

ASSESSMENT OF MATERNAL FACTORS INFLUENCING MORTALITY OF
CHILDREN UNDER FIVE YEARS OF AGE IN KAREMO SUB-COUNTY IN
SIAYA COUNTY, KENYA

BY

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DECLARATION

I, **PAUL AWITI ODINGO** declare that this thesis is my original work and to the best of my knowledge it has never been presented for examination in part or in full at any level of academics in this University or any institution of learning.

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DEDICATION

I dedicate this work to my late brother Solomon Onyango (Abbas Solo) who on his death bed encouraged me to pursue my masters' degree. May your soul rest in peace bro!

ABSTRACT

About 17,000 children below five years of age die each day across the world, 99% occur in developing nations with 50% accounted for by Sub-Saharan Africa (SSA). Kenya's high under-five mortality rate (U5MR) at 52 deaths per 1,000 live births won't scale down without solving the high under-five mortality (U5M) in rural areas. Despite Karemo Sub-County in Siaya County having relatively good access to public and private health facilities, it nevertheless exhibit U5MR of 184 deaths per 1000 live births. This is over 3 times higher than the national U5MR; hence an understanding of risk factors is required as a way of fast tracking progress of achieving Sustainable Development Goal 3 (SDG) by 2030. The aim of this study was to assess maternal factors influencing U5M in Karemo Sub-County. Specifically, the study sought to identify maternal social-demographic, economic and health seeking behaviour on U5M. A retrospective cross-sectional design in which multi-stage probability sampling, Probability Proportional to Size (PPS) and simple random sampling was employed to recruit 299 mothers with under-fives (U5s) from 5 selected sub-location. Data was collected using pre-tested structured questionnaire on a face to face interview. Categorical data were analyzed against U5M using Chi-square test and logistic regression performed with SPSS version 22. Significant factors associated with U5M were; education, birth order, marital status, polygamy, occupation, birth interval and maternal age. Children born to mothers with tertiary level of education were 78% less likely to die than those whose mothers had primary education (OR=0.223, $p<0.0001$). However, children of higher birth orders of 4 and above were seven times more likely to die than those of lower birth orders of 3 and below (OR=7.687, $p<0.0001$). Accordingly, children born in polygamous union were four time more likely to die than their counterparts in monogamous union (OR= 4.165, $p<0.0001$). Contrarily, children of married mothers were 68% less likely to die than those of single mothers (OR= 0.324, $p=0.001$). Similarly, children of employed mothers were 6% less likely to die compared to those of none employed mothers (OR=0.941, $p<0.0001$). In addition, children of older mothers between 35 to 49 years were three times more likely to die than those born to mothers below age 20 years (OR=3.214, $p=0.021$). Lastly, those with short birth interval of less than 2 years were 1.9 times more likely to die than those with longer birth intervals (OR=1.997, $p=0.011$). The study concluded that; old age, higher birth order, single motherhood, short birth intervals, lack of post primary education and occupation were major factors influencing U5M. Therefore, promotion of women economic empowerment, advocacy on girl child education beyond primary levels and; sensitization and mobilization of mother to accept and use birth control mechanism should be emphasized as effective strategies of reducing U5M in this community. Therefore, shift interventions as prioritized in this study are encouraged to enhance faster reduction of U5M in this community.

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LIST OF ABBREVIATIONS

CORPs	-Community Resource Persons
HDSS	-Health Demographic Surveillance System
HIV	-Human Immunodeficiency Virus
IGME	-Inter-Global Agency Mortality Estimation
IMR	-Infant Mortality Rate
KDHS	-Kenya Demographic Health Survey
KEMRI	-Kenya Medical Research Institute
KNBS	-Kenya National Bureau of Statistics
MICS	-Multiple Indicators Cluster Survey
MUERC	-Maseno University Ethical and Review Committee
NDHS	-Nigeria Demographic Health Survey
SCRH	-Siaya County Referral Hospital
SDGS	-Sustainable Development Goals
SPSS	-Statistical Package for Social Sciences
SSA	-Sub Saharan Africa
U5M	-Under-Five Mortality
U5s	-Under fives
UN	-United Nations
UNICEF	-United Nations Children's Fund
US-CDC	-United states Centre of Disease Control
WHO	-World Health Organization
PPS	-Probability Proportion to Size

DEFINITION OF TERMINOLOGIES

- Under-fives:** These are children who are below five years of age (0-59 months).
- Under-five mortality:** This is the probability per 1000 live births that a new born baby will die before reaching five years of age (0-59 Months) or their fifth birthday, if subject to age-specific mortality rates of the specified year. It encompasses all levels of childhood mortality namely: neonatal mortality, post neonatal mortality, Infant mortality and child mortality.
- Neonatal mortality:** Is the probability of a child dying before reaching one month of age (0-29 days).
- Post neonatal mortality:** Is referred to the probability of a child dying after one month of birth to one year of age (1 month- 1 year).
- Infant mortality:** This is the probability of a child dying before reaching one year of age (0-12 months).

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CHAPTER ONE: INTRODUCTION

1.1 Background Information

Every year about 6.3 million children under five years of age die across the world (UN-IGME, 2013). Most of these deaths occur in Sub Saharan African (SSA) countries like Kenya (WHO, 2013). The world has made substantial progress in reducing the under-five mortality rate (U5MR) by 49 percent from 90 deaths per 1,000 live births in 1990 to 46 deaths per 1,000 live births in 2013. However, this reduction is not uniform, 99% of these under-fives (U5s) death occur in developing countries with almost 50% being accounted for by SSA (UN-IGME, 2013; WHO, 2013). All regions in the world have reduced their under-five mortality (U5M) by 50 percent or more except SSA (UN-IGME, 2013). Thus, in spite of the observed improvement, there are huge disparities in child mortality among low and middle income countries, with SSA carrying the highest burden of U5M.

Sub-Saharan Africa continues to face significant challenges in reducing U5MR (UN-IGME, 2013). The region still faces two major challenges: the highest risk of neonatal death and secondly, the wide disparities of U5M among its countries. Specifically, the region loses one in every nine children born before their fifth birthday (98 deaths per 1,000 live births) which is nearly twice the average in developing countries and about 16 times the average in the developed nations (6 deaths per 1,000 live births) (WHO,2013; UN-IGME, 2013). Kenya is not different; neonatal death (as a major component of child mortality) accounts for 60% of infant deaths and there are large disparities of U5M; the highest numbers of deaths being experienced in rural parts of the country (KNBS and ICF Macro, 2010; Ettarh *et al.*, 2012).

In the year 2013, 3.2 million U5s died in SSA despite this region having only a fifth of the total children's population in the world (Smith *et al.*, 2010; UN-IGME, 2013). Besides, it is worth noting that all 12 countries with U5M above 100 deaths per 1000 live births are still in this region (WHO, 2013). Moreover, out of the 61 countries with high U5MR (with at least 40 deaths per 1,000 live births), Kenya included, only 25 countries have reduced their U5MR by at least half between 1990 and 2012 (UN-IGME, 2013). The emerging evidence revealed that U5MR is not declining as much as expected in many African countries. This raises serious concerns about

the continent's capacity to achieve the Sustainable Development Goal 3 (SDG) target of 25 deaths per 1,000 live births (Garenne & Gakusi, 2006).

In Kenya, the level and trend of U5MR is not static. For example, between 1940s and 1980s, there was a dramatic fall of about 4% per annum. Far from declining, it increased by 25% between late 1980s to the mid 1990s (Mutunga *et al.*, 2007). This trend coincided with a number of other adverse trends: stagnation in growth of per capita income, declining levels of immunization, falling school enrolment, and the emergence of an HIV/AIDS epidemic (Mutunga *et al.*, 2007). Contrarily, from late 1990s, there was remarkable decline in both Infant mortality rate (IMR) and U5MR with exception again of around 1998 where U5MR increased to 111 deaths per 1,000 live births from 96 deaths per 1,000 live births (Ikamara, 2004). This increased trend was attributed to a number of factors such as; increased poverty, adverse effects of economic poverty and cost recovery programs associated with structural adjustments programs, increased childhood malnutrition, decreased use of certain maternity care services, decline in coverage of child immunizations, inability of the public health systems to provide services, the HIV/AIDS epidemic and the ethnic clashes that were rocking parts of the country (Ikamari, 2004).

From the beginning of millennium, however, there has been consistent remarkable decline in all levels of childhood mortality. For example, U5M has declined by 36% from 90 deaths per 1,000 live births to 52 deaths per 1000 live births while infant mortality has also dropped by 32 percent from 61 deaths per 1,000 in the 2003 to 39 deaths per 1000 live births in 2014. This implies that 1 in every 25 children born in Kenya dies before its first birthday, while 1 in every 19 does not survive to age five (KNBS and ICF Macro, 2014).

The improvement in child survival could be attributed at least in part to various government programmes such as the substantial increase in childhood immunization coverage levels both at the national and County levels, improvement in key malaria indicators such as ownership and use of treated mosquito nets, preventive treatment of malaria during pregnancy and free medical care for both maternal and child health at all levels of health facilities (KNBS and ICF Macro,

2010). Despite the observed improvement, Kenya is still twice far from meeting the SDG 3 target of 25 deaths per 1,000 live births by the year 2030 (KNBS and ICF Macro, 2014).

One of the major challenges the country continued to experience is the disparities of U5MR across the previous Provinces in Kenya (KNBS and ICF Macro, 2008). Nyanza Province exhibited the highest level U5MR of 149 deaths per 1,000 live births in comparison to Central Province which has the least rates of U5MR of 51 deaths per 1,000 live births. This implies that one in 7 children born in Nyanza dies before age five compared with one in 20 children in Central Province. Thus, the risk of a child dying before age five is almost three times higher in Nyanza than in Central Province (KNBS and ICF Macro, 2008).

Upon promulgation of the Kenyan new constitution in 2010, Provinces were subdivided into several counties to enhance devolution. Thus, the former Nyanza Province was divided into Siaya (with an U5MR of 167 deaths/ 1000 live births), Kisumu (91 deaths/ 1000 live births), HomaBay (123 deaths/ 1000 live births), Migori (102 deaths/ 1000 live births), Kisii (66 deaths/1000 live births) and Nyamira (52 deaths/1000 live births) counties. Within these counties, U5MR varies greatly with Nyamira County having the least U5MR of 52 deaths/1,000 live births while Siaya County leading with an U5MR of 167 deaths/1,000 live births (MICS, 2011). This variation in U5MR continues to exist within various sub-Counties in Siaya County. Karemo Sub-County register the highest U5MR of 184 deaths/1000 live births compared to Boro and Uranga which has U5MR of 171 deaths/ 1000 live births and 125 deaths/ 1000 live births respectively (Otieno, 2011).

In order to fast track the progress in reducing U5MR, specific proven interventions would have to target important causes of child death within areas that are burdened by U5M (Darmstadt *et al*, 2005; Bhutta *et al.*, 2008). Since no single factor can account for the high child mortality (Adhikari *et al.*, 2010 ; Engmann *et al.*, 2013; Black *et al.*, 2003) hence, there is need to assess various factors influencing U5M to determine specific ones that requires urgent interventions as a way of fast tracking progress in achieving SDGs by 2030. Various studies have shown mixed findings on maternal socio-demographic, socio-economic and maternal health seeking behaviour (Ettarh *et al.*, 2012; kanmiki *et al.*, 2014; Brockerhoff *et al.*, 2000; Singh, 2015). However, there

is no documented evidence that has shown an association between these maternal factors and U5M in Karemo Sub-County, Siaya County in Kenya.

1.2 Statement of the problem

Despite the substantial reduction of U5M observed in recent decades, around 6.3 million U5s children still die yearly across the world. Half of these deaths (3.2 million) occur in SSA. The observed decline however, is not evenly distributed with almost all deaths occurring in low and middle-income countries like Kenya. In Kenya, U5MR variations exist across the various Counties in the previous Nyanza Province with Siaya County having the highest burden of 167 deaths per 1,000 live births (MICS, 2011).

One in 6 children in Siaya County dies before reaching their fifth birthday compared with 1 in 19 children in Nyamira County which has the lowest U5MR among counties (MICS, 2011). Moreover, these disparities continue to exist within the County. Karemo Sub-County in Siaya County depicted high U5MR of 184 deaths per 1000 live births compared to Uranga Sub-County which has the least U5MR of 125 deaths per 1000 live births (Otieno, 2011).

This study was designed to assess factors influencing U5M in Karemo Sub-County in Siaya County. Despite this Sub-County having relatively good access to public and private health facilities, it still exhibit high U5MR. The Sub-County is ranked as one of the poorest in Kenya and known to be endowed with most cultural beliefs and practices on the causes of childhood morbidity and mortality. Moreover, mothers in this area are of low socio-demographic, socio-economic and have poor health seeking behaviour. There are high rate of school dropout among girls at primary level due to teenagers' pregnancy which is rampant in the Sub-County. In addition, there is sparse information about child deaths and the risk factors involved in this Sub-County. Thus, there is need for assessing maternal risk factors associated with U5M if the desired decline is to be achieved in this area and Kenya at large.

