DETERMINANTS OF INFANT MORTALITY RATE IN CHEPALUNGU BOMET COUNTY, KENYA

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DECLARATION

This thesis is my original work and has not been presented for the award of degree in any other University or for any other award.

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DEDICATION

This thesis is dedicated to my Congregation, The Franciscan Sisters of Saint Joseph (FSJ) and my late father Mr. Samwel Mutai for the support and encouragement they gave me during my studies.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AAU	Association of African Universities
BCIDP	Bomet County Integrated Development Plan
IMR	Infant mortality rate
KDHS	Kenya Demographic and Health Surveys
KNBS	Kenya National Bureau of Statistics
MDGs	Millennium Development Goals
MMRAM	Mapping Malaria Risk in Africa data base for Mali
NACOSTI	National Commission for Science Technology and Innovation
NICU	Neonatal Intensive Care Unit
NCPD	National Council for Population and Development
SDGs	Sustainable Development Goals
SPSS	Statistical Packages for Social Sciences
SSA	Sub-Saharan Africa
UN	United Nations
UN IGME	United Nations Inter-agency Group for Child Mortality Estimation

OPERATIONAL DEFINITION OF TERMS

Cultural Factors:	These are the beliefs, moral values, traditions, language, and laws held in common by the community living in Bomet.
Economic Factors:	These are the factors that affect the economy of people living in Bomet and may include interest rates, tax rates, laws, policies, wages, and governmental activities.
Economic Status:	Refers to the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation.
Environmental Factors:	These are factors such as temperature, food, pollutants, population density, sound, light, and parasites that have direct or indirect influence on infant mortality rates in Chepalungu Sub County, Bomet County.
Fertility:	Fertility is the quality of being able to produce offspring through reproduction following the onset of sexual maturity.
Household:	This consists of one or several persons who live in the same dwelling and share meals among people living in Chepalungu Sub County, Bomet County.
Infant:	This is the more formal or specialized synonym for the common term baby, meaning the very young offspring of human beings who is less than one year old.

Infant mortality Rate: This is the number of infant deaths for every 1,000 live births.

Neonatal mortality:	This is the number of death within the first 28 days of life, and it is a core indicator for neonatal health and wellbeing and is becoming a prominent component of overall under-five mortality.
Perinatal mortality:	This is the sum of the number of perinatal deaths (stillbirths and early neonatal deaths) divided by the number of pregnancies of seven or more months' duration (all live births plus stillbirths).
Postneonatal mortality:	This is the number of resident newborns dying between 28 and 364 days of age in a specified geographic area (country, state, county, etc.) divided by the number of resident live births for the same geographic area (for a specified time period, usually a calendar year) and multiplied by 1,000.

ABSTRACT

Globally, the infant mortality rate is regarded as an important indicator of understanding population health and it stands as high as 31.9%. The rate varies substantially across the world with the highest found in sub-Saharan Africa. In Bomet, Infant Mortality Rate (IMR) stands higher compared with the national average. The high Infant Mortality Rate is said to have been attributed by various factors such as poor livelihood and health opportunities. These have a tendency of deteriorating living conditions leading to prevailing low standards of living and raised living costs which has risen cost of protein rich food rendering communities poor malnutrition and susceptible to infection. Despite the renewed focus and recent progress in infant mortality, achieving the sustainable development goal (SDG) target in infant mortality of 25 deaths per 1000 live births will be a challenge unless factors influencing infant mortality receive more attention. It has also been observed that infant mortality in Chepalungu Sub County is not an exemption since infant mortality in Bomet County is higher at 57 per 1000 compared with the National average of 54 per 1000. Therefore, the purpose of this study was to establish determinants of high infant mortality in Chepalungu sub-county. The study adopted a descriptive survey research design. Descriptive survey research design describes the distribution of and relationship among variables. The study targeted all household mothers in the reproductive ages 18-49 and key informants in Chepalungu sub-county. Purposive and Stratified simple random sampling techniques were used to select 381 mothers and 4 key informants in Chepalungu Sub-County. Data was collected using questionnaire and interview schedule. Quantitative data was analyzed using frequencies, percentages, and Chi-square test while qualitative data was coded, transcribed and organized thematically. The study findings may form a platform upon which demographic and health policy may be formulated and may be useful to other future researchers. The study concluded that high infant mortality was attributable to low level of education of the mothers, large household sizes, difficulty in access to health facilities, mothers' and spouses' incomes, place of delivery and type of marriage contrary, place for medical attention for infants does not have any effect on infant mortality. Further, environmental factors had a great bearing on infant health and as such explain infant mortality. The study recommends that the communities within Chepalungu Sub County ought to embrace family planning practices as a way to control their household numbers. This is because a household with few individuals is capable to meet medical needs thereby registering lower infant deaths. Study also recommended that residents in Chepalungu should be encouraged to engage in income generating activities besides subsistence farming. This will enable them to have some income necessary for providing for the infant needs including nutrition and medical needs. Furthermore, campaign programs should be designed with an aim of discouraging unfair cultural practices that promote infant mortality. Such campaigns can encourage the mothers to seek delivery at the health facilities. This can be done through community health volunteers, increasing number of dispensaries and providing ambulances. Lastly, the study recommended the need to conduct environmental education program targeting the mothers on the human waste disposal, safe drinking water and safe cooking fuel. Future research should be conducted to include: causes of infant mortality, biological factors influencing infant mortality and climatic determinants of infant mortality by region.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides an overview of study background, problem statement and purpose of study. It also states research objectives, research questions, significance and study justification. Scope and limitations of the study have also been presented.

1.2 Background to the Study

Infant mortality is the death of under one year of age. The death toll is assessed by the infant mortality rate (IMR), which is the number of deaths of infants for every 1000 live births. Reno, & Hyder, (2018) discovered that there are many factors that contribute to infant mortality across the world. These factors include the mothers' level of Education, environmental conditions, political and health conditions among others. According to Kumar, *et al.,* (2020), infant mortality is by far the most sensitive indicator of population health as well as reflects the country's adverse social, environmental and economic conditions. The (MDGs) of the United Nations Millennium Declaration also focused on the financial dimension and quality of life of a nation and description of the population wellbeing as an attribute of infant mortality.

World Health Organization(WHO)(2017), reported that risks of an infant dying under one year of age was highest in the African Region (51 per 1000 live births), compared to six European Regions (8 per1000 live births). In Kenyan context, the Population and Housing Census 2019 enumerated the population at 38.6 million where data trend indicated that total population tripled between 1969 and 1999 with an increase of 1 million infants born yearly as echoed by the data from National Council for

Population Development (NCPD) (Peters, 2020). Migration of residents from rural to Urban in some areas of Kenya, Chepalungu included has been stirred by search for employment and settlement which has resulted to urban growth. This rapid migration has to some extend created disparities in the economic, social, cultural and environmental status of the people in the Country as acknowledged by boundary changes and classifications of the society.

The up-coming metropolitan setting however in the Kenyan counties- Chepalungu integrated is characterized by critical effects both negative and positive as indicated by the WHO (2018). In particular there have been increased imbalances that have led to problems in rural areas have increased poverty and inadequate services especially among the less fortunate members. According to Kimani-Murage, *et al.*, (2016), there was enough evidence which revealed that explosion of urban population in a region has been found to go together with high rates of poverty and poor health conditions. It further contributes to high infant mortality more so in slums and rural areas than in more urban centers.

Globally, IMR has been decreasing from 65 deaths per 1000 live births in 1990 to 29 deaths per 1000 live births in 2017 (WHO, 2017). Present condition of infant mortality in Africa is becoming critical factor. High rates of mortality levels have been frequently documented especially infant mortality which had been a critical challenge in the continent of Africa. Tichenor, & Sridhar, (2019) indicated that African infant mortality is a significant problem that has caused worries among people particularly over the pace at which it is increasing. This influences the

achievement of the Sustainable Development Goals (SDGs) in many developing countries.

Reno, & Hyder, (2018) is concerned about the need to sustain the rate of infant mortality because it can affect the economy of the country. This is a great concern as it arises from the belief that demanding developed technologically sophisticated public health interventions could bring about sustained mortality only with limited improvements in third world living standards. Kenya where Bomet County is found as an individual country in Sub Saharan Africa has seen very critical trends of infant mortality.

In order to implement 2030 Agenda for Sustainable Development Goals (SDG) on objectives to guarantee sound lives for all at all ages and advance to world leaders embraced prosperity. According to Buse and Hawkes (2015), measures to end unnecessary death of infants and reduce to 25 and below for every 1,000 live births by 2030**)**. In this way urgent efforts required in all those nations that are left behind, (UNIGME 2017).

According to WHO (2018) report,Mali had the highest IMR in Africa with 100 deaths per 1,000 live births and became the second country in the world after Afghanistan**.** According to the report, this is a threatening situation on the economy and general development of a Country if no quick measures are taken. On the contrary Berríos, (2018) found out that IMR in Japan has been decreasing gradually from 1967 which was 16.2, in 1970 it was 13.4, it was 2.3 in 2010 and in 2018 it was 1.8 per thousand live births. According to the statistics, this made Japan to have the lowest IMR in the

world. In spite of the world considerable advancement in decreasing IMR in the preceding decades, inconsistencies in infant survival still exists across regions and countries. As Kiross, *et al.,* (2020) put it, Sub-Saharan Africa remains the region with the most astonishing IMR in the world. However the infant survival rate of every country changes with variables, such as the fertility rate and income circulation.

Tesfaye, *et al.,* (2020) discovered that attributes of infant health rates in Ethiopia had differences between the proximate trend and hidden determinants of interests on the ground. The first attribute of infant health leads directly to death, while environmental and social barriers prevent access to basic medical resources and thus contribute to an increase in IMR where 99 per cent of infant mortality deaths occur in developing countries and 86 per cent of such deaths are due to infections, premature deaths and complications during childbirth and birth injuries. Birth injuries have an indirect impact on infants (Tesfaye, *et al*., 2020; Singh, *et al*., 2017). However, according to Singh, *et al.,* (2017) malformations have such a massive effect on child mortality, accounting for 5% of infant deaths in developed countries, while malnutrition and infectious diseases are the main causes of high infant mortality in developing countries.

WHO (2018) report indicated that infant mortality in the United States, Sweden and Germany were affected by the high preterm infant mortality rates compared to other European countries. Report also defined the differences in reporting between the United States and Europe. However, it noted that France, Czech Republic, Ireland, Netherlands and Poland do not report all live births of babies under 500 g and/or 22

weeks of gestation. In Russia, infant death, which was extremely premature, accounted for only 0.5 per cent of all live born children (Wolowyna, 2020).

Oh, Yohannes, *et al.*, (2017) indicated that IMR in the United States was approximately 2.3 per cent to a historic low of 582 infant deaths per 100,000 live births in 2014. In 1850, rates were estimated at 216.8 per 1,000 white-born babies. However, there were 340.0 per 1,000 African-Americans. The rates have declined significantly in modern times. The decline was due to modern improvements in basic health care, technology and medical advances. Overall, there is a dramatic decrease from 20 deaths in 1970 to 6.9 deaths (per 1000 live births) in 2013.

While developing countries are forging forward in harnessing the application of modern facilities to decline infant mortality in health sectors, the adoption is slow and costly (Gostin, *et al.*, 2019). Despite several interventions, new policies put in place by the Government, campaigns to create awareness and new strategies by the ministry, few of the technologies have been implemented for adoption by society (Theobald, *et al.*, 2018).

In Kenya, the Kenya Service Provision Assessment Survey (KSPA) revealed that most health care providers are not taking care of sick children holistically, but rather are treating children only for the presenting illness (Wando, 2017). It established the factors that are associated with the promotion of child health using a holistic approach, such as the Integrated Management of Childhood Illness (IMCI) strategy to manage a sick child. The IMCI strategy aims to reduce morbidity and infant and child mortality by implementing three main components: improving health workers' skills

in case management; improving the health systems; and improving family and community childcare practices (Theobald, *et al.,* 2018).

In addition, vision 2030 aims at ending preventable deaths of new born and children under 5 years of age. This can help to reduce neonatal mortality to as low as 12 per 1000 live births and under -5 mortality as low as 25 per1000 live births.

As per the previous literature it is exceptionally clear that critical strategies and projects are set up to improve IMR in Chepalungu Sub-County so as to achieve Sustainable Development Goals (SDGs) by 2030**.** In Bomet, Wando, (2017) indicates IMR was 57 deaths per 1000 live births in the county while the National IMR was 54 deaths per 1000 live births. This is a critical scenario owing to the fact that Chepalungu is in the County of Bomet and no research has been done in the area.

1.3 Problem Statement

According to the WHO worldwide the IMR has decreased from an estimated rate of 65 per 1000 live births in 1990 to 29 deaths per 1000 in 2017. The study of IMR is important in any given society since it is recognized as a general health indicator of a population. Perkiö, (2021), in a study of low-and-middle-income countries, found out that socio-economic variables such as female illiteracy rate and income distribution explain a large part of variation in IMR. Reducing IMR is central in the SDG and was still a challenge and current rates indicate that Kenya may not achieve the target set to be at least as low as 25 deaths per 1000 live births by 2030.

Just as it is a general state in Kenya, Chepalungu Sub County has enjoyed an impressive and sustained decline in infant mortality, in the last decade (Langat, 2019).

These improvements are widely attributed as resulting from governments' improvement in services and various targeted new public health initiatives that have improved maternal health and improved access to water and sanitation. However infant mortality in Chepalungu, Bomet Sub County varies by place of residence. Rural parts of Chepalungu still records high infant deaths.

The rise in IMR is said to have been attributed by various factors such as poor livelihood and health opportunities. Although past studies depict rise in infant mortality in the republic, there is no specific study that had previously been carried out to examine the determinants of high IMR in Chepalungu.. This therefore calls for this study whose main goal was to find out why IMR is high in Chepalungu Sub County. This study thus aimed to fill this knowledge gap by looking into determinants to high infant mortality in Chepalungu Sub County, Bomet County.

1.4General Objective of the Study

The general objective of the study was to examine the determinants of high infant mortalityrates in Chepalungu, Bomet County.

1.4.1 Specific Objectives of the Study.

i. To determine the effect of social factors on high infant mortality rate in Chepalungu, Bomet County, Kenya.
ii. To establish the effect of economic factors on high infant mortality rate in Chepalungu, Bomet County, Kenya.
iii. To determine effect of cultural factors on high infant mortality rate in Chepalungu, Bomet County, Kenya.

iv. To establish the effect of environmental factors on high infant mortality rate in Chepalungu, Bomet County, Kenya.

1.5 Research Questions;

i. What are the effects of social factors on high infant mortality rate in Chepalungu, Bomet County, Kenya?
ii. Which economic factors contribute to high infant mortality rate in Chepalungu, Bomet County, Kenya?
iii. What are the effects of cultural factors on high infant mortality rate in Chepalungu, Bomet County, Kenya?
iv. What are the effects of environmental factors on high infant mortality rate in Chepalungu, Bomet County, Kenya?

1.6 Justification and Significance of the Study

Mortality is a key driver of population change and to understand the effect of infant mortality is very crucial for policy makers and establishment of programs to enhance the reduction of the infant mortality (Vollset, *et al.,* 2020). IMR is the highest level of mortality in all age groups. A study in Chepalungu Sub County was therefore necessary since it would highlight the determinants of infant mortality. The findings could also form a basis for further research on other determinants of IMRin Chepalungu, Bomet County and other regions.

This study will contribute towards achieving the attainment of Universal Health Care for children in Kenya by the year 2030. It lays emphasis on the need to be placed on some key areas such as the scaling up maternal and child health, immunization coverage, and prevention of water borne diseases among others. In addition, it

contributes towards the improvement on preventable and primary health care at all levels.

Chepalungu Sub County was chosen because it was classified as an area characterized with high IMR compared to other Sub Counties in Bomet County. This area is also marred with a number of challenges ranging from high poverty index, persistent of water scarcity and poor cultural practices which are promoters of poor uptake of healthcare services. All these put together enhance high infant mortality rate in the area.

1.7 Scope and Delimitations of the Study

Despite the fact that there exists an array of determinants of infant mortality, this study focused only on social, economic, cultural and environmental determinants of high infant mortality rate in Chepalungu, Bomet County. Through sampling, the study used 381 household mothers in the reproductive ages of 18-49 years and 4 key informants.

There was the inability to traverse the expansive Chepalungu sub-county due to scarcity of time and resources. Therefore samples were taken to represent the entire sub-county. Incomplete filling of the questionnaire and the inability to give right information by the respondent was another setback. However, the study utilized the services of key informants and secondary data sources to supplement the primary data obtained from the respondents. Some respondents were reluctant in participating in the study and this was overcome by assuring them of the confidentiality and anonymity of information they provided.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, relevant literature was reviewed. It covered the concept of IMR, social, cultural, economic and environmental determinants of infant mortality. Theoretical and conceptual frameworks are also presented.

2.2 Concept of Infant Mortality

Infant mortality has been examined to be an unavoidable aspect of human experience (Wallace, *et al.*, 2017). Monika, (2018), indicated that the control of infant mortality has been one of society's most staggering accomplishments in the pursuit to manage the environment to their improvement. He further observed that a great deal of the fast development in population in developing countries has been essentially the consequence of rapid high IMR. Mueller, (2020) asserted that the increase has been brought about principally by the introduction of new health technology.

