232	0.272

CD = Children dead, CEB = Children ever born and FPOP = Female population.

multiple regression analysis. This is a parametric inferential statistical method that attempts to determine whether a group of variables together predict a given dependent variable (Jekel et al., 1996). A mathematical analogy of the multiple regression equation is as shown below.

$$Y = B_0 + B_1X_1 + B_2X_2 + \dots + B_nX_n + E$$

This is the probability of an event occurring where:

Y is the linear combination;

B<sub>0</sub> is the constant;

B<sub>1</sub>,..., B<sub>n</sub> are regression coefficients estimated from the data;

X<sub>1</sub>,..., X<sub>n</sub> are independent variables e.g. LEVESCH;

E is the error and

Y = dependent variable.

For every value of b (slope) a calculated t- value is presented with an accompanying probability level for each t- value. An independent variable is said to be a significant predictor of the dependent variable if the absolute t- value of the regression coefficient associated with that independent variable is greater than the absolute critical t- value which is  $t = 2.336$  (16).

### Ethical considerations

Ethical and scientific clearance for this study was done by the Maseno University Research and Ethical Review Board. Permission to conduct the study was sought from the Kenya National Council for Science and Technology which is the agency responsible for approving studies involving human subjects. Informed written consent was also voluntarily sought from all the study participants. The purpose of the study was explained to the respondents and they were assured of confidentiality prior to the consent and administration of the tools.

## RESULTS

### Demographic indicators

Demographic findings showed that the mean age of the women interviewed was 28.8 years with more than half (56.3%) of the respondents being aged less than 30 years of age. Proportions of children dead which was computed as a measure of Children Dead (CD) divided by Children Ever Born (CEB); (CD/CEB) were found to vary according to different age groups (Table 1); the age category 15 - 19 years exhibited the lowest proportion of children dead (0.059) while 45 - 49 exhibited the highest proportion (0.272).

### Health seeking behaviour indicators

Analysis of the attendance of antenatal clinics during pregnancy revealed that majority (77.2%) of the respondents reported attending antenatal clinics more than once during the last pregnancy. Antenatal clinic attendance had a strong negative relationship with infant/child death with a correlation coefficient value of  $r = -0.219$ ,  $P < 0.05$ .

Analysis of place of delivery revealed that, 79.6% of the mothers delivered their last child at home with recorded 0.145 proportions of the children dead. Those who reported that they delivered their last child in health facilities formed 20.4% with 0.107 proportions of the children dead. Majority of the respondents (74%) reported to have been assisted by Traditional Birth Attendants (TBAs), 20% by trained midwives, while 6% reported self assisted deliveries. Women who reported to have been assisted by a midwife during delivery registered the lowest proportion of children dead (0.113), followed by those who were assisted by Traditional Birth Attendants (0.140) while those who reported self-assisted deliveries had the highest proportion of children dead (0.178).

Three categories of immunization status were analyzed namely: complete for age, not complete for age and none. The immunization status was ascertained by seeing the vaccination card and checking for the BCG scar. Those mothers who reported that their children had completed the immunizations registered the lowest proportion of children dead (0.101), while those with no immunization at all had the highest proportion (0.142). Immunization emerged the second major determinant of infant and child mortality in the study area ( $t = -3.888$ ,  $P = 0.012$ ).

An analysis of the history of previous illness revealed that malaria was the commonest illness among children aged below five years with 39.7% of the respondents reporting it on a 2-week recall period. Diarrhea was reported by 14% of the respondents, while 6 and 3.8% reported measles and acute respiratory infections respectively. On reported action taken during the above illnesses, majority (64%) of the respondents reported buying medicine from the shops to treat malaria; 18.2% reported having taken their children to the health facilities; 9.8% reported consulting a Community Health Worker; 5.2% did nothing; while 3.8% visited a spiritual or