1.3 Objectives of the Study

1.3.1 General objective

To assess maternal factors influencing under- five mortality in Karemo Sub-County in Siaya County, Kenya.

1.3.2 Specific objectives

- i. To identify the maternal socio-demographic factors influencing U5M in Karemo Sub-County, Siaya County.
- ii. To establish the maternal socio-economic factors influencing U5M in Karemo Sub-County, Siaya County.
- iii. To determine maternal health seeking behaviour influencing U5M in Karemo Sub-County, Siaya County.

1.4. Research questions

- i. Which maternal socio-demographic factors influence U5M in Karemo Sub-County in Siaya County?
- ii. What maternal socio-economic factors influence U5M in Karemo Sub-County in Siaya County?
- iii. Which maternal health seeking behaviour influence U5M in Karemo Sub-County in Siaya County?

1.5. Significance of the study

Due to high U5MR observed in this area coupled with the existence of limited literature on this topic, this thesis highlighted various maternal risk factors influencing U5M in this community. It further provided various recommendations that would steer improvement on child's survival. Lastly, the outcome of this study added to the limited literature on factors influencing U5M in Karemo Sub-County, Siaya County in Kenya.

CHAPTER TWO: LITERATURE REVIEW

2.1 Maternal socio-demographic factors influencing U5M

2.1.1 Maternal age at birth

Previous studies have found maternal age at birth to have a significant effect on child mortality, with a higher risk of child death at too young (<19) and too old maternal ages (>35) (Manda *et al.*, 1999; Doctor *et al.*, 2011; Ettarh *et al.*, 2012; Kanmiki *et al.*, 2014; Singh *et al.*, 2015). This agrees with the KDHS conducted in 2008 that revealed the neonatal, post neonatal and infant mortality rates exhibit the expected U-shaped association with mothers' age. These findings may be attributed to the fact that very young mothers may experience difficulties during pregnancies and deliveries because of their physical immaturity while old women may also experience age-related problems during pregnancy and delivery (KNBS and ICF Macro 2010).

Kanmiki *et al.*, (2014) also found out that under-five mortality is higher in the young and older mothers compared to the middle aged mothers but further found disintegrated result among the affected cohorts with older cohort experiencing higher childhood mortality than the younger cohort. This was attributed to older mothers being less likely to be educated and therefore less likely to be associated with the enhanced mortality advantages associated with education and also because older mothers might be more likely to be associated to higher parity compared to younger mothers. In addition, children born of young mothers also tend to be underweight, malnourished and perhaps anaemic, a combination of which increases the risk of diseases and eventually causes child death (Wambugu, 2014).

In Siaya County, majority of mothers give birth when too young (12-19 years). A study conducted by Oliech (2016), revealed that teenagers pregnancies have risen from 17% in 2014 to 35% in 2016. Moreover, another study done in Karemo Sub-County revealed that maternal age was key factor influencing maternal health seeking behaviour. Too young mother had poor health seeking behaviour compared to their counter parts in the older cohort (Mchembere, 2013). However, no study has directly linked maternal age and U5M in this community.

2.1.2 Marital status

Marital status has been found to contribute greatly in influencing under-five mortality. Married women were less likely to experience child death than their unmarried counterparts (Kanmiki *et al.*, 2014). Only few studies have analyzed the effect of mother's marital status on child mortality. However, there is the notion that mothers in stable marriages would get support from their partners during antenatal through to postnatal care which can reduce risk of child mortality. Also, marriage may confer advantages such as pooling of resources to either patronize good health services or provide adequate care with respect to providing good nutrition to infants and children (Kanmiki *et al.*, 2014).

Conversely, another study found out that single mothers were less likely to experience U5M (Worku *et al.*, 2009). The author claims that single mothers are more autonomous and therefore able to frequently visit health facilities when the child is sick but this can only be possible when single mothers are economically stable. In Karemo Sub-County, similar to Siaya County, 65.3% of women with U5s are married while 34.7% are single (widowed, divorced or separated) (MICS, 2011). However, there is no evidence base supporting the influence of marital status on U5M within this community.

2.1.3 Birth order

Previous literatures have shown an increased risk of child death for highest-order births (Manda *et al.*, 1999; Brockerhoff *et al.*, 2000; Singh *et al.*, 2015). Children with birth order 3-4 and birth order 4+ have higher risk to under-five mortality of life than the children with birth order 1 (Islam *et al.*, 2008). The possible reason could be effects of repeated pregnancies in depleting a woman resources and straining her reproductive system. These effects are likely to be compounded by the fact that higher parity women are more likely to have closely spaced birth (Islam *et al.*, 2008).

The KDHS (2008) confirmed this pattern for higher order births in under-five mortality with births of order 7 and higher experiencing the highest levels of childhood mortality except for post neonatal and child mortality. In addition, the finding of Ettarh *et al.*, (2012) confirmed that higher birth order was significantly associated with an increased likelihood of mortality in the overall sample but this result was only significant in the urban areas and not rural areas. On the

contrary, other findings showed no influence of birth order on under-five mortality (Ronsmans *et al.*, 1996; Deribew *et al.*, 2007). In Siaya County, most mothers have high parity hence they tend to give birth to 4 and above children but this is common among older mothers (>35 years). More so this situation is also characterized by mothers in polygamous unions (MICS, 2011). Contrarily, no documented evidence has shown an association between birth order and U5M in Karemo Sub-County.

2.1.4 Birth interval

The length of birth interval significantly impacts child chances of survival, with short birth intervals considerably reducing the chances of survival (Islam *et al.*, 2008). Children born fewer than two years after a prior sibling suffer substantially higher risks of death than children with interval of two or more years. For example under-five mortality is 130 deaths per 1000 live births for children born after an interval of less than 2 years compared with a rate of 78 deaths per 1000 live births for birth intervals of 4 or more years (KNBS and ICF Macro, 2010).

This could be due to the fact that woman with short birth intervals between two programs have insufficient time to restore their nutritional reserves, a situation, which is thought to adversely affect fetal growth. Competition among siblings is considered a plausible mechanism in the association between birth intervals. The situation may have a bearing on the nutrition of the young child (Boerma and Bicego, 1992). In Siaya County more than half (57.3%) have a birth interval of less than 24 months after a previous child while 42.7% have longer birth intervals of 2 years and above (MICS, 2011). This is one of the factors that are linked to U5M within the County. However, no document has linked the period of birth spacing to U5M in Karemo Sub-County.

2.1.5 Gender of the child

Several studies conducted in developing countries have shown that infant mortality is higher for boys than for girls (Huq and Cleland, 1990; Rahman *et al.*, 2005). A study done in Nairobi slum of Kenya on U5M showed that male children were significantly more likely to die than female children (Mutisya *et al.*, 2010). This finding agrees with the KDHS report that showed higher mortality rate among male children than female children across all childhood mortality indicators (KNBS and ICF Macro, 2010). However, some studies have shown different results with one

conducted in Malawi finding no significant effect of gender on child mortality (Manda *et al.*, 1999).

Contrarily, a study conducted in India on determinants of U5M showed a slightly higher mortality for girls than for boys (Nath *et al.*, 1994). The consensus in the literature is that girls - +have a biological advantage than boys, causing higher rates of infant mortality for boys. These findings were similar to a study conducted in Karemo Sub-County that revealed prompt seeking for care for male children compared to female (Mchembere, 2013). This notion is supported by Pokhrel *et al.*, (2005) who argues that the gender of the child not only affect illness report but also the decisions to choose health care provider but also the cost to be used in treatment.

2.1.6 Marriage type

Most studies have not looked at the effect of polygamy on child mortality. However, a study conducted by Kanmiki *et al.*, (2014) showed that children whose mothers are in polygamous unions have higher chance of experiencing under-five death than those in monogamous marriages. This may be due to possible rivalry from co-wives and neglect from husbands during pregnancy and early child care which is typical of African polygamous marriages with consequential effects on child survival (Kanmiki *et al.*, 2014).

It could also be due to the fact that in this predominantly agrarian communities where women do not have formal jobs and often tend to rely on the little resources that are provided by their husbands, women who are in polygamous marriages will be doubly stretched with regards to resources because the little the husband has will have to be shared among the several wives (Kanmiki *et al.*, 2014). This study agrees with a longitudinal study done in Nigeria which revealed that monogamous marriage had less likely association with U5M compared to polygamous (Gbenga *et al.*, 2012). Despite Karemo Sub-County being a culturally homogenous community in which polygamous union is accepted, there is no documented literature that has linked polygamous union with U5M.

2.1.7 Religion

Many studies done in the developing countries have shown an association between religion and U5M (Black *et al.*, 2003; Adhikari *et al.*, 2010; Engmann *et al.*, 2013; Ettarh *et al.*, 2012). Contrary to a study done in the rural Northern Ghana that did not show significant association though the odds points to the fact that respondents who did not practice any religion and those

who practice traditional religion had a higher chance of experiencing under-five death than Christians and Muslim (Kanmiki *et al.*, 2014). This was consistent with a study done in Nigeria which showed that children born to mothers who practiced traditional religion had increased risk of about thrice than the general population to experience perinatal deaths (Doctor *et al.*, 2011). Conversely, a study done in Bangladesh showed no significant effects of religion on under-five mortality (Islam *et al.*, 2008). However, it is important to note that many of these studies highlighted above have not researched on the different factions (denominations) of religion.

2.2 Maternal socio-economic factors influencing under-five mortality

2.2.1 Maternal income

In developing countries poverty is one of the strong predictor of child mortality (Doctor *et al.*, 2011). Evidence reveals that households with lower wealth quintile have higher probability of high U5M (Lawn *et al.*, 2005; NDHS, 2008; KNBS and ICF Macro, 2010; Ettarh *et al.*, 2012). However, only few studies have assessed the impact of maternal income on U5M (UNICEF, 2012). Higher income households tend to experience less of U5M compared to lower household income. This finding was in agreement with another study that was conducted in Bangladesh that equates higher income to less U5M (Islam *et al.*, 2008). However, these two studies never assessed maternal income exclusive of paternal income.

It is imperative to include maternal income in determining factors influencing U5M because it determines the financial strength of the mother to seek appropriate and timely treatment at the onset of illness whether the husband is present or not at the moment. For example, in a study conducted in Nigeria; one respondent claimed that her child died because the husband was away and she never had money. Similar situation was evident in Niger and Kenya where mothers would seek spiritual intervention since these healers charge less of what it would be required in the health facilities (UNICEF, 2012). Despite the awareness of free maternal and child health services at the health facilities, mothers claimed financial constrains in transportation to the facilities and purchase of prescribed drugs at the pharmacy (UNICEF, 2012).

In Siaya County, most households have been rated poor (56.4%) followed by 23.2% who are in the middle tertiles while only 20.5% are in the richer tertiles (MICS, 2011). To add on, most mothers are either housewives or farming hence survived on limited resources from their

husbands (Odhiambo *et al.*, 2012). However, there has been no documented evidence of an association between maternal income and U5M within the County or in Karemo Sub-County.

2.2.2 Literacy level/Education

Education can exert a positive influence on child health and survival. Studies done across developing countries have found a strong association between maternal education and U5M with majority showing that child mortality rate is higher among less educated mothers compared with mothers who have higher levels of education (Deribew *et al.*, 2007; Worku *et al.*, 2009; Oti *et al.*, 2011). Kenya Demographic Health Survey (2008) revealed that under-five mortality rate is noticeably lower for children whose mothers either completed primary school (68 deaths per 1000 live births) or attended secondary school (59 deaths per 1000 live births) than among those whose mothers have no education (86 deaths per 1000 live births). However, U5M is highest among children whose mothers have incomplete primary education (KNBS and ICF Macro, 2010).

Islam *et al.*, (2008) in Bangladesh found out that the mother education level had significant positive effect on child mortality. Educated mothers in rural areas with primary and secondary levels of education were 0.351 and 0.224 times less likely to experience child mortality than mothers with no basic education. In another study done by Tariku *et al.*, (2013) in Ethiopia revealed that the incidence rate of under-five deaths per 1000 person years among births to mothers with no education was more than double compared to mothers with secondary and tertiary level of education. Another cross-sectional survey done in South Africa showed a strong survivorship of U5M on mothers who had access to education than to mothers who had no access to education (Kwabena *et al.*, 2011).

The levels of maternal education showed a distinct influence on under-five mortality, the rates being lower for mothers with secondary education. This phenomenon may be attributed to children of educated mothers enjoying better diets and better overall care than the children of non-educated mothers (Bairagi, 1980). Mozumder *et al.* (2007) suggests that the decline of U5M can be attributed to increasing educational levels among parents, and changes in the length of birth interval associated with fertility decline. Ettarh *et al.*, (2012) further suggests that education increases a mother's level of knowledge and skills, thus enabling her to effectively understand

and utilize available information and resources critical for child health and survival. However, no study has linked maternal education and U5M in Karemo Sub-County.