According to Fedele, & Stefanelli, (2017) most infant deaths are brought about by infections that are easily preventable or treatable with demonstrated, affordable and quality-conveyed interventions. They noted that infections and neonatal complications are in charge of by far most of the infant deaths comprehensively. According to O'Brien, *et al.,* (2019), study done in UK,2.7 million infants die consistently in their first month of life and an equivalent number are stillborn. Inside the main month, up to half of all deaths occur within the first 24 hours of life, and 75% occur in the first week of life (Chung, *et al.*, 2019).

Lan & Tavrow, (2017) observed that, in Mali however not perfectly correlated high infant mortality with average income in a given country may be closely related to an overall level of wellbeing in a country. It is in fact regarded as one of those illuminating actions of how well a society is meeting the needs of its people. They also revealed that Malaria Risk in Africa database for Mali (MMRAM) is among the influence of high infant mortality especially in the inland delta of the Niger River, (Clark, & Snawder, 2019).

McGough, *et al.,* (2017) carried out a study of disease transmission and community health and was of the view that the effect of hereditary anomalies on infant mortality decreased the rate of infant mortalities. However, it differed in some nations like in Central Latin America and Eastern Europe where the abnormalities of the heart and the central nervous system was attributed to high infant deaths due to natural discrepancies, (Bednarczuk *et al.,* 2020).

Miller, *et al.,* (2017) observed that infant mortality explains reasons why most governments mainly in developing countries opt for solutions of reducing high IMR to the lowest levels that they could afford. To do this, they need to know exactly what changes have contributed to high IMR and what factors, if any, have to be addressed. According to Osuorah, *et al.,* (2017) low weight makes up 60-80 per cent of infant mortality in developing countries. They observed that the lowest mortality rates are between infants weighing between 3000 and 3500g and those weighing less have high IMR. In the African situation, the level of IMR has increased considerably, as Paget *et al.,* (2019) argued that the level of mortality in Africa is among the highest in the world.

Using WHO (2018) information, it was predicted that by 2018 the world's IMR would be 42.09 per thousand while Kenya's IMR would be 39.38 per thousand. The IMR in Kenya decreased from 2009 to 2019. In 2009 IMR was 40.3, in 2010 it was 39.4, in 2015 it was 35.3, in 2018 it was 32.9 and in 2019 IMR it was 31.9 per 1000 live births (Mogeni, *et al.,* 2019). This therefore initiated the interest in the researcher to examine factors that are attributed to the high infant mortality in Chepalungu sub-county of Bomet County, Kenya.

2.3 Social Determinants of Infant Mortality

Empirical studies have demonstrated that literate mothers have more healthy infants and higher likelihood that their children may live longer than their illiterate partners (Lee, et al., 2018). A study by Taramsari, et al., (2021) found that the IMR was higher in countries with higher economic inequalities, which determine the social class as a major factor. They found that lower household income was associated with high infant mortality in society. Differences between races were also noticeable, with more infant mortality among African-American mothers at a rate of 44% higher than the expected average.

A study in Indonesia by Baker, & Gadgil, (2017) targeting urban areas revealed that many working-class mothers had low infant mortality since they could provide for their infants. However, women working in industry had less time to take care of their infants who were therefore mostly prone to early infections. In addition, they were malnourished due to the fact that they were being taken care of by older siblings care givers who had little formal education in child care. (Frimpong, 2019).

A woman's education has been observed to be an important factor behind the nation's high IMR. Hossain, *et al.,* (2018) demonstrated that an infant born to an illiterate mother in India had a higher possibility of dying within first month of birth compared to mothers who had 12 years and above level of education. Post-neonatal death rate was also high in illiterate mothers than those who had simple formal education.

According to Aldirawi, *et al.,* (2019), there is a relationship between mother's level of education and IMR in Gaza strip. Here 550 mothers of infants were interviewed, half of them had had dead infants and half of them had live infants. This demonstrated that mothers with lower level of education had a higher risk of IMR than the educated ones. The study concluded that there was a positive relationship between parental level of education and the living of infants in Gaza strip (Van den Berg, et al., (2018).

In Kenya Salawu, *et al.,* (2020) found out that youthful mothers were exposed to complications during delivery hence high IMR. As revealed by them, young mothers had high rate of infant mortality as compared to older mothers who had their experience in motherhood and proper feeding (Kabir & Maitrot, 2017). These factors assisted in evaluating the causes of infant mortality in the study locale.

In a study by Duarte, (2020), in Brazil, it came out that mother's religious affiliation had critical position in high level deaths of infants in the society. It further revealed that infant deaths among the Protestant mothers were lower than those of Catholics mothers, the reason being that mothers who belonged to protestant religion had more restrictions on their way of life than the Catholics. However, Marinelli *et al.,* (2019) examined the influence of religious affiliation on infant mortality in the United States

found out that IMR was lower in countries with a bigger population of Catholics and Protestants because the fundamentalist rejected education and medication which led to higher IMR.

In Zimbabwe, Humphrey, *et al.,* (2019) associated churches such as Apostolic and Zionist to be practicing faith healing which made their followers to ignore medication when their members were sick in order to pray for healing. They attributed the Roman Catholic and protestant churches to be exposed to health care facilities and education which made them to have socially well off and better educated members of society (Mukesi, *et al.,* 2019). This contributes to a decline in IMR amongst the Catholics and protestants than those from other churches like Apostolic and Zionist.

2.4 Economic Determinants of Infant Mortality

The relationship between IMR and levels of income was looked at with a specific focus (Pabayo, *et al.,* 2019), According to Tang, (2019) the connection between infant mortality rate and dimensions of salary is an important variable for a country's level of income, with the goal that views infant survival as an element of the country's level of development. On the other hand Taramsari, *et al.,* (2021) examined the relationship between parents' Socio- Economic Status (SES) and infant mortality, and the results showed that education and Social Economic Status of parents had a significant role in the decline in IMR.

An investigation by Wabwile, (2019) on financial determinants of infant mortality in Kenya, found a variation in levels of IMR in several Regions. For example in the Nyanza region, IMR was almost triple that of the Central Region which had lowest IMR. This was attributed and this was attributed to the variation in income between

the two Regions. The study revealed that inadequate job opportunities made parents in Central Region to reduce the conception rate so as to invest in the education of their children.

Haldar, & Hembram, (2020) looked at causes of infant mortality in Sikkim in India, between 1990 and 1994 and found out that as the when there was an increase in Gross Domestic Product (GDP) and there was a decrease in IMR in all the nations concerned. Infant Mortality associated with birth defects was inversely proportional to GDP. Therefore, there was a significant approval that intrinsic abnormalities represented an expansion of infant deaths in both developed and developing nations (Eneh, 2019). However, IMR was higher in poor nations than in wealthier nations. Surprisingly, it was found out that conditions such as spinal abnormalities that could be reduced through preventive measures still caused numerous infant deaths in Italy.

Henrick, *et al.,* (2017) clarified that in the developed countries, infants who were not breastfed were bound to die of pneumonia and other multiple diseases such as diarrhoea in the initial six months of life in contrast with those who breastfed. In another research, Khadka, (2019) reported that IMR was higher among women in non-farming regions when contrasted with those who were either not working or working in the agricultural sectors.

Most of the empirical studies reviewed are based on social-economic factors on infant mortality while the current study tried to look at the economic factors to build up the relationship between infant mortality in Chepalungu, Bomet County, Kenya.

2.5 Cultural Determinants of Infant Mortality

Several studies concerned with the cultural factors affecting IMR in sub-Saharan Africa have been featured. Among them was the attributes of high infant mortality in society by (Harkness, & Super, 2020). According to Cain, *et al.*, (2018) most of studies done have indicated that cultural factors are integrated in the enormous ethnic and religious beliefs which exist in Sub-Saharan Africa. Most of the cultural practices and beliefs reflect some strength on whether mothers had sought medical care during pregnancy and when their newborns were sick.

According to Dhingra, & Pingali, (2021), in most societies, the culture inclination of women's social status whether she can conceive and give birth, is an additional opportunity for marriage in the Sub-Saharan Africa. High fertility results in women having short birth intervals between pregnancies that put both the infant and the mother at risk, leading to death in most cases (Dhingra, & Pingali, 2021). However they found out that in a culture where young people under 18 years old engage in unhealthy sex before marriage, there are complications during delivery because most of them don't seek for health care and this could lead to high Infant mortality.

Ndlovu, (2018) in a study on Determinants of infant and child Mortality in Zimbabwe, found out that women who had given birth at a youthful age had a higher IMR than those who had their first delivery at advanced ages. This implied that the adolescent stage was a critical attribute to high IMR. According to Nyaruwanga, (2017) women in Zimbabwe are sexually active during the adolescence stage and, so, could conceive without any medical care, a crucial feature of IMR among youthful mothers in Zimbabwe.

Martínez, *et al.,* (2020) carried out a research on cultural determinants of infant mortality in southern Peru. They found out that among the Amerindian children in southern Peru, high IMR was accounted for during the perinatal and neonatal period. Most of the cultural factors discussed implied that there are situations of infant mortality when male infants were favored over female infants as a norm in the society (Nibogore, 2020). In other instances IMR were commonly not recorded due to failure of register for death certificates.

Shole, (2017) observed that cultural explanationforinfant mortality are furrowedroadswhere prejudices against wives or children leaving the house makes it difficult for women and newborns to get treatment that is available to them or needed. The influence of cultural lifestyle and way of life of a people is another attribute for some deaths in infants throughout years. According to Howell, *et al.,* (2018) mortality risks are high in people addicted to alcohol substance abuse and smoking and individuals who are obese. This is because they cause premature births which contribute to high IMR.

2.6 Environmental Determinants of Infant Mortality

Research has shown that environmental and social barriers prevent access to basic medical resource which contribute to a high level of IMR. According to Domnariu (2015), infant mortality in developing countries was due to infections, premature births, complications during delivery, prenatal asphyxia as well as birth injuries. However, Domnariu (2015) observes that many of these causes can be prevented with very low costs.

WHO (2018) report indicated that among the ten leading mortality risks that contribute to high infant mortality in developing nations are: dirty water, sanitation and smoke from carbon fuels. Vakili *et al* (2015) on a different observation reported that diseases of infant mortality are linked to several common trends, scientific development and social programs. The scholars felt that the trends for its decline could include improvement of sanitation, and especially access to safe drinking water which would dramatically help in the decrease of high infant mortality fataldisease. Pasteurization of milk and other living standards in the urban settings would as well assist in the increase of education and awareness regarding infant mortality in regions.

Currier, & Widness, (2018) noted that traditional practices pose risks associated with poverty. These include lack of safe water, lack of sanitation, transfer of waste and indoor air contamination in a disorganized ecological perimeter. Other risks, such as rural air contamination and agro-industrial chemicals as well as disposables that require environmental protection, should also be organized and implemented (Sumankuuro, *et al.,* 2017).

Similarly, Heft-Neal, *et al.,* (2018) noted in a related report that there is a relationship between infant mortality, family quality and network conditions in rural countries affected by environmental hazards. Their findings, among others, show that the use of clean cooking fuels, access to safe water and sanitation reduces the risk of infant mortality. However, the study recommended that women who are exposed to pollution on a daily basis when pregnant should be closely monitored by their physicians. Their physicians should also monitor them and their infants after birth. It

was also noted that children living in environments with more air pollution, high population density, high crime rate and low level of income will have high IMR.

A research by Mokgaga, *et al.,* (2020) on environmental determinants of infant mortality in urban Kenya, found out that those families that had flush toilets in their area of residence had lower IMR than those without any such facilities. A study by Mwambire, (2020) on Determinants of Infant and child Mortality in Kenya showed that there was 20% increase in infant deaths in family units with no latrine contrasted with those who had.

In another study, Anele, *et al.,* (2020) on factors influencing infant mortality in Kenya projected the mortality discrepancies according to maternal education, marital status and place of residence. She used a multivariate regression analysis and reported a significant relation between the ratios of observed to anticipated deaths and length of breast feeding, age of weaning, water treatment, maternal literacy and attendance of antenatal clinics by expectant mothers. Education appeared to be very important and significant in affecting ratio of observed to expected deaths. There was also a significant relationship between toilet facilities, source of water, and treatment of ordinary water and percentage of the expected deaths.

2.7 Literature Gap

The reviewed literature on empirical studies indicates that mothers with formal education experience lower risk of infant mortality than those without much education. The economic status showed incompatible findings given that in some of the studies reviewed families with accumulative wealth had lower cases of infant mortality due to their potential in the provision of improved conditions of healthcare

and diet. Other studies indicated that mothers from such households had higher chances of infant mortality due to improper methods of breastfeeding.

Attributes on environmental factors indicated a significant consistency that area with cleaner water sources had lower rate of infant mortality. Countries such as Kenya and Asia are still struggling to improve their areas in sanitation that threatens the health sector especially that of vulnerable infants. On the cultural factors, the reviewed literature indicated that Work status, education and exposure of the mothers influenced the rate of infant mortality. However, some studies have indicated that there is a difference in whether or not it has had an impact on infant mortality.

The social factors reviewed in the studies revealed that mothers who live in urban have mixed results. Some showing higher likelihood of experiencing infant mortality while others show that high or lower infant risks depends on the surrounding residence. Mothers whose residential surrounding is highly populated tend to experience higher risk of infant deaths as observed while infant mortality in less densely populated areas.

In most of the studies reviewed, for instance Adewusi, & Nwokocha, (2018) study examined the family unit's natural, economic attributes, maternal statistics and their impact on infant mortality while the current study examined the determinants on infant mortality. The study further used cross classification and double strategic relapse systems while this study filled the gap by using a questionnaire and an interview guide to collect data. Further most of the studies were carried out in developed countries than Bomet county Kenya, a developing country where Chepalungu is found.

Table 2.1: Literature Gap

No	Author	Details of the Study	Factors Identified	Gaps Identified
1	Lee, et al., (2018).	Exploring the relationship between maternal health literacy, parenting self-efficacy, and early parenting practices among low-income mothers with infants.	Maternal health literacy	Knowledge gap on the relationship between social factors and IMR
2	Frimpong, M. A. (2019).	Exclusive Breastfeeding Practice among Formally and Informally Employed Nursing Mothers Attending Child Welfare Clinic at Mamprobi Polyclinic, Accra	Exclusive breast-feeding practices	Knowledge gap on the exclusive breast-feeding practices among nursing mothers from rural community.
3	Salawu, *et al.*, (2020)	Preventable Multiple High-Risk Birth Behaviour and Infant Survival in Nigeria.	High-Risk Birth Behaviour	Knowledge gap on how social factors promote high risk behaviour and high IMR.
4	Pabayo, *et al.*, *(*2019)	State-level income inequality and mortality among infants born in the United States 2007–2010: a cohort study.	Income inequality and mortality among infants	No relevant study in Kenya showing connection between level of income and high IMR among rural women
5	Haldar, & Hembram, (2020	National Level. *Sustainable Development Goals: An Indian Perspective*, 41.	National IMR	Indian context but not in Kenyan context
6	Henrick, *et al.*, (2017)	Breastfeeding behaviors and the innate immune system of human milk.	Breastfeeding behavior	No clarity on the bad feeding behaviours of mothers
7	Harkness, & Super, (2020).	Why understanding culture is essential for supporting children and families.	Cultural practices	No clarity on how cultural practices among Kenyan communities promote IMR
8	Dhingra, & Pingali, (2021)	Effects of short birth spacing on birth-order differences in child stunting: Evidence from India.	Birth spacing	How poor birth spacing promotes IMR not well explained
9	Ndlovu,	Factors influencing infant and	Infant and	Examined broad

	(2018)	child mortality in Zimbabwe.	child mortality	factors influencing infant mortality. Current study will be specific to 4 IMR determinants
10	Domnariu (2015)	Leading Factors and Recent Trends in Under Five-Year-Old Mortality.	Trends in under 5 mortality rate	Illustration no in line with the Kenyan context
11	Currier, & Widness(2018)	A brief history of milk hygiene and its impact on infant mortality from 1875 to 1925 and implications for today.	Milk hygiene & IMR	No clarity on how milk hygiene currently lowers IMR
12	Anele, (2020)	The influence of the Municipal Human Development Index compared to maternal education on infant mortality: a retrospective cohort study in the extreme south of Brazil.	Maternal education and IMR	No illustration on how environmental education reduces IMR.

2.8 Theoretical Framework

2.8.1 Proximate Determinants Model

This research was based on the proximate determinants model. Mosley and Chen established this framework model in 1984, then changed it in 1985. The Model provides a demonstration of the impact of family sex on gender differences in surviving children's health status. This model was originally created to examine variables affecting infant mortality, the nearby determining model is based on the notion that all social and economic determinants of infant mortality operate through a series of biological or near-defining determinants to impact a child's survival probability.

This model therefore integrates social, economic, medical and biological reasons for the death of children. The proximate determinants of Mosley and Chen (1984) are grouped into 5 categories: maternal variables (age and parity of mom); environmental

pollution (infection tract); nutritional insufficiency; injury; and personal disease control; (preventive and curative care).

According to Van Malderen, *et al.,* (2019) the determinant factors are all social and economic causes of child mortality and are classified into individual, family and community-level variables by Mosley and Chen. My method is based on the near-defining framework because I look at health status, but the health status of survivors is the result of interest rather than death. My model thus differs in that I analyze proximate determinants as outcomes themselves; gender differentials in the proximate determinants represent ways in which household attitudes against girls translate into worse health status for surviving girls and higher mortality rates for girls.