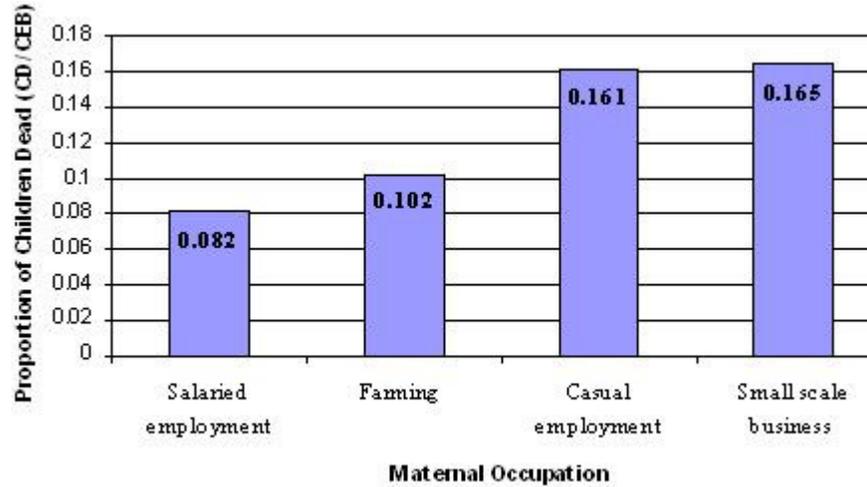


Figure 1. Proportion of children dead stratified by maternal occupation.

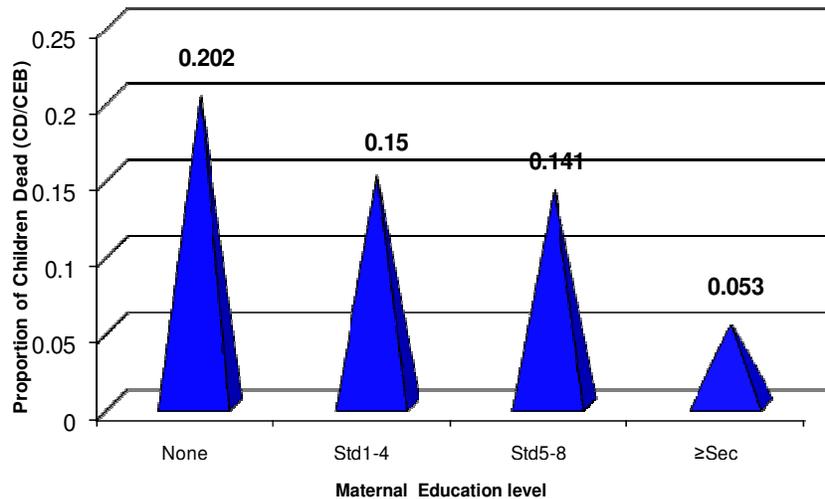


Figure 2. Proportion of children dead stratified by maternal education level.

traditional healer.

**Socio-economic indicators**

**Maternal occupation**

Majority (47%) of the respondents reported to be involved in small-scale businesses in the nearby urban center, 42% had no major occupation and were mainly involved in small scale farming and 6% were on salary employment, while a minority (5%) reported to be involved in casual work which was predominantly working as house-helpers in the urban center. The mothers whose daily occupation was small-scale business had the highest proportion of children dead (0.165) while those on

salaried employment had the lowest proportion (0.080) (Figure 1). Maternal occupation showed a significant inverse relationship with infant/child mortality, the correlation coefficient being  $r = -0.320$  and on multiple regression analysis, it emerged to be the main determinant of infant and child mortality in peri-urban communities ( $t = -5.094, P = 0.000$ ).