2.2.3. Occupation

Different cross-national studies done in developing countries suggested that maternal occupation influence U5M (Sivakami, 2003; Mustafa & Odimegwu, 2008; Chowdhury *et al.*, 2010). Kishor & Parasuraman (1998) found out that a mother's employment status does affect child survival. They reported that the chance of child death at age 12–47 months was significantly higher when the mothers were employed. The chances of dying at ages 0–11 months are higher only if the mother is employed in or outside the home for wages. In addition, Mustafa & Odimegwu (2008), study reports that child mortality is higher for mothers working in agriculture compared to those mothers not working. They attribute this to the nature of employment and the fact that women are not available to care for the children for long periods of time.

Another study done in Bangladesh revealed that neonatal mortality rate (NMR), Post neonatal mortality rate (PNMR) were higher in those who were employed while lower for children of mothers who are housewives (Chowdhury *et al.*, 2010). Similarly, Islam *et al.*, (2008) also found out those women who were in “services” group and “others” groups were of a higher risk to have children losses at child mortality than housewife groups. Moreover, a more recent study conducted by Kanmiki *et al.*, (2014) in Northern Ghana found out a higher proportions of those mothers involved in farming and the self-employed experiencing high U5M compared to civil servants and students (Kanmiki *et al.*, 2014). However, Pandey *et al.*, (2009), did not find any association between maternal occupation and U5M.

In addition, employment can increase women autonomy and reproductive health status because it raises awareness and provide new ideas, behaviour and opportunities through interaction with people outside the home and community (Sharma *et al.*, 1998). However, the role of female occupation must be seen in light of financial package i.e. the amount paid is able to employ house help, able nutritious diet and quality health services and if not then it is likely to have negative impact of U5M (Sharma *et al.*, 1998). In Karemo Sub-County, most women live by subsistence farming and small scale training, only few are salaried or employed while the rest are housewives who depend fully on their spouse to provide for them (Odhiambo *et al.*, 2012).

However, there is no evidence base that link maternal occupation and U5M in Karemo Sub-County.

2.3 Maternal Health seeking behaviour

2.3.1 Place of delivery

The likelihood of U5M has been linked to place of delivery with evidence indicating that women who deliver at the health facilities have lower probability of reporting child death compared to those delivering in home settings (Deribew *et al.*, 2007; Doctor *et al.*, 2011). Another study done in Bangladesh found out that medical attention at the time of delivery, ANC, and place of delivery are statistically significant factors of child survival (Mondol *et al.*, 2009). The differences in child survival have largely been driven by the use of skilled delivery care at health facilities compared with the deliveries that occur at home which in most cases are not attended to by skilled birth attendants. Conversely, studies conducted in Nigeria and South Africa found that place of delivery did not have an effect on perinatal and under-five mortality (Worku *et al.*, 2009; Oti *et al.*, 2011).

2.3.2 Perceived distance to the health facilities

One critical variable that has consistently been shown to affect access to care in developing countries is the distance from the patient house to the clinic. The phenomenon of decreasing health care utilization with increasing distance lived from a facility is often called the distance-decay effect (Feikin *et al.*, 2009). Previous studies demonstrate a pronounced decline in clinic attendance with increasing distance of residence. The rate of clinic attendance was found to halve by 2 to 3.5 km. In rural western Kenya the declines in clinic attendance with distance are steeper; the reasons for this are unclear. In addition, a study conducted by UNICEF Kenya in Homa Bay County, confirmed that distance from home to the health facility was a challenge for many caregivers (UNICEF, 2012). In rural Asembo in (2003–2004), a situation similar to Karemo Sub-County, few transport options existed except for walking and the use of motorbikes. As such, the gradient of time expended in visiting the clinic would increase steeply as distance from the clinic increased (Feikin *et al.*, 2009).

In other African settings where other forms of public transport exist, physical distance might be less of a factor in clinic visitation than the cost of transport (Feikin *et al.*, 2009). Access was

usually by foot across difficult terrain, made more problematic during the wet season. Although some routes were navigable by bicycle or motorbikes, hiring transport required additional expenditure. Most caregivers were therefore forced to walk, often carrying their sick child, and this often prohibited attendance (UNICEF, 2012).

In Karemo Sub-County, accessibility to the health facilities might not be a challenge. Most roads are all weathered and well maintained while few are tarmac. In addition accessibility is easier with motorbikes and bicycles apart from footing. Furthermore, most dispensaries are situated about 3-5 Km apart with the farthest being about 5Km from the nearby government health facilities (SCRH, 2016). However, there is no documented evidence that link distance to the health facilities and U5M in this community.

2.3.3. Perceived quality of care

One of the factors to high U5M is the nature of the service being offered at the health facility (Das *et al.*, 2008). A number of studies have indicated this predicament. For example in a study conducted by Chibwana *et al.*, (2009), revealed that long queues were the barriers to health facilities. This was attributed to the system which mixed adults, youths with under five and due to the fact that there is no specific clinician for under-five children in rural Sub-counties where the health facilities are under staffed. In addition the facilities were being closed at 12 O'clock for lunch break leaving patients still queuing and also during the weekends and sometimes no medical assistance around. Health workers and caregivers also mentioned other facility-based factors such as shortage of drugs and lack of diagnostic capacity as a reason for not seeking care promptly (Chibwana *et al.*, 2009).

Moreover it was put on record by some caregivers the kind of mistreatment they undergo in the hands of the health professional, a situation that was confirmed by the health professional claiming that it was due to shortage of staffs hence they handle huge numbers of patients. The health facilities lacked triage as a result some children die on the queues and again due to long queues, clinicians make hasty examination missing out some relevant information for appropriate treatment (Chibwana *et al.*, 2009).

In another study conducted by Das *et al.*, (2008) pointed out that the quality of care provided at the average health facility in developing countries is low, and much research points to the fact that the quality of care provided to poor and rural populations is lower still. Moreover, Klemick *et al.*, (2009) highlights the low levels of competence and lower levels of performance of the health care practitioners posted to these facilities as a reason to the compromised quality observed. Contrarily, there is no study that has shown an association between quality of care at the health facilities and U5M in Karemo Sub-County in Siaya County.

2.4. Conceptual framework for this study

Child mortality has been the subject of investigation for a long time with many scholars trying to find out possible causes that could be curbed to zero it. Previous studies have used different conceptual framework to analyze the impact of various factors on child survivals (Gorthmaker *et al.*, 1979; Mosley and Chen, 1984; Sastry *et al.*, 1997; Sharma *et al.*, 1998; Meegama *et al.*, 1980). However, this study was based on the conceptual framework for child health and mortality modeled by Mosley and Chen (1984).

The authors made distinctions between variables considered to be exogenous or socio-economic; cultural, social, economic, community and regional factors, and endogenous or biomedical factors; breastfeeding patterns, hygiene, sanitary measures, and nutrition. They agreed that these underlying factors or socio-economic factors affect child morbidity and mortality indirectly through biomedical factors termed as proximate determinants (Mosley and Chen, 1984).

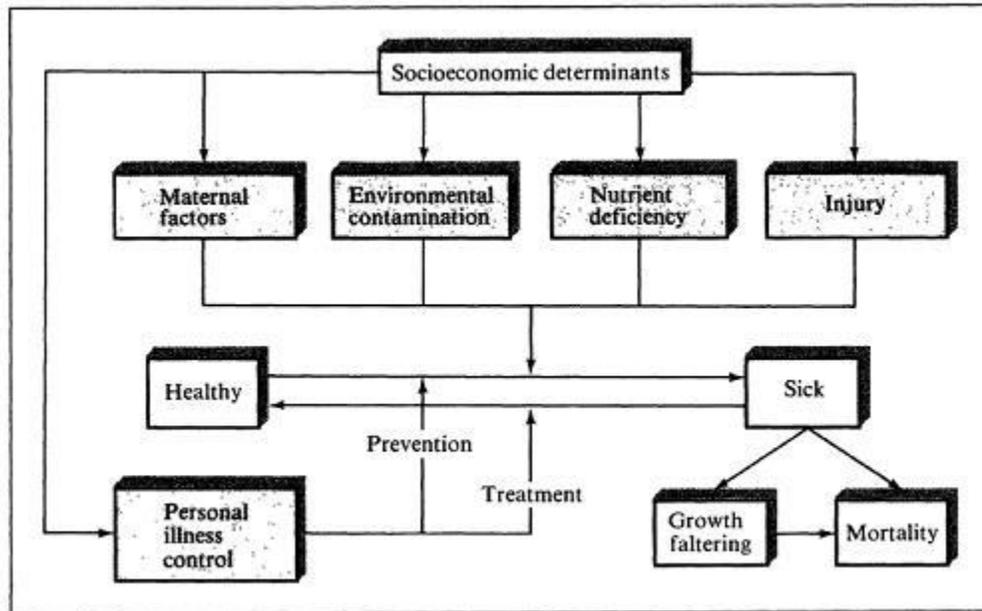
These socio-economic determinants are grouped into three broad categories of factors: individual, households and community. Individual level factors include individual attributes such as skills, health and time, usually measured by mother's educational level, whilst the father's education level correlates strongly with occupation and household income; traditional norms/attitudes i.e., power relationship within the household, values of children, beliefs about disease causation and food preferences. Household level factors include income/wealth effects such as food availability, quality of water supply, clothing, bedding, housing conditions, fuel/energy availability, transportation, means to purchase day to day essential items of hygiene/preventive care, and access to information. Community level factors include the ecological settings (climate, temperature, altitude, season and rainfall), political economy

(organization of food production), and physical infrastructure (roads railways, electricity, water, sewage, and political institution and health system variables).

These factors operate through proximate determinants that directly influence morbidity and mortality risks among children (Mosley and Chen, 1984). The basic feature of the two author's framework is the specification of a set of 14 proximate determinants through which all socio-economic determinants must operate to influence the risk of morbidity and mortality among children (Mosley and Chen, 1984; Schultz, 1984). In this frame work, the socio-economic factors operate through maternal demographics, environmental factors, nutritional deficiency, injuries and personal illness control.

These determinants are categorized into 5 major groups. They include: maternal factors such as age at birth, parity and birth intervals; environmental contamination (the air, food, water,); nutritional efficiency such as nutrients availability to the infant or to the mother during pregnancy and lactation; injury related disabilities; personal illness control such as use of preventive services including immunization, malaria prophylactics or antenatal care, and the use of curative measures for specific conditions. This study focused exclusively on the maternal socio-demographic factors, maternal socioeconomic factors and maternal health seeking behaviour and how these factors influence high U5M in Karemo Sub-County in Siaya County (**Figure 2.1**).

Figure 2.1: Analytical framework for childhood survival in developing countries



Source: Mosley and Chen (1984). An analytical framework for the study of child survival in developing countries

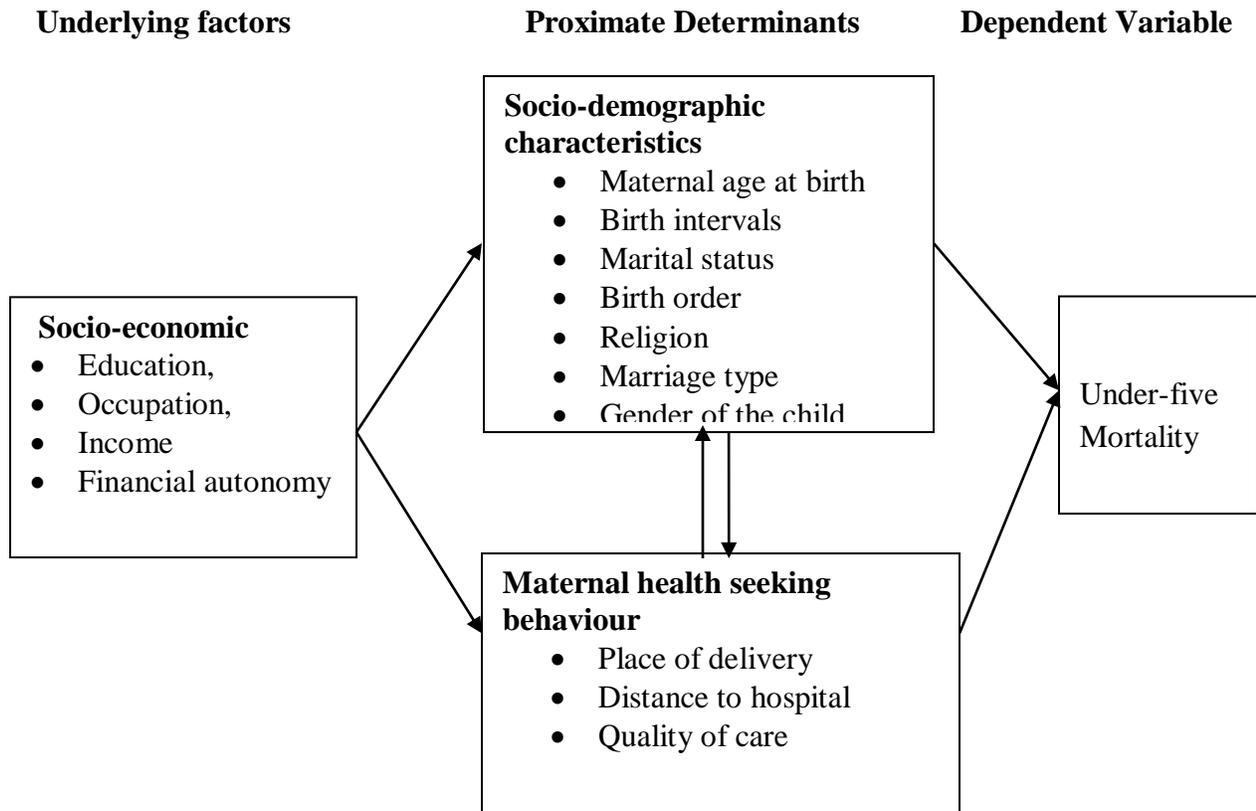
2.5 Operational framework

The operational framework was modified from Mosley and Chen, 1984 analytical framework to help guide investigation on appropriate factors influencing under-five mortality in Karemo Sub-County, Siaya County in Kenya (**Figure 2.2**). The basis of choosing this framework was as follows:

1. The Mosley and Chen (1984) analytical framework contains a proposition of the proximate determinants of mortality which if supposedly exhaustive and systematic, U5M would change if one or more of the determinants also changes (Hill *et al.*, 2000).
2. It attempts to address the linkage between U5M due to public interventions on one hand and social, economic and intermediate variables on the other hand.
3. It also offers a scheme that treats socio-economic factors, such as individual productivity of the fathers and mothers, income/wealth, ecological settings, political economy and the health system as independent variables that must act through five proximate determinants (Islam *et al.*, 2008).