2.8.2 Modernization Theory

This study was informed by the modernization theory which is based on social, economic, cultural and environmental factors. The theory of modernization is used to explain society's process of modernization. It was based on the thoughts of German sociologist Max Weber which formed the basis for a paradigm of modernization developed by the sociologist Talcott Parsons from Harvard.

This theory holds that Social, economic, cultural and environmental factors are key variables that contribute to social progress as well as the development of societies (Subramaniam, *et al,.* 2018). It seeks to explain process of social development. Theory of modernization is open to controversy from socialist and free market ideologies. It helps to demonstrate how socio-cultural factors, economic and environmental factors influence infant mortality. Modernization theory emphasizes

not only positive processes, but also reactions to the change (Banda, 2020). It also looks at internal dynamics, with reference to social and cultural structures as well as the adaptation of new technologies.

The theoretical concepts relate a number of attributes have been established to affect infant mortality in many counties and societies. The attributes range from social, economic, cultural, and environmental factors. Lamnabhi-Lagarrigue, *et al.,* (2017) affirm that problems of infant mortality essentially operate throughout a universal set of biological instruments to exercise a collision on humanity. Gupta, *et al.,* (2021) argued that it should take into consideration numerous aspects that contribute and establish the level of mortality in a society. Thus the aspects identified in broad classifications as Social, Cultural, Environmental and Economic.

The conceptual framework shows relationship between independent, intermediate and dependent variables. Independent variables were studied in terms of social, economic, cultural and environmental determinants of infant mortality, while infant mortality was the dependent variable. The researcher intended to determine whether there is a significant link between the independent and dependent variables and whether their inter-relationship is attributed to the state of infant mortality in Chepalungu.

2.9 Conceptual Framework

This study adopted a modified conceptual framework developed by Subramaniam in 2018.The conceptual framework helps in demonstrating relationship between independent and dependent variables. Each component of independent variable is

critical in determining infant mortality rate among the communities living in Chepalungu Sub County, Bomet County.

In this conceptual framework, the independent variables considered for this study were; social determinants (household size, education level, residence) variables which have direct influence on IMR. Secondly, this study examined economic determinants (occupation, income level) which also play a critical role in determining level of IMR within the study area. In addition, cultural determinants are considered to include place of delivery, type of marriage and Place for treatment which in one way or the other influence IMR. Lastly, the study examined environmental determinants such as source of water, sanitation and air pollution which has an impact on IMR level within the study area. They are all considered as the direct influencers of IMR in the area of study.

The moderating variables that enhance influence of independent variables on infant mortality rate were maternal reproductive health and attitude towards primary health services. They indicated that good maternal reproductive health and positive attitude towards primary health services lowers IMR whereas reverse is true.

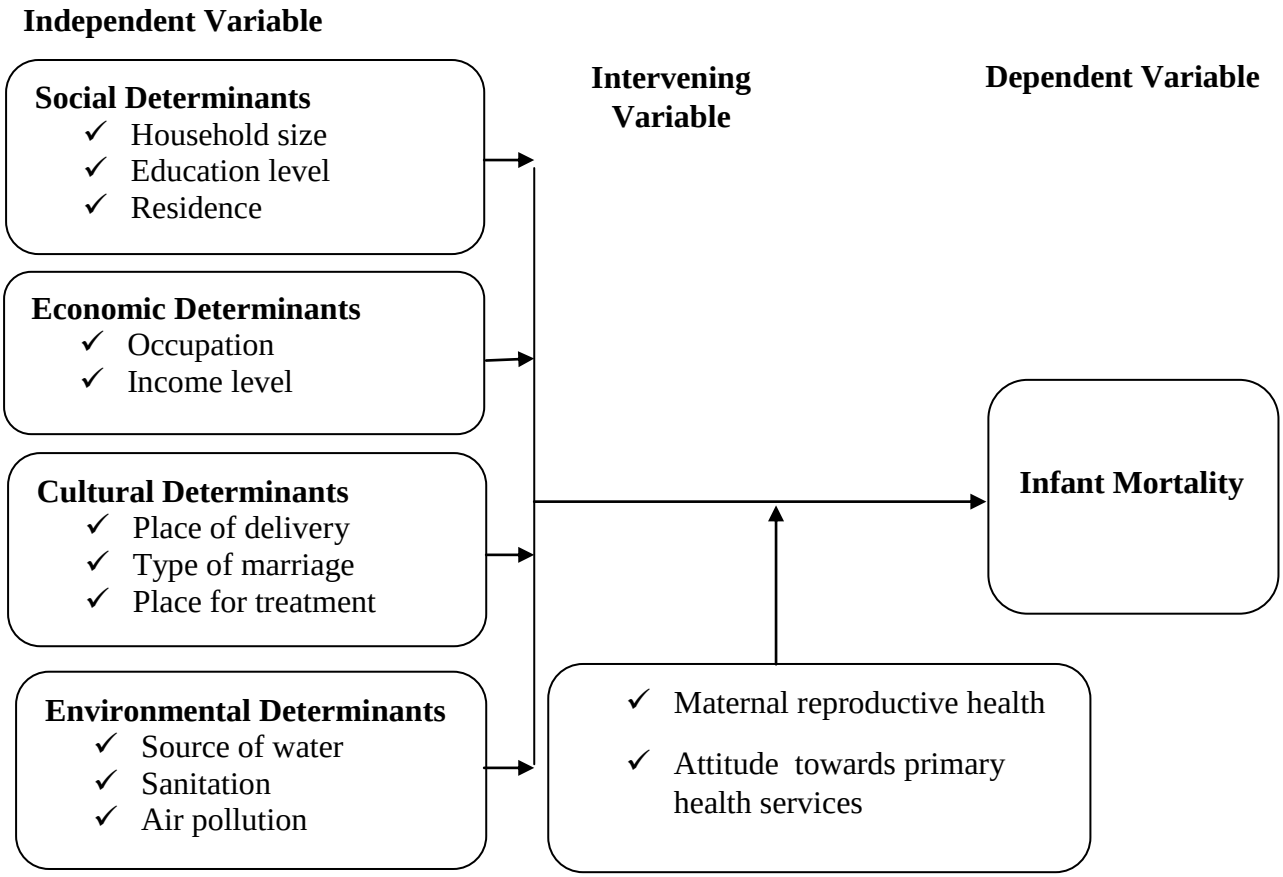

Figure 2.1: A conceptual framework showing the relationship between the underlying factors and infant mortality.

Source: Modified from Subramaniam (2018)

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The chapter presents procedures and methods that the researcher used to carry out the study. It is organized according to the following sub-headings: research design, location of the study, target population, description of sample and sampling procedures, description of research instruments, piloting of research instruments, validity and reliability of research instruments, trustworthiness of qualitative data, description of data collection procedures, description of data analysis procedures and ethical considerations.

3.2 Research Design

A research design provides an outline for the purpose of data collection, measurement and analysis (Schoonenboom, & Johnson, 2017).This study was guided by mixed methods research design. A mixed method approach design involves use of both quantitative and qualitative approaches so that an overall strength of the study is high, (Ishtiaq, 2019). In this study, both quantitative and qualitative techniques complemented one another in a proposition to examine determinants of infant mortality in Chepalungu of Bomet County.

The study used both descriptive survey and naturalistic phenomenology design to assess the infant mortality while qualitative approach entailed understanding the meaning, perception, and empirical evidence that individual participants attributed to the notion of infant mortality. Further, important review of literature was conducted to obtain significant information on infant mortality globally and Kenya in particular.

The descriptive survey research design was chosen because it involves collecting quantitative data in order to answer questions concerning the current status of infant mortality situations in Chepalungu and deals with the frequency, allocation and interrelation of variables. The survey research enables a researcher to collect data at a particular point in time with the intention of describing the nature of existing conditions and identifying the standards against which existing conditions can be compared and determined (Vaske., 2019). Further Celis Sierra, (2020), posits that descriptive survey research determines and reports things describing behaviour, attitudes, opinions, values, perceptions and attributes as precisely as possible.

According to Englander, (2020) phenomenology examines the world as it appears to individuals when all the prevailing understanding of the phenomena is laid aside and revisit the immediate experience of the phenomena. In this case the characteristic of phenomenology is an emphasis on the participants' responses, interpretations and experiences. According to Anyon, *et al.*, (2018), a systematic phenomenological study strengthens a study and entails the use of several sources of data. The current study used health workers and mothers to collect the data on the factors contributing to infant mortality in Chepalungu of Bomet County. The researcher also used two different forms of data collection tools (a questionnaire and an interview guide) to collect information from the participants.

3.3 Study Area

This study was conducted in Chepalungu Sub-County in Bomet County which lies between latitudes $0^0 29'$ and $1^0 03'$ south and between longitudes $35^0 05'$ and $35^0 35'$ east. The county is divided into five Sub-Counties namely Bomet central, Konoin, Chepalungu, Sotik and Bomet central. Chepalungu Sub-County covers an area of 539.8 Km^2 with a population of 163,759 individuals (Bomet County Government 2018). The population density is 387 persons per km squared.

In Bomet County registered life expectancy at birth stood at 58 years in 2014. However, there is an anticipated improved life expectancy at birth for both sexes from 57 years in 2009 to 64 years by 2030. This will be contributed to by improvement in healthcare services, improved living standards, improved education among others. Bomet CIDP 2018 to 2022 aims to improve education, healthcare provision, food security, road network, improved standards of the residents and job creation especially for the youth. .

It is bordered by Narok County to the south, Nyamira to the West, Nakuru to the North East and Kericho to the North. The greater population of Chepalungu Sub-County is involved in agriculture. The major cash crop in the county is tea growing. Animal rearing is another major source of income. Food crops grown are maize, beans, sweet and irish potatoes, vegetables, millet, onions, tomatoes and sorghum.

An extensive piece of the Sub County is described by undulating geology that offers an approach to complement the landscape to the south. The land inclines to around 1800 m above sea level in the lower territory with a number of dispersed slopes in

Sigor plain. Bomet County has two major rivers, these are Mara and Itare. Water reservoirs are common in Chepalungu. The normal temperature is 18^0C. However, there are few Dams in the drier zones of the study area. The Chepalungu sub-county is divided into five wards. Its population distribution and density for the years 2009 and 2019 as shown in the tables 3.1 and 3.2 below.

Table 3.1:Population density and distribution by Sub County in Bomet County

	2009			2019	
Sub-County	**Area Km2**	**Population**	**Density**	**Population**	**Density**
Bomet Centr	266	131,527	494	167,702	630
Bomet East	311.3	122,273	393	155,903	501
Sotik	479.2	167,214	349	213,204	445
Konoin	445.1	139,040	312	177,281	398
Chepalungu	**539.8**	**163,759**	**303**	**208,799**	**387**
Total	2037.4	723,813	355	922,888	453

Source: KNBS (2019) Housing and population census look for the recent one

Table 3.2: Household by gender in Chepalungu Sub County

		Adult			Children	
Sub County	**Total**	**Female**	**Male**	**Total**	**Female**	**Male**
Chepalungu	30,604	11,146	19,458	50	35	15
Total	**30,604**	**11,146**	**19,458**	**50**	**35**	**15**

Source: KNBS (2019)

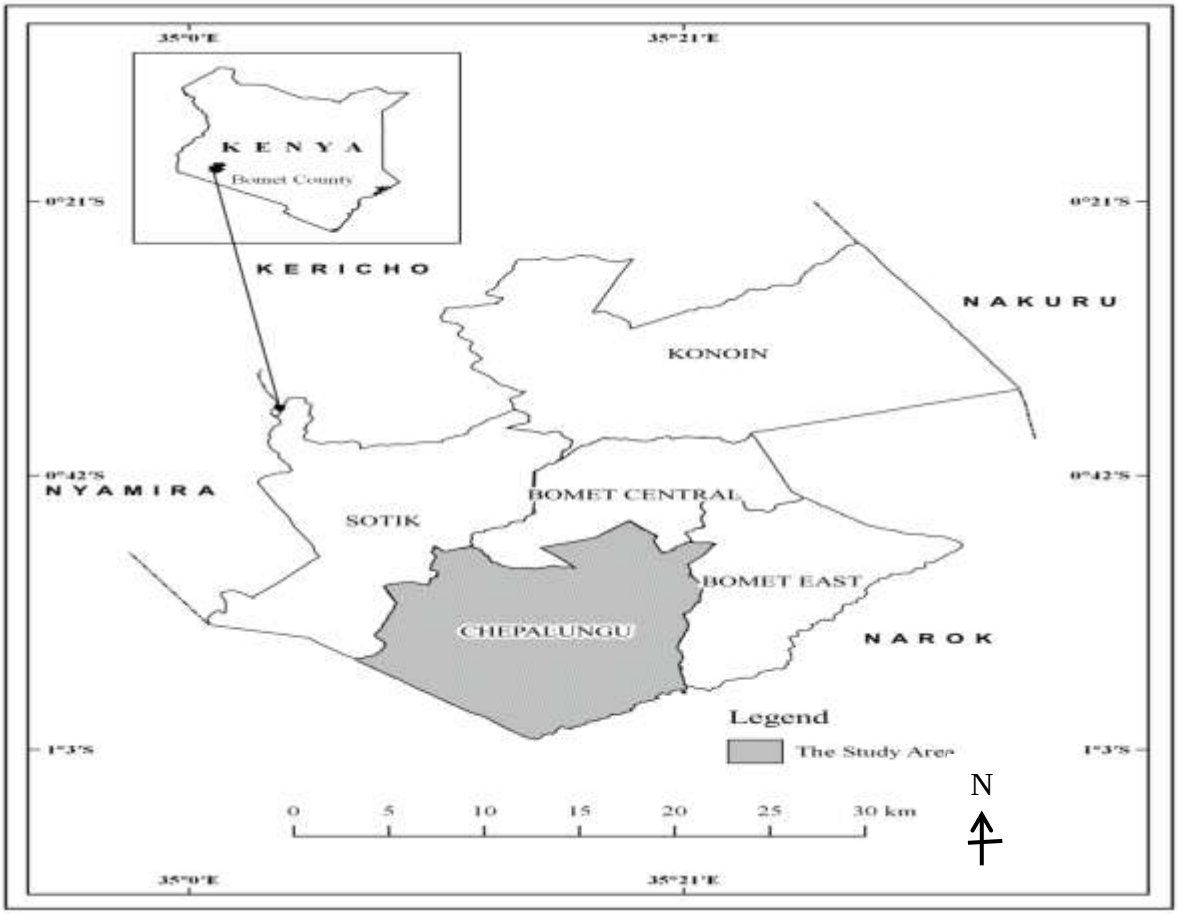

Figure 3.2:Map of Chepalungu showing the location of the study area

Source: Kenya Demographic and Health Survey Bomet County **(**2013/2014**).**

Bomet County has only one government gazette plantation forest called Chepalungu forest which chances to be in the study area. The study area does not have any mineral except for the extraction of ballast and building stones that boosts the economic activities carried out in the Sub- County.

Most of the cattle breeds reared in the area on which most people depend on for their livelihoods are of poor quality associated with frequent outbreaks of diseases and insufficient pasture. Farmers do not benefit much since the roads are inaccessible forcing them to sell their products to middlemen who exploit them. The rainfall in the

County ranges from 1000mm-1400mm per annum and evenly distributed throughout the year. However, the lower part which is the study locale (Chepalungu) is generally dry especially between the months of June and November (County Government of Bomet 2018).

3.4 Target Population

This study targeted all mothers in the reproductive age of 18-49 years and Health officials (Clinicians/Nurse in-charge**)** who were the Key informants in Chepalungu Sub-County. This is because they had significant information on the causes of infant mortality in the study area.

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Technique

The study used both probability and non-probability procedures to select the sample size. Non-probability sampling is when the researcher intends to get information from particular sources with significant information for the study. In this case the Key informants (Health workers) were selected using a Purposive sampling technique. According to Bhardwaj, (2019) purposive sampling assists the researcher to build a sample that is significantly required to their specific needs. Chepalungu has four health centers with similar unique features which assisted in the provision of credible information. These were Sigor Sub District, Siongiroi, Chebunyo and Olbutyo Healh Centres. The researcher in this study purposively collected data from each of the four health facilities that were available in Chepalungu sub-county where the person who was in charge of the health Centre automatically formed the sample size.

According to Gay, *et al.,* (2014), probability sampling is a procedure that utilizes techniques that permit the researcher to specify the chance, that each participant of the sampled population was selected for the study. Therefore the present study used simple random sampling technique which is a probability sampling technique to select the mothers for the sample. Simple random sampling involves listing the number and randomly picking them from the list. There is no exact size of the sample but this depends on the purpose of the study and nature of the population under study, (Gay, *et al.,* 2014). Chepalungu sub-county is divided into five wards with similar characteristics hence provision of significant data. Simple random sampling method was used to select data from the five wards independently from each ward (77) respondents were selected. Therefore 385respondents were sampled for the study. For a survey research, a sample of 30% of a population is sufficient (Mugenda, 2014).

3.5.2 Sample Size

This study targeted about 58,000 mothers in the reproductive age of 18-49 years and Health officials (clinical officers/nurses in charge) who were the Key informants from Chepalungu Sub County, Bomet County, Kenya. This is because they had significant information on the causes of infant mortality in the study area.