**Level of education**

Majority of the respondents (61%) were within the primary class 5 - 8 level of formal education, 17% reported to have attained secondary school level and above, 12% were of primary class 1 - 4 and 10% reported no formal education. Cross tabulation of level of

**Table 2.** T - statistic coefficients for multiple regression analysis.

Model 1	Standardized coefficients (beta)	t	Significance (p)
Maternal occupation	0.085	-5.094	0.000
Immunization	0.058	-3.888	0.012
Treatment of drinking water	0.048	-3.647	0.028
Source of drinking water	0.051	-3.111	0.034
Maternal age	0.048	2.635	0.048
Parity	-0.191	2.226	0.050
Maternal education (5 - 8)	0.058	-2.182	0.060
Antenatal clinic attendance	0.051	-2.134	0.062
Land acreage	0.046	-2.111	0.071

Critical t- value = 2.336 (Frank, 1994).

schooling with number of children dead showed that the proportion of children dead reduced as the level of formal schooling rose (Figure 2). The highest proportions of children dead, (0.202), was registered among those with no formal education, while those of secondary school and above had the lowest proportion (0.053). On multiple regression analysis, maternal education did not emerge a significant determinant of infant and child mortality in the study area ( $t = -2.182$ ,  $P = 0.060$ ).

### Environmental health indicators

Analysis of the source of drinking water for the children showed that majority (68.6%) of the respondents used roof catchment during rainy season, 14.7% got the water from the river, 14.2% from boreholes, 1.3% from Lake Victoria while 1.1% used tap water. Proportions of children dead per each category were: 0.117 for roof catchment, 0.156 for borehole, 0.166 for lake and 0.229 for river.

Findings on method of water treatment showed that 43.3% of the respondents treated their water by boiling, 9.9% treated by storing in pots, 6.2% treated by filtering, 0.8% used chemicals while 39.8% did not treat drinking water. The category of respondents who never treated water at all registered the highest number of children dead while those who used chemicals reported no death.

### Cumulative effect of significant indicators

The analysis revealed that the main factors that affect child survival in the study area are maternal occupation and immunizations ( $t = -5.094$ ,  $P = 0.000$  and  $t = -3.888$ ,  $P = 0.012$ ). The study also established that, treatment of drinking water, source of drinking water and maternal age strongly determined child health (Table 2).

### DISCUSSION

Maternal age showed a strong positive relationship with childhood mortality. This phenomenon can be interpreted in two dimensions; first, mothers in young age categories have lower parity and second, they are also not keen on revealing or disclosing deaths of their children especially the single mothers. Mothers aged 35 and above are prone to losing children because of high parity and increased responsibilities that may deter their responsible attention to childcare. They also tend to give accurate history of their dead children. Similar findings have been documented in several studies (KDHS, 2003; Ouma, 2006; Mbulu et al., 1994; Turker, 1996).

The correlation coefficient analysis revealed significant relationship between infant and child mortality with the level of education attained by a mother. As maternal education increased childhood mortality decreased. This is similar with previous researches done at different levels (Mbulu et al., 1994; Turker, 1996; Ware, 1995; Omotundo, 2005; Rogers et al., 1997).

The above findings may be due to the fact that maternal education enhances a mother's health choice for children; improves cleanliness at home and enhances child quality in terms of fewer children. Furthermore consumption and use of pre-natal care during pregnancy which in turn leads to an improvement of both maternal and child health depends on maternal education. However, this variable did not emerge significant in the multiple regression analysis.

Participation of mothers in the labour force showed that mothers who were involved in casual work and small-scale businesses had higher infant and child mortality levels than those on salaried employment and subsistence farming. It is important to note that mothers on salaried employment have a specified number of hours within which they work and go back home early enough to care for the children. Mothers who participate in casual work and small-scale businesses spend very little time

little time on child rearing and domestic work. Reduction in maternal time devoted to child rearing may be directly related to infant and child mortality through loss of specific elements desired for infant and childcare such as breastfeeding and supervision during feeding.

It is reasonable to expect childhood mortality to be associated with the availability of health care services. Access to modern medical facilities throughout a mother's pregnancy, at delivery, during infancy and early childhood is thought to be particularly important in reducing childhood mortality. The study showed that use of modern medical care facilities from the time of conception to early childhood including immunizations had an inverse relationship to infant and child mortality. Antenatal care and immunization status recorded significant correlation to child mortality. However, on multiple regression analysis, only immunization emerged as a major determinant of child health.