4. In addition, it allows all the proximate determinants to be measured either directly or by use of a proxy from the available sources of information (Titaley *et al.*, 2008)

Figure 2.2: Operational frame work for Under-fives' survival



Source: Adapted from Mosley and Chen's (1984), Analytical framework for the study of child survival in developing countries

CHAPTER THREE: MATERIALS AND METHODS

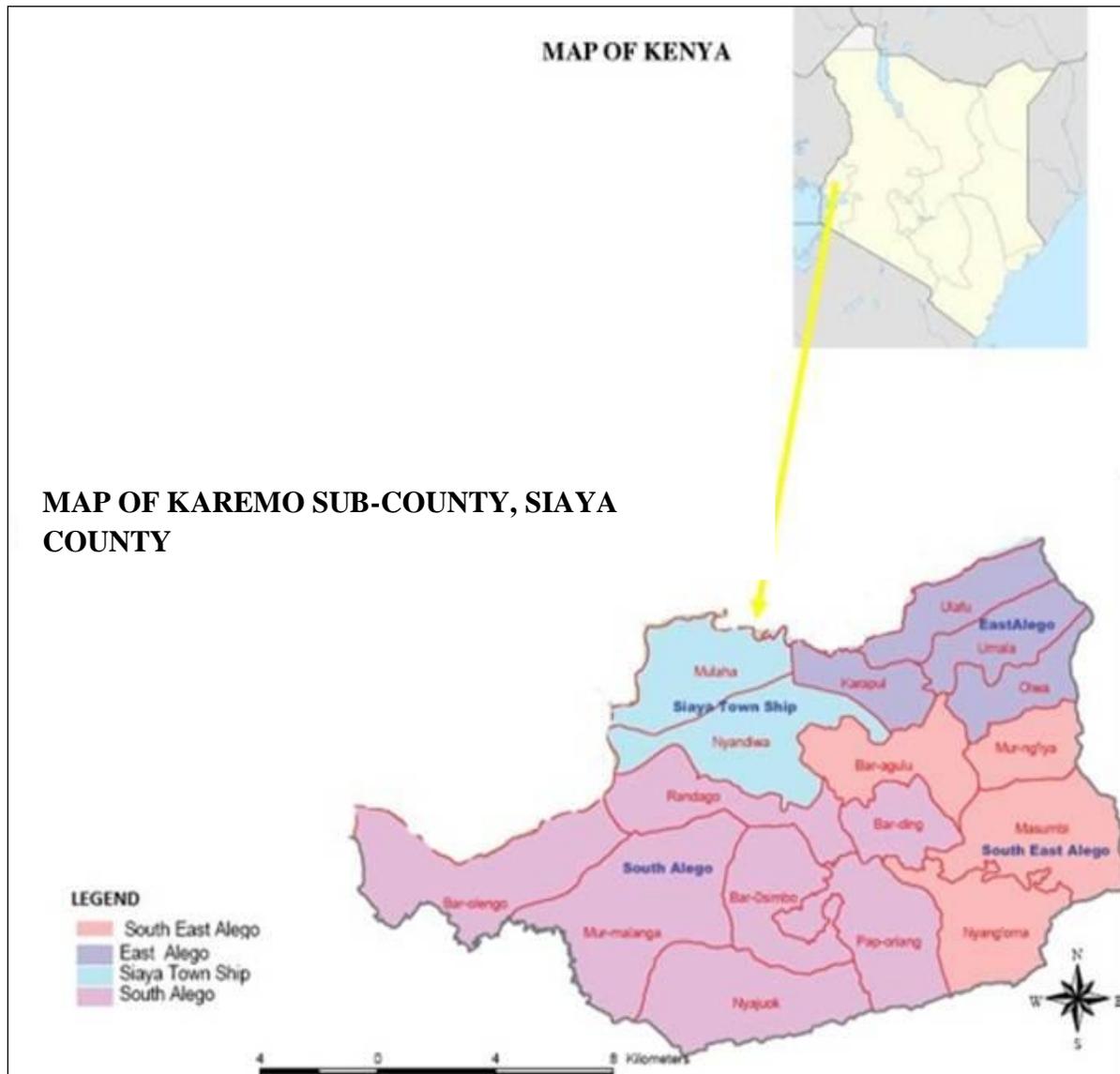
3.1 Study Site

Karemo Sub-County is located in Siaya County in western Kenya (**Fig 3.1**). The total population is approximated to be 88,705 (Male 47%; Female 53%) individuals. In terms of size, it covers an area of 239.8 km² (KNBS and ICF Macro, 2010). Moreover, it is situated at approximately 0.220S–0.230N latitude, 34.530W– 34.280E longitude. The rainfalls are seasonal with the heaviest ‘long’ rains occurring from March through May and ‘short’ rains falling between October and December with bimodal peaks in April–May and November–December. The average temperatures range between 17.8C and 35.8C at a mean altitude of approximately 1070 metres above sea level. Most of the houses are built of mud, cement or brick with roofs of iron sheets or thatched grass (Odhiambo *et al.*, 2012).

The population is predominantly rural and culturally homogeneous. Over 95% of its members are of the Luo ethnic community and earn their livelihoods through subsistence farming and local trading. These residents live in households and compounds (Odhiambo *et al.*, 2012). There are 8 government functioning health centers/dispensaries (Ng’iya, Ting’wangi, Kadenge, Bar Olengo, Umala, Mulaha, Barding’, Nyangoma) and one county referral hospital and other private health facilities (SDHS, 2013). The major causes of childhood mortality are diarrheal diseases, respiratory diseases (pneumonia), malaria (which is high and perennial with seasonal peaks in May–July and October–November), malnutrition, measles and HIV related complications (Amornkul *et al.*, 2009).

Kenya Medical Research Institute (KEMRI) and the US centers of Disease Control and Prevention (CDC) have been conducting collaborative public health research in Siaya County over a period of 10 years (Odhiambo *et al.*, 2012). In 2006, the population of Karemo Sub-County was also included and is being monitored under a Health Demographic Surveillance System (HDSS) that records every birth, death and migration (into, out of, and within the study Sub-County) every 4 months. The Sub-County has approximately 168 villages of 400-700 people each, 13402 compounds and 21150 households. Families live in compounds and each compound has been mapped using Geographic Information System (GIS) coordinates (Odhiambo *et al.*, 2012).

Figure 3.1: Map of Karemo Sub-County, Siaya County in Kenya



3.2 Study Design

This was a retrospective cross-sectional design. The design enabled the researcher to obtain pertinent and precise information at a specific point in time within a specified geographical boundary. Thus, the design was used to collect data on factors influencing U5M in Karemo Sub-County in Siaya County in the month of February 2016. The design was in the form of household survey in which interviewers administered pre-tested structured questionnaires to the respondents on a face to face interview. The questionnaires were used to elicit information on the socio-

demographic characteristics (mother's age, birth order, birth interval, gender of the child, religion, marriage type and marital status), socio-economic (maternal education, occupation, income and female financial autonomy) and maternal health seeking behaviour (place of delivery, perceived distance to health facility and perceived quality of care) and their influence on U5M in Karemo Sub-County.

3.3 Study Population

The target population of this study was the entire population of women of reproductive age (15-49 years) residing in Karemo Sub-County, Siaya County that had given birth 59 months preceding the survey and who had met the inclusion criteria spelt below. The sample frame for this study consisted of all women of reproductive age who were the actual mothers of these children below five years of age in Karemo Sub-County, Siaya County.

3.3.1 Inclusion criteria

To be eligible for inclusion into this study, a participant had to be a woman of reproductive age who had a child below five years of age. They also met the criteria spelt below:

1. Must be a resident of Karemo Sub-County (potential participant states that she must have lived in Karemo for the last four month (4 months)).
2. Spent the night or eaten in the selected household the night before the interview.
3. A woman aged 18 years and above or mature minor who had a child below 5 years of age.
4. Able to provide informed consent.

3.3.2 Exclusion criteria

1. A participant who was in the same household with another participant yet was not selected through lottery method.
2. Care takers of under-fives i.e. a woman who had under-five but she wasn't the actual mother of the child.
3. Not able to provide informed consent.

3.4 Sample Size Determination

The sample size calculation was aimed at obtaining adequate statistical precision. This calculation was done using the Fishers *et al.*, (1998) formula as shown: $n=Z^2Pq/d^2$. The prevalence of U5s mortality in Karemo Sub-County was approximated at 0.184 and was used in the calculation with 95% confidence interval and 5% significance level. The calculation is as shown below:

Where; n =desired sample size
 Z =standard normal deviation at the required confidence level
 d =marginal error or degree of accuracy desired (95% confidence limit, thus $d=0.05$)
 p = proportion of under-five mortality was approximated at =0.184
 q = $(1-0.184) = 0.816$
 $n=1.96^2 \times 0.184 \times 0.816 / 0.05^2 = 230$ U5s.

Since the target total population was more than 10,000, we took our sample size to be 230 women. A 30% sampling error was calculated as follows (30% of 230) =69 thus giving a sample size of $230+69=299$ mothers of U5s. These 69 women were added to cater for non respondents.

3.5 Sampling Technique

This study employed a multi-stage probability random sampling technique. The Sub-County is divided into 4 locations with 17 sub locations, 168 villages and 21150 households. Each sub-location has approximately 8-10 villages. In the first stage, 5 sub-locations were randomly selected out of the 17 sub-locations. In the second stage, 299 households with women who had children below five years of age were sampled from the 5 selected sub-locations. The five sub-locations randomly sampled were: Nyangoma, Mulaha, Pap Oriang', Mur-Ngi'ya and Barding'. Since the number of U5s varies per cluster, probability proportional to size was employed to determine the number of households to be surveyed per sub-location. The sampling frame of all U5s as of the year 2015 was extracted from the Community Health Extension Workers (CHEWS) data recoded in the nearby affiliated health facilities attached to the 5 sub-locations.

Prior to data collection, the centre of each village was determined through the help of village elders and the direction of movement was selected randomly by picking of a piece of paper

written North, South, East and West. The first household was selected at random according to the direction chosen and then subsequent households were interviewed until the threshold per cluster was achieved. All women of reproductive age who met the inclusion criteria spelt above were requested to participate in the study. In cases where there were more than one index participant per household, one selected by lottery method was interviewed.

3.5.1 Procedure for probability proportion to size calculation

$$\frac{\text{No. of U5s/cluster}}{\text{Total no. of U5s in the 5sub – location}} \times 299 \text{ U5s}$$

For example, Mur-Ng’iya has 1041 children below five years of age and the total number of U5s in the five sub-location was 6260 U5s. Therefore the number to be sampled in this sub-location

$$\text{was; } \frac{1041}{6260} \times 299 = 50 \text{ U5s.}$$

The sample unit therefore, was women of reproductive age (15-49 years) who were the actual mothers of these children but not the children themselves. The results were tabulated as shown in **Table 3:1**.

Table 3.1 Number of households interviewed per cluster using probability proportion to Size

NAME OF THE CLUSTER	NO. of U5s/cluster	No. of H/H selected by PPS
MULAHA	1641	78
NYANG’OMA	1358	65
MUR-NGIYA	1041	50
BARDING	527	25
PAP ORIANG’	1693	81
TOTAL	6260	299

Source: CHEWS’ report of U5s 2015.