The study adopted the formula suggested by Smith (2013) determine the sample size since the targeted population was greater than 10,000;

$$\textbf{Sample Size} = \{(\textbf{Z-score})^2 \times \textbf{Std Dev} \times (\textbf{1-StdDev})\} / (\textbf{Margin of error})^2$$

Where;

Z-score is the corresponding value on the Z-score table to a confidence level of 95% (1.96).

Std Dev is the standard deviation (variance) expected in the response given as $\pm$ 5%

The margin of error expresses how much error was allowed in the mean.

Therefore, the sample size for the household heads was determined as

$$\frac{(1.96)^2 \times 0.5^2}{0.05^2} = 385 \text{ household heads.}$$

Upon these three hundred and eighty one (381) households and four (4 key) informants drawn from Chepalungu Sub-county Health Centres added up to three hundred and eight five participants (385). The key informants were selected such that only those with information on infant mortality were sampled.

3.6 Research Instruments

According to Creswell, & Creswell, (2017), research instruments are means by which primary data is collected from the sample size. Study data was collected by use of both questionnaire and interview schedule.

3.6.1 Questionnaire for Mothers.

Shufutinsky, (2020) argues that in research, questionnaires are widely used due their advantages in giving similar or standardized results on the subject under study. Questionnaires make it possible to compare responses from different participants on the same questions (Zhang, *et al.,* 2017). It is therefore because of these reasons that the researcher found it necessary to use a questionnaire for the study. The study also utilized secondary sources of data to complement the field data. Questionnaires were used to collect data from mothers who were aged between 18-49 years. The participants' questionnaire comprised of structured and semi-structured form. It covered the following sections; section A; Demographic characteristics, Section B; concept of infant mortality, C; social factors on infant mortality, D; Economic factors

on infant Mortality, E; Cultural factors on Infant Mortality, and section F; Environmental factors on infant mortality. The questionnaire had both open and close-ended questions. The researcher got the information from illiterate mothers through interview guided by the questionnaires.

3.6.2 Interview Guide for the health care officials.

According to Smulowitz, (2017) an oral conduction of interview provides an in depth data which is not possible when using a questionnaire alone. This study conducted one set of interview for the health care officials. In line with Yeong, *et al.*, (2018) the interview was directly extracted from the research questions that were impetus for the research and instruments. The schedule comprised of both structured and unstructured questions capturing all the research questions on the study as follows; demographic information; the social factors, Economic factors, Cultural factors and Environmental factors. The interview schedule was carried out by the researcher herself and lasted between 15-20 minutes for every respondent interviewed.

3.7 Pilot Study

The researcher conducted a pilot test of instruments in two health facilities in Bomet East Sub- County which had the same geographical features as study area and so was appropriate for the pilot study. In this case, the instruments were administered to 2 health care workers and 10 mothers who were not part of the study. The participants responded to the items and commented on the clarity of the instructions as well as relevance of individual items. According to Williams-McBean, (2019), a pilot study can be done to establish whether the procedure has merit and to correct obvious defects. Therefore, their comments helped in detecting the ambiguity, unclear

statements and other inadequate contents in the study. The researcher then used input of respondents from the pilot study to improve the research instruments.

3.7.1 Validity

In order to validate the research instruments, the researcher used the technique of content validity, to test the degree to which the sample of the test items represents the content it designed to measure (Mohajan, 2017). Additionally Hayashi Abib, & Hoppen, (2019) attribute validity to propose truthfulness and as a measure of how well a proposal is conceptualized that is how reality matches the actual truth.

In this study, the researcher used Face and Content validity to validate the quantitative instruments (Health workers questionnaire) (Connell, et al., 2018). Content validity of a research instrument refers to the degree to which the test in real sense measure, or specifically relate content, ideal or concept for which it was designed. Face validity centers on the judgment made based on scientific approach on whether the gauges used conform to an expected construct.

In order to test content validity, the study sought the assistance of experts (Connell, *et al.*, 2018). According to Eltaybani, *et al.,* (2020), judgmental procedure of evaluating whether an instrument is likely to provide content valid data is to request professionals in the meticulous area and persons who can render a bright judgment about adequacy of the tools to enable adjustments done according to their comments and recommendations before administration. In this study therefore, the instruments were distributed to the two supervisors from Kenyatta University (KU) to critically scrutinize the items with a view of establishing whether the set of items truthfully

represented the variables in the study and whether such content was justified with the reviewed literature. The experts were to read, judge, make recommendations and give the feedback to the researcher. To validate the instruments and ensure their accuracy in measurements of what they were to measure, on a close scrutiny their suggestions were incorporated and final questionnaire produced.

For interviews schedules, validity was determined through methodological triangulation. This consisted of mixing approaches of data collection by use of questionnaires which consisted of both closed and open-ended questions and interview schedules. The purpose was to acquire additional data in order to put additional weight on the topic under study. Procedural triangulation is the application of more than one approach of data gathering. However, several authors have argued that triangulation is to increase the correctness of the study; in this case, triangulation is considered to be one of validity approaches (Abdalla, *et al.*, 2018).

3.7.2 Reliability.

Accordinging to Mohajan, (2017) reliability is the extent to which a researcher's instrument produces dependable outcomes each time it is administered. Hopkins, (2017) refers to the steadiness or stability in the measurements and noted that there exist two (2) major aspects of reliability; one is consistency over time and the other is internal regularity. On the other hand Wise, et al., (2019) argue that reliability of measuring research instruments when administered to similar subjects at various times and the researcher gets the same results, it creates uniformity.

Internal consistency was used to compute the reliability for quantitative study instruments in this study. Using this statistical technique, the reliability of questionnaires involved data obtained from ten mothers and two health workers from the pilot study at an interval period of two weeks. The researcher conducted internal consistency in order to determine reliability within the instrument itself and within questions/items within the same instrument using Cronbach's Alpha technique. The data collected was subjected to Cronbach's Alpha technique of reliability test where the Likert scale attitude questions were subjected to reliability analysis (Halim, *et al.,* 2020). According to (Halim, *et al.,* 2020), Alpha 0.7 and above was accepted as reliable.

Using this method, the question items on Likert scale sought to identify the important aspects considered relevant in the different research objectives. The questions were set using a Likert scale ranging from 1 to 5. The general Cronbach's Alpha coefficient for all the different items was obtained. Where the index efficient was above the 0.7 threshold as suggested by Taber, (2018) it was taken to be significant. This means that in all the items where the coefficients were well above the recommended cut-off of 0.7 demonstrated excellent reliability.

The link between causes and infant mortality was assessed on a scale of specific items. The Cronbach's Alpha index for the 5 items was 0.721. This reliability score is well over the 0.70 threshold recommended by Kothari (2017) hence the items were reliable. This was done to all the items in the different Likert Scales in the different questions designed to examine the respondents' responses. Therefore, reliability of

0.70 and above was adopted in this study for all the quantitative items in the different questionnaire instruments.

3.8 Reliability of Qualitative Research Data instruments.

Reliability of qualitative data research instruments centers on the researcher for being the instrument itself (O'Connor, & Joffe, 2020). In qualitative research, both validity and reliability are tied together. The trustworthiness of a study therefore engrosses transferability, conformability, credibility and dependability. Transferability refers to showing that the findings can be applied to other people, credibility refers to confidence in the findings from the participants and content in which the study was undertaken, conformability involves the degree of neutrality which the findings of the study shaped sorely by the participants minus the researcher interest or bias and dependability indicates that the findings are consistent if the study is repeated (Kanygin, & Koretckaia, 2021).

3.9 Data Collection Procedure

The study was conducted from 2019 to 2021 after the researcher had obtained authorizing documents from Kenyatta University Graduate School and (NACOSTI). The researcher with the help of research assistants then visited the homes during the day most preferably in the evening to collect data from the households. Those who were able to read and write were identified from the sample. Questionnaires were administered and collected after a period of one week. Thereafter, the instruments were administered to those who could not read and write. Finally, the researcher visited the key informants in their offices to collect data through face-to-face interview.

3.10 Data Analysis procedure

Data collected were analysed using qualitative and quantitative methods after it had been edited and coded for totality and correctness at the end of each collection day before storage. Both Quantitative and qualitative data analysis was conducted to better comprehend the factors for infant mortality in Chepalungu Sub County, Bomet County. Data was analysed through descriptive statistics for all quantitative data. Computer software (SPSS] 22.0 was utilised to code, enter and analyse results of the study. Descriptive statistics were utilised to investigate and explain the association between variables in the sample study (Mishra, *et al;* 2019). Descriptive analysis was necessary for the study as it gives data summary, description and interpretation of situations as they are during research period. Descriptive statistics were used to analyse various items in the questionnaire in terms of frequencies, percentages, means, and standard deviations. This was due to their significance in simply relaying the outcomes to most readers (Mishra, *et al;* 2019).

3.10.2 Content Analysis

Qualitative data was analysed by means of a content analysis approach whereby a thematic content analysis was presented in a narrative form. According toScharp, & Sanders, (2019), thematic analysis is qualitative approaches which analyses classifications and illustrate patterns (themes) that emerge from the data. Subsequently, data related to participants' views, attitude or feelings, as is the case in this study, is best handled thematically. Qualitative data from open ended questions and interview schedule outcomes were analysed thematically. Outcomes for data which were not quantifiable were presented by means of direct quotations, excerpts and narrations.

3.10.3 Inferential statistics

Inferential statistics (Chi-Square analysis) was used to test relationship between the independent variables and IMR at 95.0% confidence level. It helps in determining whether the association between two variables is statistically significant. This study therefore used statistical software to generate Pearson Chi-Square Chi Square statistic (Schober, *et al.*, Schwarte, 2018). Pearson Chi-Square correlation was applied to determine the association between independent variables; social, economic, cultural and environmental determinants and the dependent variable (infant mortality rate). According to Schober, *et al.*, (2018) correlations technique is applied to determine the association between a dependent variable (environmental factors) and the independent variables (infant mortality). Table 3.4 shows a summary of statistical techniques that was used to analyze quantitative data per objective.

Table 3.2: Quantitative Data Analysis Matrix

Objective	Independent Variable	Dependent Variable	Method of Analysis
To determine the social factors associated with infant mortality in Chepalungu, Bomet County, Kenya.	Social Factors	Infant Mortality	Frequency, percentages, and Chi-Square
To establish the economic factors associated with infant mortality in Chepalungu, Bomet County, Kenya.	Economic Factors	Infant Mortality	Frequency, percentages and Chi-Square
To determine the cultural factors associated with infant mortality in Chepalungu, Bomet County, Kenya.	Cultural Factors	Infant Mortality	Frequency, percentages and Chi-Square
To establish the environmental factors associated with infant mortality in Chepalungu, Bomet County, Kenya.	Environmental Factors	Infant Mortality	Frequency, percentages and Chi-Square

The reactions from key source interviews calendars were recorded properly for further preparing. The subjective information was translated completely in accordance with the examination targets. The subjective information got from meetings was coded by recognizing and marking things with likenesses in topics, assurance as per goals and rising subjects. This was done through substance investigation.

3.11 Logistical and Ethical Considerations

Ethical consideration presents informed consent and respects individuals' rights in the study. Ethical concerns constitute a significant component of a research as far as researcher's conduct is concerned. The study observed all the ethical issues required in research. The code of voluntary participation demands that a person is not compelled to be involved in the study and thus the participants' approval was sought. The participants had to be informed about the research in order to make their own decision whether to participate or not (Clark-Kazak, 2017). In this research, procedures were followed to ensure that all respondents participated voluntarily.

The second ethical conduct involved anonymity. It means that a respondent in research remains unknown all through the research (Kumar, et al., 2020). Researcher ensured that all participants understood the study content, duration, and benefits of the study and were at liberty to answer the survey questions but their rights were protected. The Participants were handled with dignity, courtesy and were not required to write their names anywhere. They were addressed according to their designation that is as health officers and mothers. In order to protect the privacy of the respondents, confidentiality was assured that the feedback given was purely academic.

The Researcher ensured that the participant's right to privacy were guaranteed, including the freedom to create, the place, time and situation where confidential information should be shared with or withheld from others. The interview sessions therefore with the health officials were on appropriate arrangement time and place. The interview involved face-to-face meetings to allow probing. The interview with the health workers was conducted in their offices during working time. The mothers were to select a convenient place and time agreed upon during the day to answer the questionnaire.

CHAPTER FOUR

FINDINGS AND DISCUSSION OF THE STUDY

4.1 Introduction

This chapter presents study findings based on research data. The response return rate is presented followed by the background information. Findings on study objectives is presented by presenting descriptive findings, inferential statistics based on chi square as well as qualitative findings from the interviews with key informants.

4.2 Response Return Rate

Study sampled 381 households and 4 health practitioners at four facilities within the sub county. The household mothers in the sample study were administered with questionnaires while the Health care official who were the key informants were interviewed. The response rate for dully filled questionnaire and complete interviews is presented in Table 4.1.

Table 4.1: Response Return Rate

Respondent Category	Sampled	Returned	Return Rate
Household mothers	381	342	89.8%
Key informants	4	4	100.0%
Total	**385**	**346**	**89.9%**

Source: Field Data 2019

Of the 381 sampled household mothers, 342 returned dully filled and complete questionnaires for 89.8% return rate. Moreover, all the 4 key informants provided complete interviews for 100.0% return rate. Thus, the study obtained an overall response return rate of 94.9% which Mugenda and Mugenda (2003) acknowledges that a response rate of at least 70% is sufficient for social science analysis. Hence the response rate was found to be sufficient for the study. The high response rate was

attained because the researcher made follow up in person and allowed the respondents adequate time to fill in the questionnaire. Moreover, the interviews were prearranged at the convenience of the key informants.

4.3 Demographic Information

The researcher captured the background and demographic information of the study respondents in a bid to understand their profile in relation to the study objectives. This included current age, age at first birth as well as number of children one had. The findings are presented in the subsequent sub-sections.

4.3.1 Age of the respondents

The current age and age at first birth of the respondents were captured. This enabled the researcher to have enabled an understanding into the child bearing stage at which the participants were at. Findings on age are presented in Table 4.2.

Table 4.2: Age of Participants

Variable	Age Group	Frequency	Percent
Current age	Below 20 years	5	1.5
	20 - 29 years	83	24.3
	30 - 39 years	77	22.5
	40 and above years	177	51.7
	Total	**342**	**100.0**
Age at first birth	Below 19 years	92	26.9
	20 years and above	250	73.1
	Total	**342**	**100.0**

Source: Field Data 2019

At the time of the study, majority of the respondents (51.7%) were aged 40 years and above with another 22.5% aged between 30 and 39 years while 24.3% were aged 20 to 29 years. However, only 5 (1.5%) of the participants were aged below 20 years.

This shows that cumulatively, 98.5% of the women were in the active child bearing age and were expected to have at least experienced child bearing.

When it came to age at first birth, the study found that majority of the women (73.1%) had their first births when they were more than old. However, 26.9% (29) of the women had first birth before being 19 years old. This shows that there is teenage pregnancy and motherhood to the extent of 26.9%. This demonstrates that for every 100 women, there are 27 cases of teenage pregnancies.

4.3.2 Number of Children

The researcher sought information on whether the women had any children at the time of the study. The findings are cross tabulated in Table 4.3 below.

Table 4.3: Number of children

		Number of children		
	Base	**0 - 3 children**	**4 - 5 children**	**More than 5 children**
Base	342	100	89	153
	100.0%	29.2%	26.0%	44.7%
Have children				
Yes	336	94	89	153
	98.2%	27.5%	26.0%	44.7%
No	6	6	0	0
	1.8%	1.8%	0.0%	0.0%

Source: Field Data 2019

The finding shows that 336 (98. 2%) of the women participants had had children at the time of the study with only 6 (1.8%) reporting that they did not have children. Further, of the 336 who had children, majority (44.7%) had more than 5 children while another 89 (26.0%) had 4 – 5 children and another 94 (27.5%) of the mothers had up to 3 children.

4.4 Infant Mortality

In this study, the variable of investigation was infant mortality which was considered as the dependent variable. Infant mortality was measured by establishing whether there were dead infants aged at age 1 and below at the time of their death, gender of dead infants, birth position of dead infants and age at death.

4.4.1 Dead Infants at age ≤ 1 year

The researcher sought information from the participating women whether; they had in their history, an infant who died within one year of birth. The findings are presented in Table 4.4.

Table 4.4:Any dead infant aged ≤ 1 Year

	Frequency	Percent	Valid Percent
Yes	276	80.7	80.7
No	66	19.3	19.3
Total	342	100.0	100.0

Source: Field Data 2019

From the findings, majority of the women participants 276 (80.7%) reported having lost an infant aged less than 1 year with only 66 (19.3%) saying that they had never had the experience. This shows that the respondents' pool was sufficient and had the information regarding infant mortality since more than 80% had experienced infant mortality at one time in their child bearing life.

4.4.2 Infant Mortality by Birth Order

Birth order could be having an effect on infant mortality. Thus, the researcher captured information regarding birth position of the dead infants so as to establish infant mortality for various birth positions. The findings are presented in Table 4.5.

Table 4.5: Birth Order of Dead Infant

		Infant Mortality (No. of Deaths)			
	Base	**1st**	**2nd**	**3rd**	**4th**
Base	342	282	48	6	6
	100.0%	82.5%	14.0%	1.8%	1.8%
Birth Position					
1st	168	168	-	-	-
	49.1%	49.1%			
2nd	72	72	-	-	-
	22.8%	22.8%			
3rd	55	44	11	-	-
	16.1%	12.9%	3.5%		
4th	24	24	-	-	-
	7.0%	7.0%			
6th	18	-	6	6	6
	5.7%		1.8%	1.8%	1.8%
10th	5	-	5	-	-
	1.5%		1.5%		

Source: Field Data 2019

The finding shows that a total of 342 infant deaths were reported. Of this total, majority of the reported deaths 168 (49.1%) were for the first births with another 72 (21.1%) being for second born. Thus, there is high infant mortality where 282(82.5%) of the infants were first and second births.