Accessibility, availability and affordability of adequate health care contribute to child health, growth and survival. The availability of quality services has a major impact on the pattern of utilization of the services (Rutstein, 1983). This study found out that malaria was the most prevalent disease among the under fives and mothers' first choice of "treatment" was buying medicine from the shops which in most cases was not the right medication and in wrong doses.

## CONCLUSION

Maternal occupation emerged as the main determinant of child health in peri-urban communities. In these communities, over indulgence of mothers in small scale businesses and casual work in urban centers also compromises other health seeking practices such as use of antenatal clinics attendance, infants' immunization and breastfeeding. These can contribute to the high infant and child morbidity and mortality reported in peri-urban settings hence the need for focused health education and other services targeting those mothers.

## REFERENCES

- AMREF (1996). A Report of the Situation of Women and Children in Four Arid and Semi-Arid Districts in Kenya. Available on <http://www.amref.org>.
- Jekel JF, Elmore JG, Katz DL (1996). *Epidemiology, Biostatistics and Preventive Medicine*. W.B Saunders company Philadelphia.
- Jelliffe DB (1997). *Advances in Maternal and Child Health*. Clarendon Press, Oxford. <http://www.clarendonpress.com>.
- KDHS (2003). Kenya National Council for Population and development. Ministry of Planning and Development. <http://www.measuredhs.com/pubs/pdf/SR104/SR104KE03.pdf>.
- Kessel E (2000). *Maternal and child care in developing countries*. Ottoo Publishers Thum/Switzerland. <https://www.healthright.org/annualreport06.pdf>.
- Mbulu T, Smith M, Sharpe J (1994). The determinants of health service utilization in a rural community in Kenya. *Soc. Sci. Med.* 12: 211-217.
- Mugenda OM, Mugenda AG (1999). *Research Methods: Quantitative and Qualitative Approaches*. African Centre for Technology Studies (ACTS) Press-Nairobi –Kenya. <http://www.msra.or.ke/resources.asp>.
- Omotundo JT (2005). *Infant/child mortality and fertility differentials in Western province of Kenya*. Msc. Thesis, University of Nairobi.
- Ouma DS (2006). *Environmental risks and socio-economic factors influencing infant and child mortality in Suba District*. M.sc. Thesis, University of Nairobi.
- Rogers IS, Emmett PM, Golding J (1997). The growth and nutritional status of the breastfed infant. *Early Human Development* October 26 (49 suppl): 157-174.
- Rutstein SO (1983). *Infant and child mortality: levels, trends and demographic differentials*. World Fertility Survey comparative studies International Statistical Institute, Voorburg NL 24: 124.
- Turker K (1996). *Maternal employment and child nutrition in Panama*. *Social Science and Medicine* 26(6): 605-612.
- UNICEF/GOK (1998). *Situation Analysis of Women and Children*. Nairobi: Regal Press Ltd [http://books.google.co.ke/books?id=nXY3XNnS6qMC&pg=PA284&lpg=PA284&dq=UNICEF/GOK+\(1998\).++Situation+Analysis+of+Women](http://books.google.co.ke/books?id=nXY3XNnS6qMC&pg=PA284&lpg=PA284&dq=UNICEF/GOK+(1998).++Situation+Analysis+of+Women).
- UNICEF (1999). *The state of the world's children: Education*. Oxford: oxford university press. [http://www.unicef.org/sowc04/sowc04\\_education\\_public\\_opinion.html](http://www.unicef.org/sowc04/sowc04_education_public_opinion.html)
- Ware, H (1995). "Effects of maternal education, women's role and child care on child mortality", in W. H Mosley and Lincoln Chen (Eds). *Child Survival: Strategies Res. Dev. Rev. Suppl.* 10: 1994-214.