3.6. Definition and measurement of variables

i Dependent variable (U5M)

The dependent variable of this study was under-five mortality (U5M). It is the probability of a child dying between birth and before celebrating his or her fifth birthday. The variable is

measured as the number of deaths recorded in the same age interval, 0-59 months as a division of the person's months lived in the same age interval i.e. being measured per 1000 live births.

ii **Independent Variables**

a) **Mother's age at birth**

This is the exact age of the mother at birth of the index child. It was computed as the difference between the actual age of the mother at the time of the survey and the age of the index child. The researcher decided to categorize all independent variables. Thus, mother's age at birth was categorized as follows: women who had given birth to the index child when below 20 years, between 20-34 years and above 35 years were categorized as <20 years, 20-34 years and 35+ years.

b) **Birth intervals**

This variable refers to the length in months of the preceding birth before the index child. The variable was categorized into two with births of less than 2 years or 24 months as <2years and those above 2years or above 24 months as >2years.

c) **Gender of the child**

This variable refers to the gender of the child who died before five years of age. Categories used here are 1 for male and 2 for female.

d) **Maternal education**

This is the highest level of education the mother had attained during the time of the survey. The variable was categorized into 4 categories with those with no education at all being categorized as "None", those who had not completed and those who had completed class eight being categorized as "Primary", those with secondary education or never completed secondary but joined form one being categorized as "Secondary" and lastly those with post secondary education being categorized as "tertiary".

e) **Maternal occupation**

This variable was defined as what the mother does to generate money at the time of the survey. Five categories were used in this variable. Those with no occupation or income generating activity were grouped as "None", those involved in farming for sale were categorized as "farmers", those in business as "Business", those in employed, teachers, civil servants were

grouped as “professionals” while those involved in activities such as house helps, casual workers e.tc being categorized as “Others”.

f) Monthly income

This refers to what the mother earns from all her financial sources for the last one month or on average what she could earn per day multiplied by the number of days worked. In this study excluded financial contribution of the husbands or partners since in order to understand position of the mother in readiness to care for the U5M. Categories used here are 1 for < Ksh2000, 2 for Kshs2-4,999, 3 for Kshs 5-10,000 and 4 for >kshs 10,000.

g) Marital status

Marital status defines the state of the household and its relation to the protective effect. In this study we used 2 categories namely; single and married. Women who were widowed, separated or divorced at the time of the survey and those who were never married were all categorized as “Singles” while those who were staying with male partners at the time of the survey were considered married.

h) Type of marriage

This variable was only applicable to those women who married. This was to assess whether polygamous union influence U5M. The variable was categorized into two parts namely; monogamous union and polygamous union

i) Religion

This variable deals majorly with the spiritual aspect of a human being. It is recorded that all human beings are worshippers of someone or something that they highly regard to control their well being named ‘god’. This fact of ‘supreme god’ leads to segregation of religion to different groups: Christians, Muslims, Buddhism and many more. In this study, the respondent religious affiliations were categorized as either Christians or Muslims.

j) Place of delivery

This refers to the place where the mother gave birth to the child or where the child was born. The categories used here are 1 for being born at hospital (both private and public), 2 for being born at home and 3 for being born in a TBAs home or house.

k) Perceived distance to the health facility

This refers to how far the mother is from the nearest health facility. The government recommends a 5 km radius to the nearest health facility. The categories used here are as follows; 1 for <3km, 2 for 3-5km and 3 for >5km.

l) Perceived quality of care

This refers to the promptness and efficiency in the kind of services received by the mother at the health facility. It comprises of time taken for the sick child to receive treatment, how to manage queues, availability of drugs and the public relationship between clients and the hospital personnel. This variable was categorized has 1 for poor, 2 for Fair, 3 for good and 4 for Excellent services.

3.7 Methods of Data collection

Data was collected using pre-tested structured questionnaire on a house to house survey (**Appendix 1**). Three trained research assistants (RA) administered the questionnaire on a face to face interview with each expected to interview approximately 10-15 respondents depending on the distance between households. The researcher purposed to choose ladies as RAs on the assumptions that some questions asked in the questionnaire seemed to be too sensitive to the respondent hence they might have felt uncomfortable to disclose the fact to male RAs.

The questionnaires were then checked for accuracy and completeness. They were then kept under lock and key to ensure privacy and confidentiality at the end of each day. The assurance of anonymity was done by requesting other household members to vacate the house while completing questionnaires and observation checklists. At the end of data collection process, all the questionnaires were randomly mixed before data entry and analysis.

3.8 Instruments pre-testing

Prior to data collection, recruitment and training of three research assistants was conducted. During this period, RAs were taken through the questionnaire step by step and each question was read and interpreted to enable the RAs obtain deeper understanding of the questions. They were further engaged in translation of the tool into Dholuo which is the native language of the study area (**Appendix 1**). This was followed by pre testing of the data collection tools in Boro Sub-County-selected based on the similarity of parameters being tested as the study site where 10%

of the total sample size was used. The purpose of instrument pre testing was to ensure the tools were clear i.e. answerability of the questions, the sequence of the questions, readability and appropriate time taken to answer each questionnaire.

3.9 Data quality

During the survey, a number of data quality assurances were put into consideration. These included proper training of RAs, checking the questionnaires at the end of each day for completeness and in case of any mistakes, the questionnaire was returned to the RA who was required to go back to the household to collect the missing information. Further, data cleaning was performed manually and several consistency checks carried out to ensure accuracy and completeness. The test re-test method was used to assess the reliability of the instruments. This involved administering the same questionnaires twice to a portion of the target population at an interval of 5 households as the process of data collection was going on and correlating their responses independently. Moreover, the validity of the instruments was ascertained by conducting a pilot study using 10% of the sample size. This ensured that the instructions are clear and all possible responses to a question are captured.

3.10. Data management and analysis

The collected data was in the custody of the researcher who always ensured privacy and confidentiality of the information given by the respondents. The completeness and consistency of the data were checked, coded and thereafter entered in Statistical Package for Social Sciences software (SPSS for Windows 22.0 Inc. Chicago. Illinois). Analyses were then conducted according to the specific objectives of the study. Descriptive analysis was first done to the respondent characteristics. This was followed by a bivariate analysis on variables identified in the conceptual framework using Pearson-Chi-square test. A two-sided p-value < 0.05 was considered statistical significant. Lastly, all variables that were significant in the bivariate analysis were included into binary logistic regression analyses to assess the relative impact of predictor variables on U5M. Odds ratios (OR) and 95% confidence Intervals (CI) were calculated. The data were presented in tables, frequencies and percentages.

3.11 Ethical consideration.

Prior to initiation of data collection, the ethical approval was obtained from School of Graduate Studies and the Maseno University Ethical Review Committee (MUERC) (**Appendix 2**). Further

approval was obtained from the County commissioner's office (**Appendix 3**). The participants were briefed on the background of the study before the beginning of interviews. Any false hope and expectation was discussed in detail in order to prevent any emotional or any other risk. The participants were informed of their autonomy and respect of voluntarily participating in the study and the ability to withdraw from the study at any time without penalty if they wish to do so. Thereafter, participants were then requested to sign the informed consent (**Appendix 4 & 5**). Participant confidentiality and privacy was maintained during data collection by ensuring that the participant was alone during the time of interview, ensuring that the questionnaires were kept safe after data collection and also by creating a password for access of the information in the computer and also unique codes instead of their names.

CHAPTER FOUR: RESULTS

This chapter presented the findings and interpretation of the study. It was sub divided into different sections. The first section involved the descriptive analyses of the study respondents. The second sections involved results from the inferential statistics (bivariate and multivariate analysis) done as per the specific objectives. The descriptive statistics was used to describe and summarize the data inform of tables, frequencies and percentages. The inferential statistics was used to help make inferences and draw conclusions. In bivariate analysis, Chi-square test was used. All variables that were significant at $p < 0.05$ in the Chi-square test were then included in the multivariate analysis conducted by binary logistic regression. The statistical Package for Social Sciences (SPSS) version 22 was used to analyze the data.

4.1 Socio-demographic characteristics

As shown in Table 4.1, 299 respondents participated in the study, majority 57.6% were between age 21-34 years followed by 22% who were between 35 and 49 years. The rest (20.4%) were below 20 years of age. About 8.1% were single mothers while 91.7% were married. Of those married, majority, 77.5% were in monogamous union while 22.5% were in polygamous union. Women with primary education were 52.1% followed by 33.4% who had completed secondary education while only 14.5% had tertiary levels of education. Moreover, most mothers 34.6% were engaged in business followed by 30.8% who had no occupation. Only 22.3% were farming, while 6.6 were self-employed and lastly 5.7% were salaried employed.

Table 4.1 Demographic characteristics of the respondents

Variables	Frequencies (n=299)	Percentages
Maternal age		
< 20years	61	20.4
21-34 years	172	57.6
35-49years	66	22.0
Marital status		
Single	25	8.3
Married	274	91.7
Type of marriage		
Monogamous	232	77.5
Polygamous	67	22.5
Education		
Primary	156	52.1
Secondary	100	33.4
Tertiary	43	14.5
Occupation		
None	92	30.8
Farming	67	22.3
Business	103	34.6
Salaried employed	17	5.7
Self employed	20	6.6

Legend: descriptive results of the respondents displayed in frequencies (n=299) and percentages (%)

4.2 Maternal and child socio-demographic factors influencing U5M

A total of 594 children below five years of age were captured in the survey. Of these U5s, 141 (23.7 %) had died before five years age prior to the survey. Most of these deaths occurred to mothers who were between 21-34 years (33.3% of 210 live births) followed by 22.4% of 268 live births to mothers below 20 years of age while 9.5% of 116 live births died to mothers who were 35 years of age and above. Maternal age was found to be a factor influencing U5M at a significant p-value of $p < 0.0001$. Similarly, 15.5% of 142 live births died to single mothers while 26.3% of 452 live births died to married mothers. Moreover, 33.1% of 236 live births died to monogamous mothers while 17.6 % of 358 live births died to mothers in polygamous union. Marital status and type of marriage were found to significantly influence U5M at a p-value of $p = 0.008$ and $p < 0.0001$ respectively.

Concerning birth order, 56.5% of 124 live births died to children with a birth order of 3 and below while 15.1% of 470 live births died to children with an order of 4 and above. The

relationship between birth order and U5M was found to be significant at a $p < 0.0001$. In addition, Children born to mothers with longer birth interval of more than 2 years experience less U5M (35.4% of 181) compared to 18.6% of 413 live births who had a shorter birth intervals of less than 2 years. This was found to be statistically significant at a $p < 0.0001$. However, there was no significant relationship between sex of the child and religion of the mother on U5M at $p = 0.195$ and $p = 0.112$, respectively (**Tables 4.2**).

Table 4.2: bivariate analysis of socio-demographic factors influencing U5M in Karemo Sub-County in Siaya County

Variables	Live Births	Deaths (%)	C: X^2 (DF)	D: $P < 0.05$
Maternal's age			23.972 ^a (2)	$P < 0.0001^*$
<20 years	268	60 (22.4%)		
21-34 years	210	70 (33.3%)		
35-49 years	116	11 (9.5%)		
Marital status			7.007 ^a (1)	$P = 0.008^*$
Single	142	22 (15.5%)		
Married	452	119 (26.3%)		
Birth Interval			19.423 ^a (1)	$P < 0.0001^*$
< 2years	181	64 (35.4%)		
>2 years	413	77(18.6%)		
Birth Order			92.649 ^a (1)	$P < 0.0001^*$
<3 births	124	70 (56.5%)		
4+ births	470	71 (15.1%)		
Sex of the child			1.676 ^a (1)	$P = 0.195$
Male	281	60 (21.4%)		
Female	313	81(25.9%)		
Type of marriage			18.763 ^a (1)	$P < 0.0001^*$
Monogamous	236	78 (33.1%)		
Polygamous	358	63 (17.6%)		
Religion			2.524 ^a (1)	$P = 0.112$
Christian	586	141 (24.1%)		
Muslim	8	0 (0%)		

Legend: 1st column indicate variables being analyzed against U5M; 2nd column indicates the total live births while the 3rd column indicate cases of U5M occurring in %. The 4th column indicates the X^2 (DF) values while the 5th column indicates Indicate p-values. *= Likelihood ratio chi square while DF is degree of freedom. Bold font indicates U5M **NOT** occurring.