4.4.3 Infant Mortality by Gender

The researcher sought to find out how infant mortality varies according to gender. Thus, information on the gender of dead infants was captured and analyzed and presented in terms of frequency and percentages as shown in Table 4.6.

Table 4.6: Gender

		Infant Mortality (No. Deaths)			
	Base	**1st**	**2nd**	**3rd**	**4th**
Base	342	238	57	43	4
	100.0%	69.6%	16.7%	12.6%	1.2%
Gender					
Male	175	134	31	10	-
	51.2%	39.1%	9.1%	2.9%	
Female	167	104	26	33	4
	48.8%	30.4%	7.6%	5.6%	1.2%

Source: Field Data 2019

From the data findings, there is slightly high infant mortality among male infants compared to female infants. Specifically, 175 (51.2%) of the reported infant deaths were male with female being 44.6%. This scenario was replicated across the group for 1st, 2nd and 3rd deaths as depicted in Table 4.6.

4.4.4 Age at Infant Deaths

The researcher sought to establish infant mortality at various ages and stages of infancy. Thus, information on age at infant death was captured, analyzed and presented in Table 4.7.

Table 4.7: Age at Infant Death

		Infant Mortality (No. of Deaths)			
	Base	1st	2nd	3rd	4th
Base	342	216	77	45	4
	100.0%	63.2%	22.5%	13.2%	1.2%
Age at Death					
At delivery or less than 1 month	113	48	16	45	4
	33.0%	15.2%	5.1%	6.0%	1.3%
1 - 6 months	153	113	40	-	-
	44.7%	33.0%	11.7%		
7 - 12 months	76	55	21	-	-
	22.2%	16.1%	6.1%		

Source: Field Data 2019

The study found that of the 342 reported cases of infant deaths, majority of the infant deaths 153 (44.7%) occurred within the first six months after delivery, followed by 113 (33.0%) infant deaths that occurred at delivery or less than a month from birth while another 76 (22.2%) occurred from 7 to 12 months. Similar findings were arrived at by Yeung, *et al.*, (2017) who found out that one out of ten infants don't live to see their first birthday celebration. Death during delivery could be attributed to place of delivery and proper prenatal care as well as distance from health facility and transport logistics. Similarly, Blencowe, *et al.*, (2021) which was done in Bangladesh, Ethiopia, Ghana, Guinea Bissau and Uganda showed that 2.7 million infants die within their first month of life. About 50% of them die within the first 24 and three quarters die within the principal week.

4.5 Social Factors and Infant Mortality

The first study objective sought to determine the social factors associated with infant mortality in Chepalungu, Bomet County, Kenya. This was investigated through various social factors including household size of the participants, level of education of the mothers and their usual places of residence. The findings are presented in the subsequent sub-sections.

4.5.1 Household Size and Infant Mortality

Household size determines availability of resources and attention for various members of each household. Moreover, the size of family determines the level of competition for such resources. Thus, family size was captured in terms of number of persons in the household. The data was cross tabulated against the number of dead infants as presented in Table 4.8.

Table 4.8: Household size versus Number of Infant Deaths

		Infant Mortality (No. of Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
No. Household Members						
1- 3 persons	47	12	24	11	0	0
	13.7%	3.5%	7.0%	3.2%	0.0%	0.0%
4- 6 persons	132	6	114	6	0	6
	38.6%	1.8%	33.3%	1.8%	0.0%	1.8%
More than 6 persons	163	42	70	35	16	0
	47.7%	12.3%	20.5%	10.2%	4..7%	0.0%

Source: Field Data 2019

From the findings in Table 4.8, majority of the mothers who participated in the study 163 (47.7%) were in households of more than 6 persons while another 132 (38.6%) were in households of between 4 and 6 persons. However, only 47 (13.7%) of the participants were in households of 1 to 3 persons. This shows that majority of the participants cumulatively (86.3%) came from households of at least 4 people. These are considered as households with many individual resource needs thus posing a challenge on resource adequacy.

The study also established that households with few persons had lost slightly less number of infants compared to households with larger number of persons. Specifically, for households with between 1 and 3 persons, 12 (3.5%) reported no infant deaths while majority (7.0%) reported only 1 infant mortality with the other 11 (3.2%) reporting 2 cases of infant mortality. Thus, households with 1 to 3 persons had lost 2 infants and below.

However, for households with 4 to 6 persons, majority (33.3%) had lost only one infant with only 6 (1.8%) reporting that they had not lost an infant. Further, 6 (1.8%) each for the households of 4 to 6 persons, reported that they had lost 2 and 4 infants respectively. This shows that 36.9% of households of 4 to 6 persons had experienced cases of infant deaths.

Similarly, despite 42 (12.3%) of the households with more than 6 persons reporting that they had not experienced instances of infant mortality, 70 (20.5%) reported that they had lost an infant while another 35 (10.2%) had lost 2 infants. Further, the remaining 16 (4.7%) of households with more than 6 persons reported 3 cases of infant mortality. Thus cumulatively, 35.4% of households with more than 6 persons had at least 1 case of infant mortality. This shows that infant mortality is common in larger households compared to smaller households. This is attributable to the need for resources, care and attention required for infants. Similarly, through the interviews, the nurses in charge noted that lack of care from the mother due to family size and ignorance contributed to a significant number of infant deaths. A Clinician reported that:

> *A number of families have many children bringing in the issue of competition in everything for instance food resulting to malnutrition causing sicknesses which end in deaths. When more than one child is sick, the one who is critically sick is attended to and the other one left. Taking care of them generally is not easy [Interview; August 2019*]

From the above discussions, it emerged that the role of parents is crucial especially regarding the household size. When the household is relatively large, there is divided attention and competition for resource leading to late diagnosis of disease signals for the infants thus making it difficult to prevent cases of disease leading to deaths. The

mothers are also not able to find adequate time to meet various parenting obligations as well as taking the infant to the hospital for medical attention. Similarly, nutritional challenges arise due to competition for food resources.

4.5.2 Infant Mortality and Maternal Level of Schooling

Level of education determines awareness of best practices and access to facilities regarding child care. Thus, the researcher sought information on highest level of academic qualification for the mothers who participated in the study. This was cross tabulated against the number of infant deaths in the household. The findings are presented in Table 4.9.

Table 4.9: Percentage Distribution of Infant Deaths by Maternal Level of Schooling

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Maternal Level of Schooling						
No Education	42	12	18	12	0	0
	12.3%	3.5%	5.3%	3.5%	0.0%	0.0%
Primary (KCPE)	181	24	100	40	11	6
	52.9%	7.0%	29.2%	11.7%	3.2%	1.8%
Secondary	53	12	36	0	5	0
(KCSE)	15.5%	3.5%	10.5%	0.0%	1.5%	0.0%
College/	66	12	54	0	0	0
University	19.3%	3.5%	15.8%	0.0%	0.0%	0.0%

Source: Field Data 2019

The finding shows that majority of the women participants 181 (52.9%) had primary education as their highest academic qualification while another 42 (12.3%) reported having no formal education. However, 53 (15.5%) of the women participants had secondary education while another 66 (19.3%) had college/university education. Thus cumulatively, 123 (65.2%) of the women participants did not have secondary

education. This indicates inadequate knowledge regarding infant child care as well as other developmental skills and requirements for infants. The level of education also determines the type of decisions made regarding health needs and solutions.

In terms of infant mortality and level of education, majority of the women with college or university education (15.8%) reported only one case of infant mortality with the other 3.5% reporting that they had not experienced any instances of infant death. However, those with only primary education reported cases of 1 infant death (29.2%), 2 infant deaths (11.7%), 3 infant deaths (3.2%) and 4 infant deaths (1.8%). Thus, 5.0% of the women participants with only primary level of education cumulatively reported more than 1 infant death.

Similarly, 12 (3.5%) of mothers with no formal education reported 2 infant deaths while only 5 (1.5%) of mothers with secondary education reported more than 1 infant deaths (3 deaths). This shows that infant deaths were lower among mothers with higher level of education compared to those with no formal education. In this case, education determines the decision to seek medical attention at the appropriate place and in a timely manner while also providing appropriate nutritional foods. On a similar note, Istiqomah, *et al.,* (2021) found that high IMR are recorded among mothers with no education compared to mothers with some level of education. Concurrently, Garcia, *et al.,* (2019) demonstrated that families with lower level of education had a higher danger of infant mortality.

One of the health worker (Nurse in charge) responded that**,**

The mothers fail to follow the prescriptions sometimes thus ending up overdosing or giving fewer drugs to the infants leading to their death due to ignorance.(Interview 2019)

4.5.3 Place of Residence and Infant Mortality

Place of residence determines access and availability of health and sanitation facilities. Thus families which reside in rural areas may lack some facilities accessible to residents than those of urban areas while aspects of pollution might be extensive in urban areas compared to rural areas. Thus information on places of residence was captured and analyzed as presented in Table 4.10

Table 4.10: Residence versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	0	1st	2nd	3rd	4th
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Residence						
Town	24	12	12	0	0	0
	7.0%	3.5%	3.5%	0.0%	0.0%	0.0%
Rural Home	318	48	196	52	16	6
	93.0%	14.0%	57.3%	15.2%	4.7%	1.8%

Source: Field Data 2019

The findings show that majority of the participants 318 (93.0%) were living in rural homes with only 24 (7.0%) residing in urban areas. From the findings, 3.5% of mothers in urban areas did not report any infant deaths with the other 3.5% reporting only 1 infant death. However, only 48 (14.0%) of the women participants who reside in rural homes reported no infant deaths while the majority 196 (53.3%) reported 1 infant death. Further, 52 (15.2%) of mothers in rural homes reported 2 infant deaths, 16 (4.7%) reported 3 infant deaths while 6 (1.8%) reported 4 infant deaths. Thus, cumulatively, 74 (21.7%) of women participants residing in rural homes reported

more than 1 infant death compared to zero (0) for mothers residing in urban areas. The findings show that infant mortality is highly prevalent in village areas compared to town areas which could be attributed to various factors including distance to health facilities for medical attention as well as sanitation. Similarly, an examination by Van Dijk, & Mandemakers, (2018) also observed infant mortality was higher among women in the non-farming area when contrasted with them that were either not working or working in the agrarian part.

4.5.4 Relationship between Social Factors and Infant Mortality

In order to establish the relationship between various social factors and infant mortality, Chi-Square analysis was run between each indicator of social factors (household size, academic qualification and residence) and infant mortality measured by the number of infant deaths reported ordered as 0, 1, 2, 3 and 4. The findings are summarized in Table 4.11.

Table 4.11: Chi Square output for Social Factors and Infant Mortality

Variable	Chi-Square Value	df	Asymp. Sig. (2-sided)
Household Size	87.434[a]	8	.000
Maternal Level of Schooling	56.379[a]	12	.000
Residence	21.580[a]	4	.000
N of Valid Cases	342		

Source: Field Data 2019

The study found that household size $\chi^2 = 87.434$ ($p < .001$), academic qualification $\chi^2 = 56.379$ ($p < .001$), and place of residence $\chi^2 = 21.580$ ($p < .001$) had statistically significant difference with infant mortality in Chepalungu Sub County. This shows that social factors explain infant mortality with $p < .05$. This view was shared by the

nurses in charge who said during the interviews that low literacy levels affect the mothers' ability to take care of the infants. Specifically, Nurse in-charge said that:

> *The level of education among mothers in the Sub County is low where most of them are school dropouts at class 7. Moreover, a number of mothers never went to school thus affecting the care they give to infants leading to high infant mortality. [Interview: Nurse in Charge, August 2019.]*

From the findings, we see that the observed high infant mortality is attributable to low level of education of the mothers, large household sizes which occasion competition for attention and resources as well as difficulty in access to health facilities inherent in the predominantly rural nature of the sub county. Similarly, Kumar and File (2010) demonstrated that a child destined to an ignorant mother in India has a 65% possibility of dying in the primary month of birth when contrasted with only 20% to a mother with 12 years and above long periods of education.

4.6 Economic Factors and Infant Mortality

The second objective sought to establish economic factors associated with infant mortality in Chepalungu, Bomet County, Kenya. The economic factors considered to have probable influence on infant mortality were occupation of the participants as well as earnings of both the participants and their spouses. These were analyzed and presented as in the subsequent sub sections.

4.6.1 Occupation of Participants and Infant Mortality

The respondents were asked to indicate their occupation. The data was analyzed by cross tabulation with the number of dead infants. The purpose was to establish a relationship between participants' occupation and infant mortality. The findings are presented in Table 4.12.

Table 4.12: Level of Occupation versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Level of Occupation						
Farmer	225	42	132	35	10	6
	65.8%	12.3%	38.6%	10.2%	2.9%	1.8%
Civil Servant	36	6	30	0	0	0
	10.5%	1.8%	8.8%	0.0%	0.0%	0.0%
Not Employed	63	6	9.9%	17	6	0
	18.4%	1.8%		5.0%	1.8%	0.0%
Business Person	18	6	12	0	0	0
	5.3%	1.8%	3.5%	0.0%	0.0%	0.0%

Source: Field Data 2019

Majority of the participants 65.8% (225) were farmers with another 18.4% (63) reporting that they were not employed. This is consistent with their residence where majority of the participants (93%) reside in rural homes (see Table 4.10). However, 10.5% (36) of the participants were civil servants with the other 5.3% (18) reporting that they were running their own businesses.

In terms of infant mortality by occupation, there emerged a pattern as the number of infant deaths was higher among the participants who were farmers and the unemployed compared to the civil servants and business people. Specifically, majority (58.7%) of the participants who were farmers reported that that they had lost 1 infant with only 42 (18.7%) indicating that they had never suffered any infant mortality. Further, 35 (15.6%) of the participants who were farmers reported that they had lost 2 infants, 10 (4.4%) had lost 3 infants while the remaining 6 (2.7%) had lost 4 infants. Thus cumulatively, 22.7% of participants who were farmers had lost more than 1 infant. Similarly, 54.0% of the participants who were not employed had lost 1 infant while 27% had lost 2 infants each and 9.5% had lost 3 infants with only 9.5%

reporting not having lost any infant. Thus, 36.5% of the unemployed mothers had lost more than 1 infant. This could be due to the fact that lack of employment leads to lack of income to enable them meet babies' needs. Moreover, being subsistent farming doesn't enable one to acquire adequate finance to meet medicine needs promptly and buy food adequately.

This finding was also supported through key informant interviews where the nurses in charge indicated that the unemployment among the women mothers and subsistence agriculture makes it difficult for them to make money to pay for medication and feeding of the infants. The Nurse in charge reported that:

> *"Most of the mothers in the Sub-County are housewives practicing small scale subsistence agriculture thus they lack money to purchase prescribed drugs which lead to death of their young ones. [Interview: Nurse in Charge, August, 2019]*.

However, infant mortality was low among the participants who were employed as civil servants and those who were running their businesses. Specifically, although majority of the participants who were civil servants (83.3%) indicated that they had lost an infant, the other 16.7% reported that they had never had an infant death. Similarly, 66.7% of participants who were in business reported having lost only one infant while the other 33.3% reported that they had not experienced any such phenomenon. This shows that infant mortality is low among these groups of women as the infants were provided with the necessary food and medication due to their proceeds from employment and businesses. Escorbore, (2020) also found out that education and SES have a critical role in decreasing IMR.

4.6.2 Participants Self-Earning and Number of Infant Deaths

The amount of earnings by the participants who were mothers determines their ability to sufficiently provide for their babies. Thus, the researcher sought information on self-monthly earning of the participants which were cross tabulated with the number of infant deaths. The findings are presented in Table 4.13.

Table 4.13: Self-Monthly Earning versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Self-Monthly Earning						
Below KSh	300	54	172	52	16	6
10,000	87.7%	15.8%	50.3%	15.2%	4.7%	1,8%
KSh 10,000 and	12	0	12	0	0	0
KSh 20,000	3.5%	0.0%	35.1%	0.0%	0.0%	0.0%
Between KSh	18	6	12	0	0	0
20,000 and KSh	5.3%	1.8%	35.1%	0.0%	0.0%	0.0%
30,000						
Above KSh	12	0	12	0	0	0
30,000	3.5%	0.0%	35.1%	0.0%	0.0%	0.0%

Source: Field Data 2019

The finding shows that majority of the women participants 300 (87.7%) had monthly earning of less than KSh. 10,000 while 12 (3.5%) had income of between KSh. 10,000 and KSh. 20,000. Further, 18 (5.3%) had incomes of between KSh. 20,000 and KSh. 30,000 while the remaining 12 (3.5%) had monthly earnings above KSh. 30,000.

The findings further reveal that participants with the lowest monthly earnings experience more infant deaths. Majority of the participants with monthly earnings of less than KSh. 10,000 (50.3%) reported that they had lost 1 infant while 52 (15.2%) indicated that they had lost 2 infants, 16 (4.7%) had lost 3 infants and 6 (1.8%) had lost 4 infants. However, only 54 (15.8%) of participants with monthly earning of below KSh. 10,000 had not experienced case of infant mortality. This is very low

compared to a cumulative total of 74 (11.7%) who had lost more than 1 infant. The case was near similar to participants with monthly earning of between KSh. 10,000 and KSh. 20,000 where all the participants 12 (3.5%) reported that they had lost an infant.

For participants with monthly earnings of between KSh. 20,000 and KSh. 30,000, majority 12 (3.5%) had lost only 1 infant while the remaining 6 (1.8%) had not lost an infant. Similarly, all the women mothers 12 (3.5%) with monthly earning of above KSh. 30,000 had only lost exactly I infant each. This shows that increase in monthly earning results into reduced infant mortality associated with adequate and improved provision of resources for care for the infants.

4.6.3 Monthly Earning of Spouse of Participants

The earning of spouse provides additional if not the main source of income for provision of resources required by the family. Consequently, the researcher sought to determine whether there was a significant influence of income of spouse on infant mortality among participants. The findings are cross tabulated in Table 4.14.

Table 4.14: Spouse Monthly Earning versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Spouse Monthly Earning						
Below KSh 10,000	294	48	172	52	16	6
	86.0%	14.0%	50.3%	15.2%	4.7%	1.8%
KSh 10,000 and KSh 20,000	30	6	24	0	0	0
	8.8%	1.8%	7.0%	0.0%	0.0%	0.0%
Between KSh 20,000 and KSh 30,000	12	0	12	0	0	0
	3.5%	0.0%	3.5%	0.0%	0.0%	0.0%
Above KSh 30,000	6	6	0	0	0	0
	1.8%	1.8%	0.0%	0.0%	0.0%	0.0%

Source: Field Data 2019

The findings regarding monthly earnings of spouses of participating mothers showed that the earnings were similar. In this case, majority of the spouses 294 (86.0%) reported monthly earnings of below KSh 10,000 while 30 (8.8%) had monthly earnings of between KSh 10,000 and KSh 20,000, 12 (3.5%) had earnings of between KSh 20,000 and KSh 30,000 with the remaining 6 (1.8%) reporting monthly earnings of above KSh 30,000.

The findings show that higher spouse's monthly earnings correspond to lower infant mortality cases. Specifically, in cases where spouses reported monthly earnings of below KSh. 10,000, majority of the participants 172 (50.3%) reported having experienced 1 infant death. Further, 52(15.2%) had lost 2 infants, while 16 (4.7%) had lost 3 infants and 6 (1.8%) had lost 4 infants. Cumulatively, 72.0% of mothers' whose spouse monthly earning was less than KSh. 10,000 had experienced at least one case of infant mortality. However, 48 (16.3%) of participating mothers where spouse monthly earning was above KSh. 30,000 had not experienced any infant death.

This is higher compared to 48 (14.0%) who reported not having lost an infant. The finding was supported by the interview with the Clinician where he said that:

> "*Poverty level is high among the population associated with low literacy levels thus infants do not get proper nutrition leading to over-reliance on carbohydrates leading to excessive malnutrition. [Interview, August, 2019]*.

The study also found that 24 (7.0%) of participants whose spouses had monthly earnings of between KSh. 10,000 and KSh 20,000 had lost exactly 1 child as infant while 6 (1.8%) those with monthly income ranging from Ksh 10,000 t0 Ksh 20,000 had not lost any infant. This could be attributed to the fact that higher income of

spouse allows the mothers and their babies to get adequate care and provision of basic needs and necessary care for infant's survival.

4.6.4 Relationship between Economic Factors and Infant Mortality

In order to establish the relationship between various economic factors and infant mortality, Chi-Square analysis was run between each indicator of economic factors (occupation, self-monthly earnings and spouse's monthly earnings) and infant mortality measured by the number of infant deaths reported ordered as 0, 1, 2, 3 and 4. The findings are summarized in Table 4.15.

Table 4.15:Chi Square output for Economic Factors and Infant Mortality

Variable	Chi-Square Value	df	Asymp. Sig. (2-sided)
Economic Factors	31.617[a]	12	.002
Self-monthly earnings	23.922[a]	12	.021
Spouse's Monthly Earnings	46.543[a]	12	.001
N of Valid Cases	342		

a. 9 cells (45.0%) have expected count < 5. The minimum expected count is .32.

Source: Field Data 2019

The study found that occupation $\chi^2 = 31.617$ ($p < .002$), self-monthly earnings $\chi^2 = 23.922$ ($p < .021$), and spouse's monthly earnings $\chi^2 = 46.543$ ($p < .001$) had statistically significant differences with infant mortality in Chepalungu Sub County. This shows that economic factors explain infant mortality with $p < .05$. In this case, occupation, mother's income as well as spouse's income determines the possibility of an infant and mother getting adequate resources for care and nutrition thus preventing cases of infant mortality. Moreover, due to low income of both mothers and their spouses, there are increased cases of infant mortality in the sub county. Similarly, Hastings, (2019) reasoned that rising wages increase the job of human capital, which

prompts guardians to bring down fertility and put more in the education of their children.

4.7 Cultural Factors and Infant Mortality

The third study objective investigated the influence of cultural factors associated with infant mortality in Chepalungu, Bomet County, Kenya. This was investigated through various indicators of cultural practices including preferred place of child delivery, type of marriage and preferred place for medical attention for the infant by the family. The findings are presented in the subsequent sub-sections.

4.7.1 Place of delivery and Infant Mortality

Place of delivery is an indicator of the possible care and medical attention a child receives at birth. This was crucially important as a significant proportion of infant deaths are reported at the time of delivery. Moreover, the place of delivery provides adequate pre-natal and post-natal care as well as training on infant care offered to the mothers. The data was cross tabulated against the number of dead infants indicated as zero (0) deaths, one (1) death, two (2) deaths, three (3) deaths and four (4) deaths respectively as presented in Table 4.16.

Table 4.16:Place of delivery of children versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	55	208	55	18	6
	100.0%	16.1%	60.8%	16.1%	5.3%	1.8%
Place of Delivery of Children						
Village attendant	6	1	0	3	2	0
	1.8%	0.3%	0.0%	0.9%	0.6%	0.0%
Home	134	6	82	29	11	6
	39.2%	1.8%	24.0%	8.5%	3.2%	1.8%
Hospital	202	48	126	23	5	0
	59.1%	14.0%	36.8%	6.7%	1.5%	0.0%

Source: Field Data 2019

The findings from Table 4.16 show that majority of the women participants 202 (59.1%) deliver their babies at hospitals/health facilities while another 134 (39.2%) deliver their babies at their homes with only 6 (1.8%) delivering their children with the help of village attendants. Delivery at the hospitals and delivery with the help of village attendants accords the mothers some expert help. This was also explained by the nurses in charge who said that some of the women mothers only go to hospitals when complications arise. Specifically, the Nurse in Charge said that:

> *A good number of mothers give birth at home. Most of them avoid prenatal care and only go to the hospitals when there are complications during delivery. The village attendants and those who help them usually lack knowledge, and facilities to help the mothers during the delivery leading to infantdeaths at birth*. [Interview: Nurse in Charge, August, 2019].

The study found that only 1 (0.3%) of the women participants who deliver their infants with the help of village attendants had not experienced any infant deaths. However, 3 (0.9%) of mothers who deliver with the help of village attendants had experienced exactly 2 infant deaths while another 2 (0.6%) had experienced 3 infant deaths. Thus 5 (1.5%) of mothers who deliver with the help of village attendants had experienced more than 1 infant deaths. Further, the study found that 48 (14.0%) of women participants who deliver their babies at the hospitals had not experienced any infant death. This was significantly high compared to only 6 (1.8%) of mothers who deliver their children at home who had not experienced any infant deaths. Further, 82 (24.0%) of the mothers who deliver their infants at home had experienced (1) infant death, 29 (8.5%) reported 2 infant deaths, 11 (3.2%) reported 3 infants deaths while a further 6 (1.8%) had lost 4 infants. Thus, cumulatively, 46 (13.5%) of women mothers who deliver at home had lost more than 1 child at infant stage.

For mothers who reported delivering their infants at the hospitals/health facilities, majority 126 (62.4%) had lost exactly one child at infant stage while 23 (11.4%) had lost 2 infants and the other 5 (2.5%) had lost 3 infants. Cumulatively, 25 (13.9%) of mothers who deliver their children at the hospitals had lost more than 1 infant with none having lost 4 children at infant stage. This is lower compared to 46 (34.5%) of mothers who deliver at home who had lost more than 1 infant. Thus, infant mortality appears to be higher among cases of home delivery compared to hospital deliveries. This is attributable to lack of proper facilities for delivery and infant care at home as well as the lack of people training at delivery.

4.7.2 Type of Marriage and Infant Mortality

Type of marriage was also considered to be a cultural factor with probable influence on infant mortality. Thus, the researcher considered whether the mothers were in monogamous or polygamous unions. The findings were cross tabulated and presented in Table 4.17.

Table 4.17: Type of Marriage versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Type of Marriage						
Monogamy	260	49	149	46	13	3
	76.0%	14.3%	43.6%	13.5%	3.8%	0.9%
Polygamy	82	11	59	6	3	3
	24.0%	3.2%	17.3%	1.8%	0.9%	0.9%

Source: Field Data 2019

The findings show that majority of the participants 260 (76.0%) were in monogamous marriages with only 82 (24.0%) being in polygamous marriages. The study found that 149 (43.6%) of mothers in monogamous marriages had lost exactly 1 child, 46

(13.5%) had lost two children while 13 (3.8%) had lost 3 children. However, for mothers in polygamous unions, majority 59 (17.3%) had lost exactly 1 child, 6 (1.8%) had lost two children, 3 (0.9%) had lost 3 children with another 3 (0.9%) having lost 4 children. Thus, proportion of infant mortality is higher in polygamous marriage (71 out of 82 mothers reported at least 1 case of infant death). This shows that there could be lack of adequate attention by the spouse as well as competition for attention and resources in polygamous marriage leading to high infant mortality.

4.7.3 Place for Medical Attention for infants and Infant Mortality

Place where the mothers seek medical attention for their children was also perceived to influence infant mortality just like place of delivery. Diagnostics and proper medication with tested procedures could be available in specific places. Thus, the respondents were asked to indicate whether they seek medical attention for their infants from the hospitals or herbalist or simply leave it for prayers. The findings were cross tabulated against the number of infant deaths and presented in frequency as percentages as shown in Table 4.18.

Table 4.18:Medical Attention for Infants versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Medical Attention For Infants						
Herbalist	36	12	18	6	0	0
	10.5%	3.5%	5.3%	1.8%	0.0%	0.0%
Hospital	294	46	183	44	15	6
	86.0%	13.5%	53.5%	12.9%	4.4%	1.8%
Prayers	12	2	7	2	1	0
	3.5%	0.6%	2.0%	0.6%	0.3%	0.0%

Source: Field Data 2019

The table shows that majority of the women mothers who participated in the study 294 (86.0%) sought medical attention for their infants from hospitals while 36 (10.5%) took their infants to herbalists or used local herbs and the remaining 12(3.5%) took their infants for prayers. The findings revealed no clear trend regarding place of medical attention for infants and infant mortality. This emerged as majority of women mothers who participated in the study 18 (5.3%) said that they sought medical attention for their infants from herbalists had lost only 1 infant compared with 183 (53.5%) of those who seek medical attention at hospitals. In addition, 10(2.9%) who seek God's intervention through prayer had not experienced any death 7(2.0%) had lost one up to 3 infants.

This is consistent with Mbaya, (2017) that social-cultural factors incorporate the immense ethnic and religious beliefs which exist in Sub-Saharan Africa, cultural practices and beliefs impact whether people look for medication during pregnancy and when their infants are sick.

Moreover, the study found that 6 (1.8%) of participants who seek medical attention for infants from herbalists had lost more than 1 infant child. This compares adequately with the 65 (19.0%) for participants who took their infants to hospitals who had lost more than one infant. Thus, there was no clear difference in infant mortality associated with place for medical attention. This view is evident from interviews with nurses in charge where they blamed increased infant mortality on mother's belief in traditional herbs treatment and prayers leaving it so late to seek medical care. The nurse in charge said that:

> *Most of the mothers who attend these hospitals believe in the herbs, they only go to the hospital when it is too late due to ignorance. Similarly, some of the mothers believe in prayers and doctrines of healing thus avoiding medical attention until at very advanced stages when the infant cannot be helped. They believe that when an infant is injected she/he will die [Interview: Nurse in Charge; August 2019*]

4.7.4 Relationship between Cultural Factors and Infant Mortality

In order to establish the relationship between various indicators of cultural factors and infant mortality, Chi-Square analysis was run between each of the indicator of cultural factors (Place of delivery, type of marriage and place of medical attention for infants) and infant mortality measured by the number of infant deaths reported ordered as 0, 1, 2, 3 and 4. The findings are summarized in Table 4.19.

Table 4.19:Chi square output for Cultural Factors and Infant Mortality

Variable	Chi-Square Value	df	Asymp. Sig.(2sided)
Place of Delivery	66.239[a]	8	.001
Type of marriage	45.016[a]	4	.001
Place for Medical Attention for infants	9.137[a]	4	.058
N of Valid Cases	342		

Source: Field Data 2019

The study found that place of delivery $\chi^2 = 66.239$ ($p < .001$) and type of marriage $\chi^2 = 45.016$ ($p < .001$) had statistically significant difference with infant mortality in Chepalungu Sub County as $p< .05$. However, place for medical attention for kids $\chi^2 = 9.137$ ($p = .058$) did not have any statistically significant relationship with infant mortality. This shows that of the three cultural factors investigated, only place of delivery and type of marriage have a significant influence on infant mortality while place for medical attention for infants does not. This could be because the trend is

changing and more mothers are favouring health facilities for medical attention for their infants with only minority still sticking to traditional herbalists.

4.8 Environmental Factors and Infant Mortality

The fourth study objective investigated the effect of environment related factors on infant mortality. Thus various factors of environment related to general public health were considered and their interplay within the families in Chepalungu Sub-County. Thus, the researcher sought information on the main source of drinking water, whether the source was safe, whether the water was treated before drinking, type of toilet used, washing hands after using the toilet as well as the type of cooking fuel. The findings are presented in the subsequent sub-sections.

4.8.1 Source of Drinking Water and Infant Mortality

The participants were asked to indicate where they obtain the drinking water for their households. This was given in terms of 4 choices as: river/stream, borehole, tap and water pan. The findings were cross tabulated against the number of infant deaths reported by the participants as presented in Table 4.20.

Table 4.20:Source of Water for Drinking versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	63	191	63	18	7
	100.0%	18.4%	55.8%	18.4%	5.2%	2.0%
Source of Drinking Water						
River/Stream	80	21	42	15	2	0
	23.4%	6.1%	12.3%	4.4%	0.6%	0.0%
Borehole	92	13	56	18	5	0
	27.0%	3.8%	16.4%	5.3%	1.5%	0.0%
Tap	68	25	35	6	2	0
	19.8%	7.3%	10.23%	1.8%	0.6%	0.0%
Water pan (reservoir)	102	4	58	24	9	7
	29.8%	1.2%	17.0%	7.0%	2.6%	2.0%

Source: Field Data 2019

The source of drinking water for households in Chepalungu Sub-County was mainly water pan/reservoir (29.8%) followed closely by borehole (27.0%) and river/stream (23.4%). However, access of tap water is least available (19.8%). This was also revealed by the nurse in charge who explained that:

> *Majority of the households use water from the water pans in the village with tap water only accessible to those in urban areas. Moreover, the water is not treated leading to waterborne diseases like typhoid among the infants. [Interview: Nurse in Charge,, August, 2019]*.

On the frequency of infant deaths in relation to source of drinking water, 15 (4.4%) of those who use river/stream reported 2 infant deaths, while cumulatively 23 (6.8%) of those who use borehole water reported more than 1 infant death. Similarly, 40 (11.6%) of participants who use water pan/ reservoir cumulatively had lost more than 1 infant each. However, for households which use tap water as their source of drinking water, only 8 (2.4%) had lost more than 1 infant with a significant 25 (7.3%) having not lost an infant child. Thus, infant mortality was highest among households using water pan as a source of drinking water (28.6%), followed by borehole (23.3%), river/stream (17.3%) with those using tap water having the least prevalence at (12.6%). This shows that the water sources are less safe and this might affect the overall health of the infants. This is because, water from the river, water pan and boreholes are open to pollution with disease causing organisms while tap water is treated against such organisms.

4.8.2 Safe Drinking Water and Infant Mortality

The study participants were asked to indicate whether they considered their drinking water to be safe for drinking. This was cross tabulated against the number of reported

infant deaths to establish whether there was an evident pattern on association between safe drinking water and infant mortality. The findings are presented in Table 4.21.

Table 4.21:Safe Drinking Water Source versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Safe Drinking Water						
Yes	113	30	72	6	5	0
	33.0%	8.8%	21.1%	1.8%	1.5%	0.0%
No	229	30	136	46	11	6
	67.0%	8.8%	39.8%	13.5%	3.2%	1.8%

Source: Field Data 2019

The study found that majority of the households 229 (67.0%) do not have safe drinking water with only 113 (33.0%) indicating that their source of drinking water is safe. For those who reported that their drinking water was safe, 72 (21.1%) reported exactly 1 infant death while another 30 (8.8%) indicated that they had no infant deaths. However, for those households whose drinking water was not safe, only 30 (8.8%) reported that they had not experienced any infant death with majority 136 (39.8%) reported exactly one infant death.