To investigate the effect of socio-demographic factors on U5M in Karemo Sub-County, Siaya County in Kenya, binary logistic regression analysis was performed. As shown in **Table 4.3**, children born to mothers who were 35 years and above were three times more likely to die (OR, 3.214; 95% CI, 1.337-7.728; p=0.009) compared to children born to mothers of 20 years and below. However, children born to mothers between 21-34 years were 0.5% less likely to die compared to those whose mothers were below 20 years of age (OR, 0.995; 95%CI: 0.576-1.718; p=0.986). Similarly, children born to higher birth orders of 4 and above were seven times more likely to die compared to their counterparts of lower birth order of 3 and below (OR, 7.687; 95%CI: 4.293-13.763, p<0.0001). Moreover, children born to married women were 67% less likely to experience U5M compared to those born to single mothers (OR, 0.324, 95%CI: 0.162-0.649, p=0.001). Children born to mothers in a polygamous union were four times more likely to die compared to their counterparts in monogamous union (OR, 4.165, 95%CI: 2.376-7.299; p<0.0001). Furthermore, children born of short preceding birth intervals were almost two times more likely to die before 5 years of age compared to their counterparts who had longer preceding birth intervals (OR, 1.997; 95%CI: 1.168-3.414; p=0.011).

Table 4.3: binary logistic regression results of socio-demographic factors associated with under-five mortality in Karemo Sub-County, Siaya County in Kenya

Variables	OR	95% CI	P-value
Age: compared to < 20years			0.021
21-34 years	0.995	0.576-1.718*	
35-49 years	3.214	1.337-7.728*	
Marital status: compared to Single			
Married	0.324	0.162-0.649*	0.001
Birth Interval: compared to > 2years			
< 2years	1.997	1.168-3.414*	0.011
Birth Order: compared to < 3 births			
4+ births	7.687	4.293-13.763**	<0.0001
Marriage type: compared to Monogamous			
Polygamous	4.165	2.376-7.299**	<0.0001

Legend: Variables in **bold** indicate the reference categories. Data are presented as odds ratios (OR) and 95% confidence interval (CI). ** p<0.0001 & * p<0.05. Values in bold indicate significant P-values

4.3 Socio-economic factors influencing U5M in Karemo Sub-County

Accordingly, as presented in **Table 4.4**, maternal education exerts a positive influence on under-fives mortality. About 20.6% of 339 live births died to mothers with primary levels of education followed by 24.7% of 162 live births who died to mothers with secondary levels of education. Majority, 33.3% of 93 live births died to mothers with tertiary levels of education. Maternal education revealed a statistical significance at a $p < 0.0001$ to U5M. Furthermore, 32% of 200 live births died to mothers without any occupation followed by 33.0% of 42 live births died to mothers who were salaried/ employed while 19.9 % of 201 live births died to mothers who were engaged into business/self-employed. Only, 15.2% of 151 live births died to mothers who were farmers. The relationship between occupation and U5M was found to be significant at a $p < 0.0001$. Moreover, Children born to mothers with a monthly income of Shs. 10000 and above (32.8% of 58) live births died before age five while 32.4% of 71 live births died to mothers who earned Shs 5000-10000 monthly. About 24.1% of 228 live births died to mothers who earned between Shs 4999 while 18.6% of 237 died to mothers with no monthly income. Maternal income exerts a statistical significant on U5M at a $p = 0.028$. However, maternal financial autonomy was not significant at a $p = 0.794$.

To establish the effect of socio-economic factors on under-five mortality in Karemo Sub-County, Siaya County in Kenya, binary logistic regression was performed. The results were presented in **Table 4.5**. Maternal education significantly influence U5M at a $p < 0.0001$. Children born to mothers with secondary levels of education were 56% less likely to experience U5s death compared to those whose mothers had primary levels of education (OR, 0.431; 95%CI: 0.243-0.766, $p = 0.004$). Similarly, those born to mothers with tertiary levels of education were 77% less likely to experience U5M compared to their counterparts whose mothers had primary education (OR, 0.223; 95%CI: 0.102-0.487, $p < 0.0001$).

Maternal occupation showed statistical significance with U5M at $p < 0.0001$. Children born to mothers who were farmers and those who were engaged in business (self-employed, casual jobs) were 4 (OR, 4.633; 95%CI: 2.435-8.816, $p < 0.0001$) and 1 (OR, 1.515, 95%CI: 0.901-2.340, $p = 0.061$) times respectively more likely to die before 5 years of age compared to those born to mothers who had no form of occupation (students, housewives). Contrarily, those born to

mothers who were employed/ salaried were 6% (OR, 0.941, 95%CI: 0.464-1.909, p=0.867) less likely to die before age 5 compared to those whose mothers had no form of employment.

Maternal income (p=0.070), place of delivery (p=0.357) and distance to the health facilities (p=0.156) did not confer significance with U5M in the multivariate analysis. However, the odds revealed likelihood of U5M within the categories. For example, children born to mothers with no income and those with an income of less than Ksh. 5000 were 2.1 (OR, 2.147; 95%CI: 0.904-5.09, p=0.084) and 1.8 (OR, 1.893; 95%CI: 0.790-4.539, p=0.153) times respectively more likely to die compared to those whose mothers earned above Kshs.10000. However, there tend to be survival likelihood of 10% among children whose mothers earn between Kshs. 5000 to 10000 (OR, 0.903, 95%CI: 0.333-2.450, p=0.842).

Table 4.4: bivariate analysis of socio-economic factors influencing U5M in Karemo Sub-County

Variables	Live births	Deaths (%)	X² (DF)	P value
Maternal education			6.598 ^a (2)	P=0.032*
Primary	339	70 (20.6)		
Secondary	162	40 (24.7)		
Tertiary	93	31 (33.3)		
Occupation			17.348 ^a (3)	P=0.001*
None	200	64 (32.0)		
Farming	151	23 (15.2)		
Business	201	40(19.9)		
Employed	42	14 (30.0)		
Female autonomy			0.461 ^a (2)	P=0.794
Autonomous	307	71 (23.1)		
Not autonomous	286	70 (24.5)		
Monthly Income			9.067 ^a (3)	P=0.028*
None	228	55 (24.1)		
<Ksh 4999	237	44 (18.6)		
Ksh 5000-10000	71	23 (32.4)		
>Kshs 10000	58	19 (32.8)		

Legend: 1st column indicate variables being analyzed against U5M; 2nd column indicates the total live births while the 3rd column indicate cases of U5M occurring in %. The 4th column indicates the X² (DF) values while the 5th column indicates Indicate p-values. *= Likelihood ratio chi square while DF is degree of freedom. Bold font indicates U5M NOT occurring.

Table 4.5: binary logistic regression results of socio-economic factors associated with under-five mortality in Karemo Sub-County, Siaya County in Kenya

Socio-economic variables	OR	95% CI	P-value
Level of education (compared to Primary)			<0.0001
Secondary	0.431	0.243-0.766*	0.004
Tertiary	0.223	0.102-0.487**	<0.0001
Occupation (compared to None)			<0.0001
Farming	4.633	2.435-8.816**	0.0001
Business	1.515	0.901-2.340	0.061
Employed/salaried	0.941	0.464-1.909	
Monthly Income (compared to >ksh 10,000)			0.867
None	2.147	0.904-5.099	0.070
< Ksh4999	1.893	0.790-4.539	0.084
Ksh 5000-10000	0.903	0.333-2.450	0.153

Legend: Variables in **bold** indicate the reference categories. Data are presented as odds ratios (OR) and 95% confidence interval (CI).** $p < 0.0001$ & * $p < 0.05$. Values in bold indicate significant P-values

4.4 Maternal health seeking behaviour influencing U5M

Table 4.6 displayed the bivariate results of maternal health seeking behaviour. The study established that place of delivery influence U5M. 26.4% of 447 live births died to mothers who delivered at the hospital while 15.6% of 147 live births died to mothers who delivered at home. The relationship between place of delivery and U5M was found to be significant at a $p=0.008$. Accordingly, distance to the nearby health facility was found to influence U5M. About, 29.1% of 316 live births died to mothers who stayed less than 3 Km away from the hospital. Moreover, 20.6% of 131 live births who died before five years of age to mothers who stayed between 3 to 5 Km away from hospital while only, 15% of 147 live births died to mothers who stayed more than 5Kms away from the hospital. The distance to the hospital was found to be statistically significant at a $p=0.002$. However, the perceived quality of care was not significant at a $p=0.370$.

4.6: bivariate analysis of maternal health seeking behaviour influencing U5M in Karemo Sub-County

Variable	Live births	Deaths (%)	X ² (DF)	P-value
Place of the delivery				P=0.008*
Hospital	447	118 (26.4)	7.064 ^a (1)	
Home	147	23 (15.6)		
Distance to the HF				
<3KM	316	92 (29.1)	12.001 ^a (2)	P=0.002*
3-5KM	131	27 (20.6)		
>5KM	147	22 (15.0)		
Perceived quality of care				
Poor	86	20 (23.3)		P=0.370
Fair	264	56 (21.2)	3.144 ^a (3)	
Good	226	62 (27.4)		
Excellent	18	3 (16.7)		

Legend: 1st column indicate variables being analyzed against U5M; 2nd column indicates the total live births while the 3rd column indicate cases of U5M occurring in %. The 4th column indicates the X² (DF) values while the 5th column indicates Indicate p-values. *= Likelihood ratio chi square while DF is degree of freedom. Bold font indicates U5M **NOT** occurring.

The effect of maternal health seeking behaviour on under-five mortality in Karemo Sub-County, Siaya County in Kenya revealed that children born at home were 1.3 times more likely to die compared to those born at the hospitals (OR, 1.346, 95% CI: 0.715-2.533, p=0.357). Similarly, children whose mothers stay between 3-5Km and 5Km away from the health facilities were 1.1 (OR, 1.109, 95% CI: 0.582-2.114, p= 0.754) and 2 (OR, 2.078, 95% CI: 0.984-4.389, p=0.55) times, respectively more likely to die compared to those whose mothers stayed in less than 3 Km (Table 4.7).

Table 4.7: binary logistic regression results of maternal health seeking behaviour associated with under-five mortality Karemo Sub-County, Siaya County in Kenya

Variables	OR	95% CI	p-value
Place of the delivery (Compared to Hospital)			
Home	1.346	0.715-2.533	0.357
Distance to the Health facility (compared to <3km)			0.156
3-5KM	1.109	0.582-2.114	0.754
>5KM	2.078	0.984-4.389	0.55

Legend: variables in **bold** are the reference categories. Data are presented as odds ratios (OR) and 95% confidence interval (CI).** $p < 0.0001$ & * $p < 0.05$. Values in bold indicate significant P-values

CHAPTER FIVE: DISCUSSION

5.1. Introduction

The main aim of this study was to assess factors influencing under-five mortality in Karemo Sub-County in Siaya County, Kenya. Various independent variables were included and analyzed ranging from demographics, socio-economic, and maternal health seeking behaviour. Bivariate and multivariate logistic regressions were conducted for inferential analysis. In the bivariate analysis, all independent variables showed a positive relationship to U5M with exception of sex of the child, religion and perceived quality of care. Variables such as maternal age, marital status, birth order, birth intervals, education, occupation, income, marital type, place of delivery and perceived distance to the nearby health facilities were positively statistically significant at a $p < 0.05$.

5.2 Maternal socio-demographic characteristics

Maternal age was significantly associated with under-five mortality. Mothers whose ages were above 35 years of age tend to experience U5M. However, mothers between 21-34 years of age revealed high chances of U5s survival. This finding was supported by a number of previous literatures which attributed high mortality to mothers who delivered when too young (< 20 years) or too old ($> 35+$ years) (Kanmiki *et al.*, 2014; Ettarh *et al.*, 2012; Doctor *et al.*, 2011; KDHS, 2008; Edmond *et al.*, 2006; Manda *et al.*, 1999). The possible reason could be too young mothers have immature reproductive system that are not fully developed to bear children. Moreover, they might experience a lot of pregnancy and delivery complication that result to death of the child. On the other hand older women may also experience old age problems during pregnancy and delivery. According to Alam *et al.*, (2000), younger mothers may not be socially and psychologically mature enough to deal with the requirements of infant and child care, or they may lack the domestic decision-making authority that older mothers.

With regard to birth intervals, children born after 24 months of the previous birth are less likely to experience U5M compared to their counterparts who have short birth intervals of less than 2 years. This finding was consistent with several previous studies done in rural set ups of Sub Saharan Africa (KDHS, 2008; Islam *et al.*, 2008; Kwabena *et al.*, 2011). This is due to the fact that women with short birth intervals between two programs have insufficient time to restore their nutritional reserves-a situation which is thought to adversely affect fetal growth. In

addition, competition among siblings is considered a plausible mechanism in the association of U5M and birth intervals (Boerma and Bicego, 1992).

Other than bio-logical risks aforementioned, there may also be economic, emotional and other burdens affecting the mothers that influence the survival of the under-five children (Tariku *et al.*, 2013). In addition, Mturi and Curti (1995) bring in a new concept of breast feeding. He argues that breastfeeding reduces the risk of getting pregnant by more than half hence lengthen birth intervals. Mothers who do not breastfeed their children for a longer period are likely to experience high rate of conception compared to their counterparts who breastfeed for a longer period.