Further, 63 (18.5%) of mothers from households who consider their drinking water not to be safe had lost more than one (1) infant compared to only 11 (3.3%) who had lost more than 1 infant among those who use safe drinking water. This shows that infant mortality is higher when drinking water is not safe. Moreover, this appears to be the case in Chepalungu Sub County where majority of the households (67%) do not have safe drinking water.

4.8.3 Treating Drinking Water and Infant Mortality

The researcher sought information on the additional efforts the households make to ensure that the water is safe for drinking. Thus, method of treating drinking water was probed with respondents indicating whether this was done by use of water guard, boiling or just leaving it to settle. Cross tabulation was done between method of water treatment and number of infant deaths with a view to establishing any patterns. The findings are presented in Table 4.22

Table 4.22: Treat Drinking Water versus Number of Dead Infants

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	82	154	6	11	0
	100.0%	24.0%	45.0%	1.8%	3.2%	0.0%
Treating Drinking Water						
Water Guard	41	12	24	0	5	0
	12.0%	3.5%	7.0%	0.0%	1.5%	0.0%
Boiling	183	64	107	6	6	0
	53.5%	18.7%	31.3%	1.8%	1.8%	0.0%
Leave Water to Settle	29	6	23	0	0	0
	8.5%	1.8%	6.7%	0.0%	0.0%	0.0%

Source: Field Data 2019

Majority of the study participants treat their drinking water by boiling (53.5%) while another 12.0% use water guard for treatment of drinking water with another 8.5% just leaving the water to settle. The study found that majority of households which use water guard for water treatment (7.0%) had exactly 1 infant death with another 1.5% having 3 infant deaths. However, 3.5% of households using only water guard for treatment had not experienced any infant deaths.

In the case of households who boil their drinking water to make it safe, a significant proportion (18.7%) had not experienced any infant deaths despite 107 (31.3%) reporting that they had experienced exactly 1 infant death. However, 6 (1.8%)

households who boil drinking water had experienced 2 infant deaths while 6 (1.8%) had experienced 3 infant deaths. Thus a cumulative total of 12 (3.6%) of households who treat drinking water by boiling had experienced more than 1 infant death.

Of those who only leave drinking water to settle, 6.7% had experienced 1 infant death while only 1.8% had not experienced any infant death. The findings show that 18.7% of those who boil drinking water had not experienced infant death, while 3.5% who use water guard for treatment had also not experienced infant with only 1.8% of those who leave water to settle had not experienced infant death. These findings show that infant mortality is lowest among households who boil drinking water compared to other methods of water treatment. This is because boiling of water eliminates disease causing germs which might eventually affect the health of the infants and other members of the household.

4.8.4 Type of Toilet Facility and Infant Mortality

The type of toilet facility available to persons in a household is an indication of hygiene level and possible disease and infection prevention mechanisms. Thus, the researcher sought information on the available toilet facility which was cross tabulated against the number of infant deaths recorded as o deaths, 1 death, 2 deaths, 3 deaths and 4 deaths at infant age to establish any relationship. The findings are presented in Table 4.23.

Table 4.23: Type of Toilet Facility versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	55	211	54	16	6
	100.0%	16.1%	61.7%	15.8%	4.7%	1.8%
Type of Toilet Facility						
Pit latrine	318	48	196	52	16	6
	92.9%	14.0%	57.3%	15.2%	4.7%	1.8%
In-door	18	6	12	0	0	0
toilet/flush toilet	5.3%	1.8%	3.6%	0.0%	0.0%	0.0%
Bush	6	1	3	2	0	0
	1.8%	0.3%	0.9%	5.8%	0.0%	0.0%

Source: Field Data 2019

Majority of the participants 318 (92.9%) came from households using pit latrine as their toilet facility with another 18 (5.3%) with access to indoor flush toilet. However, the study found that only 6 (1.8%) of the participants use the bush as their toilet facility. The findings show that 5 (6.8%) of those who use the bush had experienced infant deaths as well as 79.0% for those who use pit latrine, with a significant 0.3% of those who use indoor flush toilets having not experienced any infant death.

Further, of the participants who use pit latrine as toilet facility, 196 (57.3%) had experienced exactly 1 infant death, 52 (15.2%) had experienced 2 infant deaths, 16 (4.7%) had experienced 3 infant deaths while 6 (1.8%) had experienced 4 infant deaths. However, for those using indoor flush toilets, 12 (3.6%) had experienced exactly only 1 infant death. Thus, infant mortality was higher among users of pit latrine and bush compared to those using indoor flush toilets with none of the families reporting multiple number of infant deaths.

Concurrent to this view, Perry, *et al.,* (2019) saw that family units with flush toilets in Kenya had infant mortality of 13 per thousand and those with pit lavatories had 31 per thousand. Thus infant mortality is prevalent among families using bush and pit latrine

for toilet facilities. This is attributable to waste disposal and vector insects as houseflies which transmit disease causing organisms. The nurses in charge also noted that use of open latrine contributes to the witnessed high IMR where one of them said that:

> *Most residents use open pit latrine while in some extreme cases, the bushes are used as the toilet facility which leads to infections with diarrhea symptoms due to poor quality of care offered to the infants. [Interview: Nurse in Charge, August, 2019]*.

The finding shows that human waste disposal could contribute to diseases and contamination which affect health especially of infants in Chepalungu Sub County. The predominant use of pit latrines and bush as toilet facilities leaves the households vulnerable to such infections transmitted by vector insects, wind and fellow human beings.

4.8.5 Wash Hands after Visiting Toilet and Infant Mortality

Washing hands after using toilet facilities is a practice considered healthy in prevention of infection causing germs. Children are vulnerable to infection thus handling them requires higher standards of hygiene such as washing of hands after using toilet facilities. Consequently, the researcher sought information from the participating mothers whether they wash their hands after using the toilet facilities. Cross tabulation of the findings was done against the number of infant deaths reported as presented in Table 4.24.

Table 4.24:Wash hand after visiting the toilet versus Number of Infant Deaths

		Infant Mortality (No. Deaths)				
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Wash Hand After Visiting The Toilet						
Yes	319	202	54	41	16	6
	93.3%	59.1%	15.8%	12.0%	4.7%	1.8%
No	23	6	6	11	0	0
	6.7%	1.8%	1.8%	3.2%	0.0%	0.0%

Source: Field Data 2019

From the findings, majority of the mothers in Chepalungu Sub County 319 (93.3%) wash their hands after using toilet facilities with only 23 (6.7%) indicating that they do not always wash their hands. Further, although a higher proportion of mothers who wash their hands after using the toilet reported having not experienced infant deaths (59.1%). Cumulatively, 17 out of 23 mothers who do not wash their hands after using toilet facilities recorded at least 1 infant death. This shows that there are more cases of infant mortality where mothers do not wash their hands after using toilet facilities. This could be due to the increased chances of transmitting disease causing organisms to the infants during feeding as a result of the unwashed hands.

4.8.6 Type of Cooking Fuel Used and Infant Mortality

The type of cooking fuel is crucial in the hygienic handling of food which might influence transfer of germs for those who use the food or the safety of the food. The researcher sought information on the cooking fuel used in their households and the number of infant deaths within the household through cross tabulation. The findings are presented in Table 4.25.

Table 4.25: Cooking fuel versus Number of Infant Deaths

	Infant Mortality (No. Deaths)					
	Base	**0**	**1st**	**2nd**	**3rd**	**4th**
Base	342	60	208	52	16	6
	100.0%	17.5%	60.8%	15.2%	4.7%	1.8%
Cooking Fuel						
Firewood	312	48	190	52	16	6
	91.2%	14.0%	55.5%	15.2%	4.7%	1.8%
Pressurized gas	18	6	12	0	0	0
	5.3%	1.8%	3.5%	0.0%	0.0%	0.0%
Charcoal	12	6	6	0	0	0
	3.5%	1.8%	1.8%	0.0%	0.0%	0.0%

Source: Field Data 2019

From the findings, majority of the households 312 (91.2%) use firewood as their main fuel type for cooking while 18 (5.3%) use pressurized gas with another 12 (3.5%) using charcoal. Of those households who use firewood, only 48 (14.0%) reported that they had not experienced any infant deaths, while 6 (1.8%) of those who use pressurized cooking gas had not experienced infant deaths with 6 (18%) of those who use charcoal as fuel having not experienced infant deaths.

The trend in fuel use and infant mortality emerged with regards to multiple deaths where households using firewood as the preferred fuel type reported multiple infant deaths while those using pressurized cooking gas and charcoal did not report any multiple infant deaths. Specifically, 52 (15.2%) of households using firewood reported 2 infant deaths, 16 (4.7%) had experienced 3 infant deaths while 6 (1.8%) had experienced 4 infant deaths. Thus, cumulatively 74 (21.7%) of households using firewood as cooking fuel had more than 1 infant deaths.

This shows a variation in fuel type used for cooking and infant mortality. The higher infant mortality for households using firewood and charcoal as fuel is attributable to the dust and smoke inherent in the fuel type which ends up contaminating the food

which may be consumed by the infant leading to disease transmission. On a similar note, Khan, *et al.,* (2017) demonstrated that the utilization of clean cooking fuels, access to safe water and sanitation decreases the dangers of infant mortality.

4.8.7 Relationship between Environmental Factors and Infant Mortality

In order to establish the relationship between the indicators of various environmental factors and infant mortality, Chi-Square analysis was run between each indicator of environmental factors (Source of drinking water, safety of drinking water, method of treatment of drinking water, type of toilet facility used, washing hands after using toilet as well as the type of cooking fuel) and infant mortality measured by the number of infant deaths reported ordered as 0, 1, 2, 3 and 4. The findings are summarized in Table 4.26.

Table 4.26:Chi Square output for Environmental Factors and Infant Mortality

Variable	Chi-Square Value	df	Asymp. Sig. (2-sided)
Source of drinking water	38.442[a]	12	.000
Safety of drinking water	21.884[a]	4	.000
Treat drinking water	39.119[a]	8	.000
Type of toilet facility	36.268[a]	8	.000
Wash hand after visiting toilet	24.761[a]	4	.000
Type of cooking fuel	18.040[a]	8	.021
N of Valid Cases	342		

Source: Field Data 2019

The study found that all the indicators of environmental factors investigated had significantly influenced on infant mortality. Specifically, source of drinking χ^2 = 38.442 ($p < .001$), safety of drinking water χ^2 = 21.884 ($p < .001$), treating drinking water χ^2 = 39.119 ($p < .001$), type of toilet facility χ^2 = 36.268 ($p < .001$), washing

hand after visiting toilet $\chi^2 = 24.761$ ($p < .001$) and type of cooking fuel $\chi^2 = 18.040$ ($p = .021$) had statistically significant difference with infant mortality in Chepalungu Sub County. This shows that environmental factors influence infant mortality with $p < .05$. Thus, environmental factors have a greater bearing on infant health and as such explain infant mortality. Polluted environment from drinking water, toilet facility and cooking fuel leads to higher infant mortality in Chepalungu Sub County. Similarly, WHO (2017) reports that among 10 distinguished major causes of high IMR in developing countries, dirty water, and poor sanitation were positioned second, while indoor smoke was rated fourth.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of key study findings based on the outlined research questions according to the designed study methodology. The study research questions were: What are the effects of social factors on high infant mortality rate in Chepalungu, Bomet County, Kenya?, which economic factors contribute to high infant mortality rate in Chepalungu, Bomet County, Kenya?, what are the effects of cultural factors on high infant mortality rate in Chepalungu, Bomet County, Kenya? and what are the effects of environmental factors on high infant mortality rate in Chepalungu, Bomet County, Kenya? Consequently, the conclusions are made based on the research findings. Similarly, recommendations for implementation and policy formulation. The chapter also provides suggestion for further research.

The study obtained an overall response return rate of 88.9% which was found to be adequate for the study. Majority of the respondents were aged above 40 years and most of the participants had had their first births when they were at least 19 years. Specifically, most of the participants had given birth at the time of the study. Further, majority of the participants reported having lost an infant with majority of the infant deaths occurring within the first six months after delivery. Further, majority of the reported deaths were for the first births. Infant mortality was slightly higher among males compared to female infants.

5.2 Summary of Findings

The summary of findings is presented based on the individual study themes as social factors, economic factors, cultural factors and environmental factors influencing infant mortality.

5.2.1 Social Determinants Infant Mortality

Based on the first objective, the study established that majority of the mothers who participated in the study were in households of more than 6 persons while the rest were in households of between 4 and 6 persons. The study also established that households with few persons had lost slightly less number of infants compared to households with larger number of persons.

In terms of education, majority of the women participants had primary education as their highest academic qualifications although some had no formal education. Majority of the women with college or university education reported only one case of infant mortality. This demonstrates that formal education helps in providing basic information on child health thus helps in lowering infant mortality rate. In terms of residence, majority of the participants were living in rural homes. Most of women participants residing in rural homes reported more than 1 infant death compared to zero (0) for mothers residing in urban areas. Overall, the study established that the three social factors explain infant mortality with $p < .05$.

5.2.2 Economic Factors and Infant Mortality

On the second objective, the study found that majority of the participants were not formally employed, followed by civil servants and the rest were running their own businesses. The study established that the number of infant deaths was higher among

the participants who were farmers and the unemployed compared to the civil servants and those people running their own businesses. Specifically, majority of the women participants had monthly earning of below KES 10,000. Participants with the lowest monthly earning experience more infant deaths. Majority of the participants with monthly earnings of below KES 10,000 reported that they had lost 1 infant.

Monthly earnings of spouses of participating mothers showed that the earnings were similar. In this case, majority of the spouses reported monthly earnings of below KES 10,000. Higher spouse's monthly earnings correspond to lower infant mortality cases. In cases where spouses reported monthly earnings of below KES 10,000. Where spouse monthly income was higher than KES 10,000, majority of the participants reported having experienced just 1 infant death. The study found that economic factors explain infant mortality with $p < .05$.

5.2.3 Cultural Determinants of Infant Mortality

With reference to the third objective, the study found that majority of the women participants deliver their babies at hospitals or health facilities. The study established that mothers who deliver with the help of village attendants had experienced more than 1 infant deaths while women participants who deliver their infants at the hospitals had not experienced any infant deaths. The study also established that majority of the mothers were in monogamous marriages with. Further, most of women in monogamous marriage had no death of an infant. Consequently, infant mortality was higher in polygamous marriage had more than one death.

For medical attention, majority of the women mothers who participated in the study sought medical attention for their infants from hospitals. The study found that some

participants who sought medical attention for infants from herbalists had lost more than 1 infant. This compares adequately with the participants who took their infant to hospitals who had lost more than one baby at infant stage. Thus, there was no clear difference in infant mortality associated with place for medical attention. This emerged as the study found that place of delivery $\chi^2 = 66.239$ ($p < .001$) and type of marriage $\chi^2 = 45.016$ ($p < .001$) had statistically significant difference with infant mortality while place for medical attention for infants $\chi^2 = 9.137$ ($p = .058$) did not have any significant influence on infant mortality.

5.2.4 Environmental Factors and Infant Mortality

With reference to the fourth objective, the study considered various environmental factors including main source of drinking water, whether the source was safe, whether the water was treated before drinking, type of toilet used, washing hands after using the toilet as well as the type of cooking fuel.

The source of drinking water for households in Chepalungu Sub-County was mainly reservoir followed closely by borehole and river/stream. Infant mortality was highest among households using water pan as a source of drinking water, followed by those using borehole, river/stream and those using tap water had the least prevalence. The study found out that majority of the households did not have safe drinking water.

Majority of the study participants treat their drinking water by boiling while another use water guard for treatment of drinking water with another just leaving the water to settle. The study found that those who boil drinking water had not experienced infant death, while those who use water guard for treatment had also not experienced infant deaths. However, those who leave water to settle had experienced a few infant deaths.

In terms of toilet, majority of the participants most of the participants came from households using pit latrine as their toilet facility. However, infant mortality was higher among users of pit latrine and bush compared to those using indoor flush toilets with none of the families reporting multiple number of infant deaths. Majority of the mothers in Chepalungu Sub County wash their hands after using toilet facilities. Most of mothers who do not wash their hands after using toilet facilities recorded more than 1 infant death.

The study found that majority of the households use firewood as their main fuel type for cooking. Of those households who use firewood, majority reported that they had not experienced any infant deaths, while those who use pressurized cooking gas had not experienced infant deaths. Overall, the study established that source of drinking $\chi^2 = 38.442$ ($p < .001$), safety of drinking water $\chi^2 = 21.884$ ($p < .001$), treating drinking water $\chi^2 = 39.119$ ($p < .001$), type of toilet facility $\chi^2 = 36.268$ ($p < .001$), washing hand after visiting toilet $\chi^2 = 24.761$ ($p <.001$) and type of cooking fuel $\chi^2 = 18.040$ ($p = .021$) statistically significant influence on infant mortality rate.

5.3 Conclusions

Based on the study findings, the following conclusions were drawn:

With regard to the first research question, the researcher concluded that infant mortality was common in larger households compared to smaller households, it was lower among mothers with higher level of education compared to those with no formal education and highly prevalent in village areas compared to town areas which could be attributed to various factors including distance to health maternity facilities, distance to health facilities for medical attention as well as sanitation. Thus, the high

infant mortality was attributed to low level of education of the mothers, large household sizes which occasion competition for attention and resources as well as difficulty in access to health facilities inherent in the predominantly rural nature of the sub county.