There was an association between marital status and U5M. Married women are less likely to experience U5M compared to single mothers (Worku *et al.*, 2009; Kanmiki *et al.*, 2014). The possible reason being mothers in stable marriages would get support from their partners during antenatal through to postnatal care which can reduce risk of child mortality. Moreover, marriage may confer advantages such as pooling of resources to either patronize good health services or provide adequate care with respect to providing good nutrition to infants and children (Kanmiki *et al.*, 2014). However, Chibwana *et al.*, (2009), claim that single mothers are more autonomous and therefore able to frequently visit health facilities when the child is sick but this only depends on the economic ability to access better health services and provide balance diet of which are necessary in child development.

Concerning birth order, children with high birth order of 4 and above are most likely to die compared to those with lower birth order of 3. This finding was consistent with other previous studies done in SSA (Singh *et al.*, 2015; Ettarh *et al.*, 2012; Islam *et al.*, 2008; KDHS, 2008; Brockerhoff *et al.*, 2000). The possible reason being higher birth order is an indicator of multiple pregnancies which in turn deplete a woman nutritional resources and straining of her reproductive system. It is also associated with higher parity and close birth intervals (Islam *et al.*, 2008). In resource poor settings, there is the aspect of financial or economic constrains that might be associated with higher birth orders or parity hence children born with higher birth order of 4 and above are more likely to die due to inadequate finances or resources to seek quality services or balanced diet (Kanmiki *et al.*, 2014).

Gender of the child was not statistically associated with U5M. This was consistent with few studies done in Malawi and Kenya (Manda *et al.*, 1999; Ettarh *et al.*, 2012). This finding was surprising since KDHS (2008), study revealed a higher survivorship for female than male. However, the possible reason might be the implementation of various health measures enrolled in the community such as; free child health care, distribution of free treated mosquito nets and preventive treatment of malaria during pregnancy that might have favoured the survival of male child (KNBS and ICF Macro, 2010).

Religion did not confer statistical significance with U5M. This was supported by Kanmiki *et al.*, 2014 study in Ghana. The region is predominantly Christians as reflected in the descriptive analysis (99.5% Christians while 0.5% Islamic religion). Despite no association in the bivariate analysis, there might be underlying factors such as belief in the cause of illness for U5s that can be exposed only when denomination affiliation of the mother is analyzed in the study.

The type of marriage showed a statistical association with U5M. Mothers who are in polygamous union having higher chances of experiencing U5M compared to their counterparts who are in monogamous union. This was consistent with other studies done in the past (Kanmiki *et al.*, 2014; Ettarh *et al.*, 2012; Adhikari *et al.*, 2010). This may be due to possible rivalry from co-wives and neglect from husbands during pregnancy and early child care which is typical of African polygamous marriages with consequential effects on child survival (Adhikari *et al.*, 2010). It could also be due to the fact that in this predominantly agrarian communities where women do not work and often tend to rely on the little resources that are provided by their husbands, women who are in polygamous marriages will be doubly stretched with regards to resources because the little the husband has will have to be shared among the several wives (Kanmiki *et al.*, 2014).

5.3 Maternal socio-economic factors

A mother's level of education is a strong predictor and can exert a positive influence on children's health and survival (KNBS and ICF Macro 2010). In this study, maternal education showed statistical association with U5M. Women who had attained primary levels of education experienced more U5M compared to women with secondary education and above. However,

comparing secondary and tertiary levels, the odds revealed higher survivorship for children whose mothers had tertiary education compared to those whose mothers had secondary education. This finding concurred with most recent studies done in the past that linked maternal education and child mortality (Quansah *et al.*, 2016; Kanmiki *et al.*, 2014; Rahmans *et al.*, 2010; Adhikari *et al.*, 2010, Worku *et al.*, 2009; Gakidou *et al.*, 2009; KNBS and ICF Macro, 2010; Deribew *et al.*, 2007; Houweling *et al.*, 2006; Basu *et al.*, 2005). However, Ettarh *et al.*, (2012) study in Kenya was surprising to show no association between education and U5M. This could be because he compared education among mothers in rural verses urban and not how education would influence U5M within a particular community.

While maternal education shows a strong positive impact on child survival, the exact mechanisms involved remain to be established (Quansah *et al.*, 2016). The possible reasons might be educated mothers can easily get access to information regarding their health status during pregnancy and that of the child; furthermore, they are able to identify symptoms of ill health on the child and thus able to translate the information in seeking or accessing health care services (Quansah *et al.*, 2016). Secondly, educated mothers may have economic advantage over their counterparts since some are employed thus increased financial ability. Lastly, education delays the mother from early marriage and thereafter motherhood hence decreasing the total number of children a woman gives birth to (Ettarh *et al.*, 2012).

Quansah *et al.*, (2016) in Ghana raised the idea that treatment-seeking behaviour of educated and non-educated mothers may provide important insights in establishing the role of education in curbing U5M. Moreover, educated mothers are more autonomous in making child health decisions and are most likely to seek treatment from well-resourced health facilities (Greenaway *et al.*, 2012). Another author argues that low level of maternal education could be a main constraint against child feeding, health seeking and hygiene practices (Amar-klemesu *et al.*, 2000). To crown it up, Mturi and Curti (1995) brings in the concept of the use of contraceptives among highly educated women or women with highly educated partners than the less or un-educated counterparts.

Mother's occupation did show a statistical association with U5M. This finding was in agreement with other several studies done in the past (Kanmiki *et al.*, 2014; Chowdhury *et al.*, 2010; Islam *et al.*, 2008). The only difference in this study was that professional/salaried mothers were less

likely to experience U5M contrary to the other studies highlighted above. The authors reasoned that non-employed mothers have enough time to take care of their children compared to those employed who possibly leave their house in the morning and only comes back in the evening for their young ones (Chowdhury *et al.*, 2010). This may have substantial effects through a lack of proper feeding and particularly, the lack of breastfeeding in early life of the child (Mustafa & Odimegwu, 2008).

On the other hand, women who are employed have an economic advantage hence they can get access to better health care services when the child is sick. Moreover, they are able to eat well balanced diet thus, nutritionally stable as such might experience less U5M compared to women who are house wives or farmers who totally rely on the income of the husband or guardians respectively. This notion is in agreement with Kwabena *et al.*, (2011) that claims that work outside the home is likely associated both with modernity and with higher family income, both of which will probably increase the children's chances of survival.

In regard to autonomy on financial issues, this study found no association with U5M. This was only supported by only Kanmiki *et al.*, 2014 study in Ghana. The possible reason might be the parameter being used in measuring female autonomy (Kanmiki *et al.*, 2014). Since different scholars have used several measures ranging from household headship, employment, income or in decision making with regard to the health of the child e.tc there should be a standard set for measuring female autonomy (Kanmiki *et al.*, 2014).

This study measured female autonomy with regard to sole decision making in household financial purchases instead of measuring autonomy in her financial decisions. Thus, financial autonomous women will get access to better health care and nutritionally stability while none autonomous will only get directive in regard to seeking health and nutrition from the husband or someone else who controls the finance (Adhikari *et al.*, 2010; Doctor *et al.*, 2011; Owais *et al.*, 2011).

Mothers whose monthly income is Kshs. 5000 and above tends to experience less U5M compared to those that earned below Kshs 4999 or none. Mothers with higher monthly income can easily access better health services and also well balanced diet (Adhikari *et al.*, 2010; Doctor

et al., 2011; Owais *et al.*, 2011). Despite the fact that maternal and child health services are free in public health facilities in Kenya has a way of accelerating progress of zeroing maternal and child mortality, there are other opportunistic cost such as transport to the health facilities and even purchases of certain drugs due to lack of them in public health facilities- a major problem in public health facilities in this area-that poor households are disadvantaged of in comparison to their counterparts (Feikin *et al.*, 2009; UNICEF, 2012). Thus, mothers with low income would resort to cheaper ways of treatment or non-formal interventions that would in long run affect the survivorship of the child.

5.4 Maternal health seeking behaviour

Place of delivery of the child showed no association with U5M in the multivariate analysis though the odds revealed higher likelihood of U5M within the categories. For example, Children born at home were most likely to experience U5M compared to those whose mothers delivered at the hospital. This finding was in agreement with several other studies done in the developing countries (Doctor *et al.*, 2011; Edmond *et al.*, 2006; Black *et al.*, 2003; Jones *et al.*, 2003). Conversely, other studies done in Kenya, Nigeria and South Africa had a contrary opinion (Ettarh *et al.*, 2012; Oti *et al.*, 2011; Worku *et al.*, 2009). These authors argued that the place of delivery does not matter so long as a skilled birth attendant is present at the time of delivery.

The possible reason being, deliveries that occurs at health facilities are assisted by skilled birth professionals compared to other places where mothers deliver without any skilled assistance. Although delivering in the presence of Traditional Birth Attendants (TBA) is marked with less likelihood of U5M, it is not 100% safe since some TBAs are inexperienced to deal with pregnancy and birth related complications. Further, the TBAs may lack modern health instruments and equipments required to safely assist births (UNICEF, 2012).

Perceived distance to the health facility was not statistically significantly associated to U5M in the multivariate analysis. However, the odds within the categories revealed higher likelihood of U5M to children born to mothers who stay more than 5 Km away from the health facilities and subsequently among those that stay between 3-5 Km compared to those whose mothers stay on average of 3 Km. According to Feikin *et al.*, (2009), increase in distance demoralizes the mothers or care givers to take the child to the health facility hence decreases chances of child survival. Another qualitative study done in rural areas of Homa Bay County in western Kenya

revealed that mothers experience a higher burden to take their children to the health facility as distance increases (UNICEF, 2012).

The decline in health care utilization for mothers with under-fives with increase in distance is called distance decay (Feikin *et al.*, 2009). However, accordingly, Feikin *et al.*, (2009), claim that the main reason might not be the physical distance but rather the cost of transport to the health facilities. Most of the roads to the health facilities are only accessible by foot or bicycle which is hardly used due to the emergence of motorbike though motorbikes are very expensive hence most mothers find it difficult to afford. In support to this finding, previous studies in Vietnam and Nigeria found a higher likelihood of U5M from mothers with transportation difficulties in poor resource settings (Swenson *et al.*, 1993; Oti *et al.*, 2011).

Perceived quality of care was not significantly associated with U5M in the bivariate analysis. This might be due to the health facilities are well staffed with professional medical officers hence there might be less deaths associated to long queues at the dispensaries or lack of a doctor to attend to a sick child. This was contrary to Chibwana *et al.*, 2009 study that revealed U5M due to long queues at the facilities since the health facilities were under staffed.

5.5 Study limitations.

This thesis was limited by not including the variables of male partners. Their involvement would have shown a paradigm shift on the finding since in poor settings like this, husband's variables such as financial income, education and number of women they marry; play an important role on under-five survivorship.

Secondly, this study employed a retrospective cross-sectional study design. However, this design does not measure causal factors (It does not allow one to attribute child morbidity to specific causes of death) rather it measures an association hence the findings are not the actual causative factors influencing U5M in this community but mere probability of events occurring. Thus, the study cannot show how the risk factors contribute to mortality directly but rather to morbidity.

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of findings

This area has been highlighted to exhibit high U5M despite having relatively good access to public and private health facilities. The study specifically looked at the influence of maternal socio-demographic, economic factors and maternal health seeking behaviour on U5s in Karemo Sub-County, Siaya County in Kenya. After conducting binary logistic regression to identify variables that significantly influence U5M and the magnitude of their influence, the following conclusion and recommendations were made:

6.2 Conclusion

This study made the following conclusions:

1. Maternal socio-demographic factors such as; age of the mother at birth (older mothers between the age of 35-49 years), the child's birth order especially above three, short preceding birth interval between siblings of less than 2 years, single motherhood and polygamy were identified risk factors influencing U5M in Karemo Sub-County.
2. Maternal socioeconomic factors such as; lack of post primary education and farming as a form of occupation were major risk factors influencing U5M in Karemo Sub-County.
3. On maternal health seeking behaviour, distance to the nearby health facility and place of delivery were not significant factors influencing U5M in Karemo Sub-County. However, the odds revealed likelihood of both distance and place of delivery influencing U5M with mothers who live beyond 3 km away from the health facility were likely to experience child death. Similarly, deliveries at home were characterized by U5M in Karemo Sub-County, Siaya County.

6.3 Recommendation from current study

The following recommendations were made:

1. **Maternal socio-demographic factors:** Mobilization and sensitization of all mothers to accept and use birth control mechanism. This would help in preventing teenage pregnancy and old mothers from conception. Moreover, it would lengthen birth spacing between siblings and control the number of children a mother gives birth to, thus, reducing child

birth order. In addition, uptake of family planning would help reduce chances of girls' school dropout.

2. **Maternal socio-economic factors:** Strategies promoting women economic empowerment should be prioritized. Women are encouraged to jointly form women groups and begin income generating projects. Moreover, community based programs such as commercial tree nursery and planting, poultry farming in rural areas targeting women should be encouraged. This would create job opportunities for poor mothers thus empower them economically. Secondly, promotion of girl child education at higher level (post Primary) should be encouraged. Strategies like provision of bursaries, low-cost boarding facilities and sanitary towels for girls from class six would be a boost to the girl child education.
3. **Maternal health seeking behaviour:** There should be increased strategies for improving accessibility of health care services. This could be achieved by construction of more health facilities or by provision of mobile health clinic within Karemo Sub-County. Moreover, strategies targeting all mothers to deliver at the health facilities should be prioritized. Community health workers should be motivated to identify and be in contact with pregnant mothers so that they can guide them from the onset of pregnancy until delivery to ensure they deliver at health facilities.

6.4 Recommendation for future studies

- a) A similar study to be conducted in other set up in Kenya that exhibit high U5M since there are variations in maternal socio-demographic, socio-economic factors and maternal health seeking behaviour in these communities that might influence U5M.
- b) Another study incorporating paternal socio-demographic and socio-economic factors influencing U5M need to be done in Karemo Sub-County since this study was limited to identifying maternal factors. If the men's factors such as; education level, number of wives and monthly income were incorporated, then, there would have be a turn of events that would have led to more productive finding on factors influencing U5M in Karemo Sub-County.

- c) Qualitative study on socio-cultural aspects where different factions of religion such as; superstition/beliefs and denominational affiliation among Christians and their influence on U5M in this Community.

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APPENDICES

APPENDIX 1: HOUSEHOLD QUESTIONNAIRE

Questionnaire administered to women of reproductive age (15-49) years who have given birth in Karemo Sub-County, Siaya county.

1.0 Identification

Questionnaire code.....Interviewer initial.....client Number.....interview Date.....Time interview begun..... time interview ended.....Cluster number.....Household number.....

My name is we are undertaking a study whose main aim is to assess factors influencing deaths of children below five years of age in Karemo Sub-County, Siaya County in Kenya. The principle investigator is Paul Awiti Odingo a master student of Public Health, Maseno University. You have been chosen to be part of this study and your contribution in filling this questionnaire is very important. The information provided will be treated as confidential.(Nyinga en.....watimo nonro ma thor mar wach en manyo gimomiyo nyithido ma jo higni abich ka duogo chien tho ei Karemo Sub-County wa ka. Jatelo maduong mar nonroni en Paul Awiti Odingo ma japuonjre mar masta ei mbalariyani mar Maseno. Oseyieri mondo idonje nonro ni kendo wageno mapek duoko magi e penjo duto ma ibiro penji. Weche duto ma ibiro wachonwa wabiro keto mopondo)

A.DEMOGRAPHIC CHARACTERISTICS

I would like to ask you some questions about yourself and the people who live with you. Please answer in the spaces provided. (Penjo ma adwaro penji biro wuok kwomi kod kwom ji duto ma odak kodi)

1. How many children have you given birth to, whether alive or dead?

isenyuolo nyithindo adi ka iriwo mangima gi mosenido (tho)?

< 3 children 4+ children

2. Unfortunately, have you lost (dead) any of your child who is below five years of age?

Mos maduong, to adi mosenindo majo higni abich kaduogo chien.

Yes No (if No, skip to Q5)

3. If yes, at what age or month did he/she die? **kanitie, ne en jahiga adi?**

0-29 days 1 month-1yr <1yr 1-5yrs 0-5yrs

4. What was the gender of the child who died? **Ne en wuoyi koso nyako?**

Male Female

5. Please I would like to record the names of **ALL** your children, whether still alive or dead, starting with the first one you had up to the last child. **Adwaro koro ndiko piny nyodo (nyithido ma isenyuolo) magi ka achako gi maduong nyaka achope matin.**

No	6. Child initial	7. Age? Jahiga adi?	8. Gender? Wuowi koso nyako?	9. Twin? Rude koso?	10. Alive? Ngima koso?
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes....1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2
		Year	B....1 G....2	Yes ...1 No2	Yes....1 No.....2

11. How old are you by your last birthday? **In to in gi higni adi/ ijahiga adi?**

15-20 years 20-34 years 35-49 years

12. What is your marital status? **Isedhi katedo koso podi?**

Single Married

13. If married, which type of marriage are you in? **in e keny mane kata chuori nig mon adi?**

Monogamous Polygamous

14. At what age did you deliver your child? **Nyathini ni ne inyuolo ka in gi higni adi?**

15-20 years 20-34 years 35-49 years

B.SOCIO-ECONOMIC FACTORS

15. What is your highest level of education? **Isomo nyaka rang'iny mane/ isomo nyaka e klas a di?**

None

Primary

Secondary

Tertiary

16. What is your occupation? **Itiyo tich mane makeloni pesa?**

None

Farming

Business

Professional

Others: Casual worker

17. Who is the sole decision maker in regard to financial issues in this house? **En ng'ama golo paro e weche mag pesa e ot ka, kata ka idwa ng'ew gimoro?**

Myself (autonomous)

My husband & I (semi-autonomous)

Husband or somebody else (Not autonomous)

18. Check for the following or ask the respondent on the following: Do you have? **Bende in gi?**

T.V;

Radio;

- Hectares of land
- Type of house (temporary, semi-Permanent; permanent etc)...
- Number of cows.....
- Number of goats
- Number of sheep.....
- Bicycle
- Motorbike
- Sofa sets.....

19. On average, how much money have you earned from all sources in the past one month?

Ka igoyo kwan duto tee e dwe achiel, inyalo loso pesa adi, kata ichuli pesa adi kama itiye?

- None
- < Ksh 2000
- Ksh 2000-4999
- Ksh 5000-10000
- > Ksh 10000

20. What is your religion? **In ja din mane kata ilemo/idiro kanye?**

- Christian
- Muslim
- Others Specify _____

C. MATERNAL HEALTH SEEKING BEHAVIOUR

21. Where did you deliver your child? **Nyathini ne inyuolo kanye?**

- Hospital
- Home
- TBAs house
- Others _____

22. Did you have a skilled assistant during your delivery? **Bende nyuolni ne okony gi jalony e weche mag nyuol kata bende ne ocholi gi nyamrerwa?**

Yes No

23. Did you attend a hospital afterwards? **Bende ne idhi e hosipital bang' mano/nyuol?**

Yes No.....

24. If yes, after how long did you attend a hospital? **Kane idhi, ne en bang' kinde marom nade?**

Within 2 months

After 2 months

25. Has your child ever fallen sick since he/she was born? **Bende nyadhini ni osebedo matuo chakre nyuole?**

Yes No

26. If yes, where did you seek/go for treatment? **Ka e, ne ithiedhe kanye?**

Health facility

Pharmacy

Church for prayers

Healer/ herbalist

Other (specify) _____

27. If never went to the health facility, why? **Kane ok idhi e hosipital, en ang'o momiy o ne ok idhi?**

Distance is far

Lack of finances

Our church do not allow us

Services at the health facility are poor

Others, specify _____

28. How far is the nearest health facility from your house in kilometers? **In mabor gi hosipital machal nade?**

<3km

3-5km

>5 km

29. In your own assessment how do you rate the services offered at the health facility?

E yiero mari iwuon, iparoni ni thieth mae hosipital maudhie chal nade?

Poor Fair Good Excellent Don't know

THANK YOU FOR YOUR TIME AND RESPONSE AND GOD BLESS YOU.

Erokamano kuom thuolo mari kod duoko penjowa gi nvasave ogwethi.

APPENDIX 2: LETTER FROM MASENO UNIVERSITY ETHICAL AND REVIEW COMMITTEE



MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: Secretary - MUERC

DATE: 21st January, 2016

TO: Paul Awiti Odingo
PG/MPH/00010 / 2013
Department of Public Health
School of Public Health and Community Development
Maseno University
P.O. Private Bag, Maseno, Kenya

REF: MSU/DRPI/MUERC/00254/15

RE: Assessment of Factors Influencing Mortality of Children Under Five Years of Age in Karemo Sub County, Siaya County, Kenya. Proposal Reference Number MSU/DRPI/MUERC/00254/15

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 21st day of January, 2016 for a period of one (1) year.

Please note that authorization to conduct this study will automatically expire on 20th January, 2017. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 21st December, 2016.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 21st December, 2016.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advise MUERC when the study is completed or discontinued.

Thank you.

Yours faithfully,

Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee.



Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED



APPENDIX 3: A LETTER FROM THE ASS. COUNTY COMMISSIONER



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THE PRESIDENCY
MINISTRY OF INTERIOR & CO-ORDINATION OF NATIONAL GOVERNMENT

E-Mail *cc.siaya@yahoo.com*
When replying please quote

Deputy County Commissioner
Siaya Sub County
P O Box 83
SIAYA

ED.12/12 VOL.II/224

3rd February, 2016

**The Assistant County Commissioner,
KAREMO SUB COUNTY.**

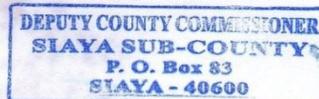
RE: RESEARCH AUTHORIZATION – PAUL AWITI ODINGO

The above named is a student at Maseno University.

He has been authorized to carryout research on Assessment of factors influencing Mortality Children under five years of age in Karemo Ward, specifically in Siaya Township Location, South East Alego Location and South Alego Location.

Please accord the necessary assistance.

pp



ISAAC KIMANI
FOR: DEPUTY COUNTY COMMISSIONER,
SIAYA SUB COUNTY.

c.c. PAUL AWITI ODINGO

APPENDIX 4: INFORMED CONSENT FORM

Principal Investigator: Mr.Paul Awiti Odingo Telephone number: 0713-313638

Maseno University Ethical Review Committee secretariat; Dr.Bonuke Anyona -0721-543 976

You are invited to participate in a research study under the direction of Mr. Paul Awiti Odingo, master student of Public Health at Maseno University. The purpose of this study is to **assess factors influencing deaths of children below 5 years of age in Karemo Sub-County, Siaya County in Kenya**. You will not benefit directly or be paid for your participation in the study. However the knowledge gained in this study will be used to improve the programs and policies that target under-fives in this community. Your participation in this study will involve answering questions in an interview which will take up to 30 minutes.

There is no harm to you for your participation in the study. The only risk to you is discomfort and possible loss of confidentiality due to sharing personal information with me such as reproductive health, marital status and deaths. I will do everything I can to keep the information you give me private in a way that nobody will use your name or make it possible for people to identify you. If the results of this research study are reported in journals or at scientific meetings, the people who participated in this study will not be named or identified. Only those who are involved in the study will record and analyze the data. The completed questionnaires and data will be kept in a locked box.

Taking part in this research is entirely voluntary. You do not have to participate in this study if you do not want to. You may refuse to answer any of the questions and you may take a break at any time during the study. You may stop your participation in this study at any time.

In case of further questions or inquiries, please you can contact me or the Maseno University Ethical and Review committee secretariat on the contacts provided above. If you agree to participate, you are requested to sign below. The research staff will also sign that all the information regarding this study has been read to you and you fully understand.

Participant’s sign _____ Date _____

Research Staff’s sign _____ Date _____

APPENDIX 5: TRANSLATED CONSENT FORM

LOKO MAR OBOKE MAR AYIE

JATELO MAR NONRO: PAUL AWITI ODINGO **0713-313 638**

KOMITI MAR MASENO UNIVERSITY MA OYIE MONDO NONRONI ODHI NYIME:

Daktari BONUKE ANYONA **0721-543 976**

Orwaki mondo ibed e kanyakla mar nonroni ka otelne kod Paul Awiti Odingo ma en japuonjre mar mbalariany ma Maseno. Thor mar nonroni en ng'eyo matut gik ma miyo nyithindo ma johigni abich ka dok chien tho ei Karemo Sub-County wani.

Onge chudo moro amora ma ibiro yudo makmana ni rieke ma ibiro yud e nonroni biro konyo keto okenge mongirore e geng'o tho mar nyithido ma johigni abich ka dok chien. Yie mari mar bedo ei nonroni biro dwaro mondo openji penjo moko ma ok bi kawo seche mangeny ni dakika piero adek.

Onge rem ma ibiro yudo e donjo ei nonroni makmana ni inyalo bedo kod pek,wichkuot kod lit mar keto ayanga weche magi mag siri modok korka nyuol, keny kata nyithindo matindo ma isewito. Kibaji kik goyi nikech abiro temo matek mondo akan wehegi ma ngato angata ok bi tiyo kod nyingi kata ng'eyi. Ponono ni dwoko mar nonro ni ne tigo e oboke mopogre opogre to ji duto te manie nonroni ok noluong nyingegi. Penjogi duto te kod duoko margi ibiro kan gi jatelo mar nonroni.

Donjo ni e nonroni ok en kuom achune to mana yie mari. Inyalo tamri dwoko penjo moko bende inyalo kawo seche mag yueyo esama nonro ni dhi nyime, bende inyalo weyo bedo e nonroni saa asaya. Kaiyie bedo e nonroni to akwayi mondo iket signature mari piny ka. Ponono ni in gi penjo moro amora mathagi kata ngeyo matut ei wehegi inyalo goyo nebni mag simbe mag jotelo gi man malo ei obokegi.

Kar keto kogno/sayin _____ Tarik _____

Jatelo makonyo nonroni _____ Tarik _____