On the second research question, the study concluded that unemployment led to lack of income to provide for the needs of the infants leading to higher infant mortality. Further, infant mortality was low among employed women as they can provide the necessary food and medication due to their income from employment and business since increase in monthly earning results into reduction in infant mortality associated with improved provision of resources for the care of infants. Consequently, higher income of spouses allows the mothers and their babies to get adequate care and provision of basic needs and necessary care for infant's survival. Overall, occupation, mother's income as well as spouse's income determined the possibility of an infant and mother getting adequate resources for care and nutrition thus preventing cases of infant mortality.

On the third question, the researcher concluded that infant mortality appeared to be higher among cases of home delivery compared to hospital delivery. This was attributable to lack of proper facilities for delivery and infant care at home as well as lack of experts with training on delivery. Further, infant mortality rate was higher among mothers in polygamous marriages compared with those in monogamous marriage since there was insufficient attention by the spouses as well as competition for attention and resources in polygamous marriage leading to high infant mortality. The study also concluded that majority of the mothers sought medical attention for

their infants from hospitals hence there was no clear difference in infant mortality associated with place for medical attention. Overall, of the three cultural factors investigated, only place of delivery and type of marriage have a significant influence on infant mortality while place for medical attention for infants did not have any influence.

On the forth question, the researcher concluded that water sources were less safe and might affect the overall health of the infants. This was because, water from the river, water pan and boreholes are open to pollution with disease causing organisms while tap water was covered and treated for such organisms. This was because; infant mortality was higher when drinking water was unsafe. However, IMR was lowest among households who boiled drinking water compared to those who used other methods of water treatment. Further, the study concluded that infant mortality was prevalent among families using bush and pit latrine for sanitary purposes and that there were more cases of infant mortality where mothers did not wash their hands after using toilet facilities compared to cases where there was hand washing after using toilet facilities. The study also concluded that there was a relationship between fuel type used for cooking and infant mortality. Overall, environmental factors have a greater bearing on infant health and as such explain infant mortality. Polluted drinking water, poor sanitation and use of firewood as main source of cooking fuel led to high infant mortality rate in Chepalungu sub county, Bomet County, Kenya.

5.4 Recommendations

Based on the findings, the following recommendations are made:

5.4.1 Social Determinants to Infant Mortality

In line to social determinants to infant mortality rate, the study recommended that there is need for the communities within Chepalungu Sub County to embrace family planning practices as a way to control their household numbers. This is because a household with few individuals is capable to meet medical needs thereby registering lower infant deaths.

5.4.2 Economic Factors and Infant Mortality

In regard to findings on economic factors as determinants to infant mortality, this study recommends that residents in Chepalungu should be encouraged to engage in income generating activities besides subsistence farming. This will enable them to have some income necessary for providing for the infant needs including nutrition and medical needs.

5.4.3 Cultural Determinants of Infant Mortality

More campaign programs should be designed with an aim of discouraging unfair cultural practices that promote infant mortality. Such campaigns can encourage the mothers to seek delivery at the health facilities. This can be done through community health volunteers, increasing number of dispensaries and providing ambulances. As a result, more mothers will be able to access the health services thus reducing instances of infant mortality.

5.4.4 Environmental Factors and Infant Mortality

Based on findings on contribution of environmental factors to high rate of infant mortality, the study recommends the need to conduct environmental education

program targeting the mothers on the human waste disposal, safe drinking water and safe cooking fuel. This can be done through forums in the women groups, pre-natal clinics and Barazas as well as church forums.

5.5 Suggestions for Further Research

This study focused on factors influencing infant mortality with focus on social, economic, cultural and environmental factors. However, the study did not consider the aspect of climatic conditions which vary from place to place. Moreover, the study did not address genetic as well as biological factors which might cause infant deaths. The conclusions are thus probably leaving a window for further research. Thus future research should be conducted to include:

i. Causes of infant mortality

ii. Biological factors influencing infant mortality

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APPENDICES

APPENDIX I: CONSENT LETTER

Jane Chepkurui Mutai.

Kenyatta University,

P.O BOX……..

Dear Sir/Madam,

You have been selected to participate as a respondent in the study "Assessment *offactors contributing to infant mortality in Chepalungu, Bomet County, Kenya."* The study seeks to investigate the Social factors, Cultural factors, Economic factors and Environmental factors. The study is in partial fulfillment of the requirement for the completion of a Masters of Arts Degree in Geography of Kenyatta University. Please note that participation in this research is voluntary. You have the right to decline to answer any question and with draw from the participation at any time prior. All the information provided would be treated with confidentially, anonymity and will be only used for the purpose of the study.

If you agree to participate in the study, please kindly sign and return the attached consent form.

I accept to

participate……sign……..date…….

Yours faithfully,

Jane Chepkurui Mutai.

APPENDIX II: HOUSEHOLD QUESTIONNAIRE

My name is Jane Chepkurui Mutai, a postgraduate student of Kenyatta University undertaking a study on; **"*Assessment of Factors that contribute to Infant Mortality in Chepalungu, Bomet County, Kenya*".** This study is basically for academic purposes and I promise to treat the information that you will provide with the utmost confidentiality. All information you provide will be treated with confidentiality.

Instructions: Tick the appropriate choice where asked.

SECTION A: DEMOGRAPHIC INFORMATION

1. Your current age bracket

☐ Below 20 years

☐ 20 – 29 years

☐ 30 – 39 years

☐ 40 and above years

2. What was your age when you delivered the first child?

☐ Below 19 years

☐ 19 years and above

SECTION B: PREVALENCE OF INFANT MORTALITY

3. Do you have any child/ children presently?

☐ Yes

☐ No

If yes, state the number…….

4. Have you ever had any case of infant mortality in your parenthood?

☐ Yes

☐ No

If yes, kindly complete the information required in the table below.

Birth position of the child	Sex of the child	Age at death (in months)

SECTION C: SOCIAL FACTORS ON INFANT MORTALITY

5. How many people stay within your house.....?

6. What is your highest academic qualification?

☐ Primary (KCPE)

☐ Secondary (KCSE)

☐ College/University (Certificate/Bachelor)

☐ No Education

Any other (specify)……

SECTION D: ECONOMIC FACTORS ON INFANT MORTALITY

7. What do you do for a living?

☐ Farmer

☐ Civil servant employee

☐ Not employed

☐ Business

Any other job (specify)……

8. What is your approximate your monthly income?

☐Below 10 000

☐Between 10 000 and 20 000

☐Between 20 000 and 30 000

☐Above 30 000

9. What is the approximate monthly earnings for your spouse?

☐Below 10 000

☐Between 10 000 and 20 000

☐Between 20 000 and 30 000

☐Above 30 000

10. What are some economic attributes that you feel contributes to infant mortality in this area? ----------

SECTION E: CULTURAL FACTORS ON INFANT MORTALITY.

11. In most occasions where do mothers conduct their child delivery from?

☐ Home

☐Village attendant

☐ Hospital

☐ Other

(Specify)……

12. In what kind of marriage are you?

☐ Monogamy

☐ Polygamy

☐ Other

(Specify)……

13. What kind of medication do you seek for when your children are sick?

☐ Herbalist

☐ Hospital

☐ Prayers

☐ Other (specify)

SECTION F: ENVIRONMENTAL FACTORS ON INFANT MORTALITY

14. What is the main source of the drinking water in this area?

☐ River/ Stream

☐ Borehole

☐ Tap

☐ Water pan (reservoir)

Any other source (Specify)……

15. Is the source of water mentioned above safe for drinking?

Yes ☐ No ☐

If no, which methods do you use to treat the water for drinking?

☐ ☐ ☐

Use of water guard Boiling Leaving it to settle .

Others (Specify) ……

16. a.) What type of toilet facilities do you mainly have around?

☐ Pit latrine

☐ In-door toilet/flush toilet

☐ Bush

Any other form (specify)……

b) Do you wash your hands after visiting the toilet?

Yes ☐ No ☐

17. What type of cooking energy do you use at home?

☐ Firewood

☐ Pressurized cooking gas

☐ Biogas

Any other type (specify)…….

APPENDIX III: KEY INFORMANT INTERVIEW (Health officials)

Instructions:

Dear sir/ madam,

I am Jane Chepkurui Mutai, a Master of Arts in Geography student from Kenyatta University. I am carrying out a study on "***Assessment of Factors that contributetoinfant Mortality in Chepalungu of Bomet County, Ken***ya. Welcome to this interview session that will take 15-20 minutes. I will ask questions on the above mentioned topic. Please note that the information you provide will be treated with utmost confidentiality and will only be used for the purpose of this study. Kindly feel free and respond as honestly as possible.

1. Briefly explain some of the Social factors that you have observed that contribute to infant mortality in Chepalungu, Bomet County, Kenya……(probe)
2. In what ways do Economic factors influence infant mortality in chepalungu, Bomet County, Kenya?.....(probe)
3. In your opinion which Cultural factors manipulate infant mortality in Chepalungu, Bomet County, Kenya?.....(probe)
4. To what extend do Environmental factors contribute to infant mortality in Chepalungu, Bomet County, Kenya?.....(probe)
5. What any other factor could you suggest contributes to infant mortality in Chepalungu?.....(probe)

APPENDIX IV: GRADUATE SCHOOL APPROVAL LETTER

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School **DATE:** 30th May, 2019

TO: **Ms. Jane Chepkurui Mutai**
C/o Department of Geography **REF:** C50/CE/27785/2013

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on **22nd May, 2019**, approved your Research Proposal for the M.A. Degree entitled, **"Factors Underlying Infant Mortality in Chepalungu, Bomet County, Kenya."**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

JULIA GITU
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Department of Geography

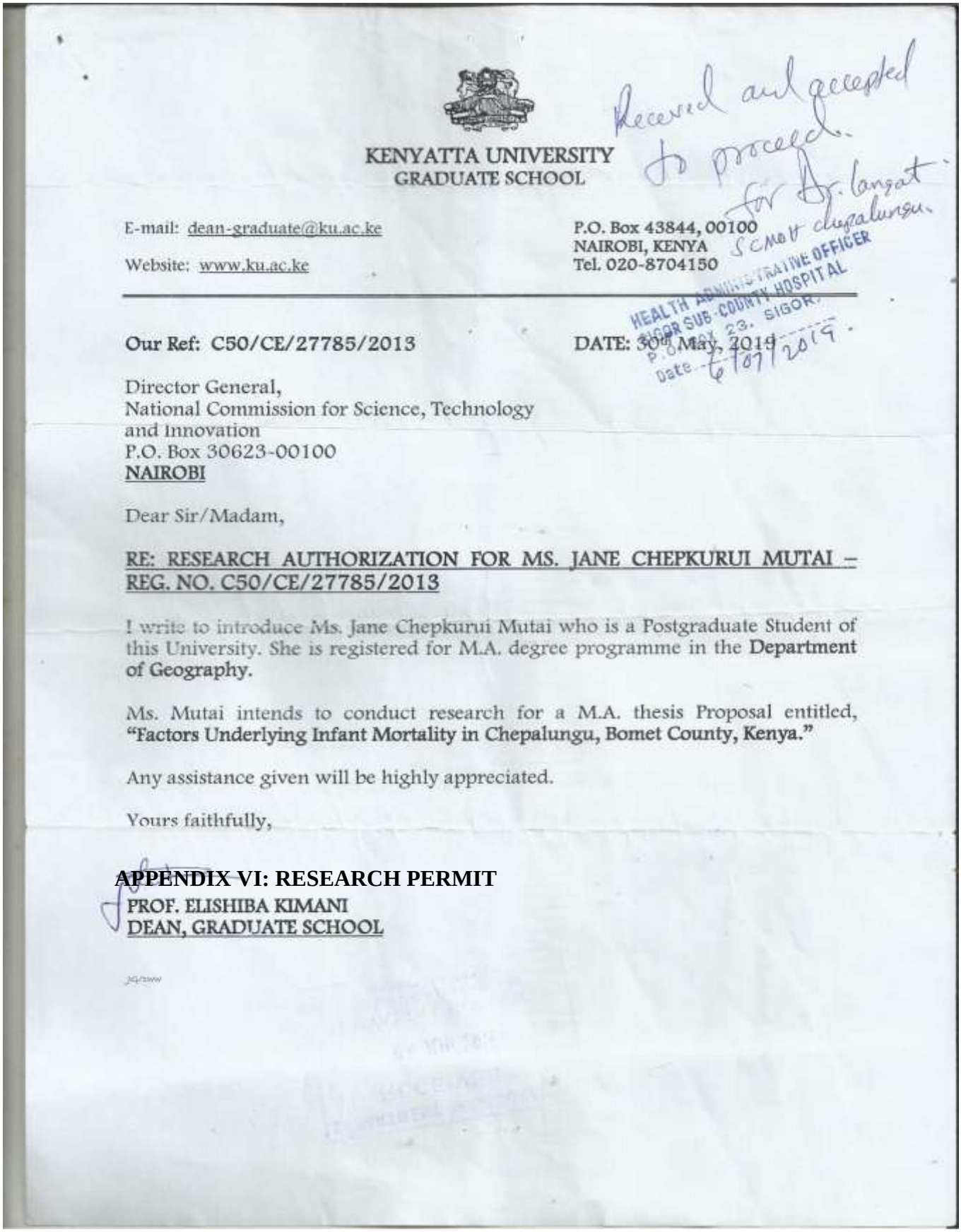
Supervisors:

1. Prof. Leonard M. Kisovi
   C/o Department of Geography
   Kenyatta University

2. Dr. Francis O. Onsongo
   C/o Department of Geography
   Kenyatta University

JG/ovw

APPENDIX V: GRADUATE SCHOOL AUTHORIZATION LETTER



KENYATTA UNIVERSITY
GRADUATE SCHOOL

Received and accepted to proceed.
for Dr. langat
SCMO chepalungu.

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

HEALTH ADMINISTRATIVE OFFICER
SIGOR SUB-COUNTY HOSPITAL
P.O. BOX 23, SIGOR.
Date 6/07/2019.

Our Ref: C50/CE/27785/2013

DATE: 30th May, 2019

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS. JANE CHEPKURUI MUTAI – REG. NO. C50/CE/27785/2013

I write to introduce Ms. Jane Chepkurui Mutai who is a Postgraduate Student of this University. She is registered for M.A. degree programme in the **Department of Geography.**

Ms. Mutai intends to conduct research for a M.A. thesis Proposal entitled, **"Factors Underlying Infant Mortality in Chepalungu, Bomet County, Kenya."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

JG/ssw

APPENDIX VI: RESEARCH PERMIT

APPENDIX VI: RESEARCH PERMIT FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **355017**

Date of Issue: **21/August/2019**

RESEARCH LICENSE

This is to Certify that Sr., Jane Mutai of Kenyatta University, has been licensed to conduct research in Bomet on the topic: FACTORS UNDERLYING INFANT MORTALITY IN CHEPALUNGU ,BOMET COUNTY KENYA for the period ending : 21/August/2020.

License No: **NACOSTI/P/19/569**

355017

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
5. The License does not give authority to tranfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one of completion of the research
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

APPENDIX VII: COUNTY COMMISSIONER AUTHORIZATION LETTER

THE PRESIDENCY
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegrams: "DISTRICTER", Bomet
Telephone: (052) 22004/22077 Fax 052-22490
When replying please quote

COUNTY COMMISSIONER
P.O BOX 71- 20400
BOMET

REF: EDU.12.1 VOL.III/ (208)

16th December, 2019

The Deputy County Commissioner
Chepalungu Sub-County
P O Box 3
SIGOR

RE: RESEARCH AUTHORIZATION – Ms. JANE CHEPKURUI MUTAI

The above named person has been authorized to carry out research on ***"Factors Underlying Infant Mortality in Chepalungu, Bomet county,Kenya"*** by the National Commission for Science, Technology and Innovation vide their letter Ref. No. 355017 dated **21st August, 2019** for the period ending **21st August, 2020.**

Any assistance accorded would be appreciated.

P. Koech
For: County Commissioner
BOMET

COUNTY COMMISSIONER
BOMET COUNTY
16 DEC 2019
P. O. Box 71-20400, BOMET

APPENDIX VIII: COUNTY DIRECTOR OF EDUCATION

AUTHORIZATION LETTER

REPUBLIC OF KENYA
MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: "ELIMU",
Telephone: 052-22265
When replying please quote
email:cdebometcounty@gmail.com
Ref/CDE/BMT/ED/AUTH/74/VOL.II/12

COUNTY EDUCATION OFFICE,
BOMET COUNTY,
P.O. BOX 3-20400,
BOMET.

16TH DECEMBER, 2019

Sr. Jane Mutai
Kenyatta University
P.o Box 43844-00100,
NAIROBI.

RE: RESEARCH AUTHORIZATION.

Reference is made to yours from NACOSTI Ref: No NACOSTI/P/19/569 dated 21st August, 2019 on the above subject.
Permission is hereby granted to carry out research on "***Factors Underlying Infant Mortality in Chepalungu" in Bomet County" Kenya,*** *for* the period ending 21st August, 2020.

Ensure, you present a copy of the research to County Director of Education-Bomet

This letter should be presented to the principal of the schools visited for the said purpose.

COUNTY DIRECTOR OF EDUCATION
P.O. BOX 3,
BOMET

INDIATSI MABALE
COUNTY DIRECTOR OF EDUCATION
BOMET COUNTY.

CC
DIRECTOR NACOSTI