IMPLICATIONS OF LONG-LASTING INSECTICIDE TREATED BED NETS FOR MALARIA CONTROL AND PREVENTION:
A CASE FOR BELET HAWO DISTRICT, GEDO REGION, SOMALIA

BY

ABDIQANI SHEIKH OMAR

UNITED STATES INTERNATIONAL UNIVERSITY-AFRICA

SUMMER 2019
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A Research Project Submitted to the Chandaria School of Business in Partial Fulfillment of the Requirement for the Degree of Masters of Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY- AFRICA

SUMMER 2019
STUDENT’S DECLARATION

I the undersigned do declare that this is my original research work and has not been presented for academic credit to any other college, institution, or university other than the United States International University-Africa.

Signed: ____________________________ Date: ____________________________

Abdiqani Sheikh Omar (657922)

This research work has been presented for examination with my approval as the appointed supervisor.

Signed: ____________________________ Date: ____________________________

Prof: Francis W. Wambalaba, PhD

Signed: ____________________________ Date: ____________________________

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ABSTRACT

The general objective of this study was to investigate the implications of long-lasting insecticide-treated bed nets for malaria control and prevention in Belet Hawo District Gedo Region, Somalia. The specific objectives of the study include: to determine the long-lasting insecticide-treated bed nets ownership among households; to investigate the long-lasting insecticide-treated bed nets usage among households and to assess the knowledge level about the effect of long-lasting insecticide-treated bed nets in malaria prevention.

A descriptive research design was used for this study because it portrayed the status of assessing the current ownership and utilization of long-lasting insecticide-treated bed nets among household members. The study was limited to BeletHawo district, Gedo region, Somalia. The sample size involved 110 pregnant women attending MCH and 220 heads of households within Belt Hawo district in Gedo region of Somalia. The study used a structured close-ended questionnaire that was distributed to the entire study population. Data analysis was done by use of the Statistical Package for Social Sciences (SPPS) version 21.0. The analysis output was analyzed and presented in tables, graphs and pie charts. Descriptive statistics were used to analyze the data by obtaining measures of central tendency (mean, mode, median) as well as the measures of dispersion, specifically the standard deviation and the variance.

The findings on objective one reveal that, the respondents strongly agreed that they are aware of ideas of preventing malaria and they are also knowledgeable on how to control malaria by clearing of bushes around them, removing of water loggings to destroy breeding places of mosquitos and also sleeping under treated mosquito nets even though there was no fair distribution of long-lasting insecticidal nets (LLINs).

The findings regarding objective two revealed that the respondents strongly agreed that it is true that LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. The only challenging fact is that some families have no pregnant mothers attending MCH clinics and none born as well and they live below a dollar in a day, so accessing treated mosquito nets is a problem. Hence not everyone is in position to own LLINs leading to spread of malaria disease. In
addition to that, some households are overpopulated, therefore LLINs ownership is cumbersome.

Lastly for findings on objective three, the respondents strongly agreed that LLINs usage among households is seen through creating awareness and knowledge that helps the respondents in the prevention of malaria disease and the spread of the disease. On the other hand, women were seen to delay in terms of seeking health services which were linked to limited financial capacity causing lack of malaria prevention. Contrarily, men were seen to be usually first in terms of seeking health care. This revealed the reasons as to why households were men were the head of the houses had access to treated mosquito nets as compared to houses that were headed by women.

In conclusion on study objective one, poor coordination and distribution of LLINs is one of the biggest challenges in the execution of organizational policies and strategies all over the world. Coordination is the interdependence of different organizational structures; it is a mandatory requirement in situations where multiple parties are required to complete the same task. In conclusion on study objective number two, the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. Lastly conclusion of third study objective revealed that LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children.

The study recommendations reveal on objective one that the government and the Ministry of health should have a budget dedicated to teaching individuals on matters concerning the knowledge level about the effect of LLINs in malaria prevention. Secondly, objective two recommendation on Determining the Extent of LLIN Ownership among Households and lastly on objective three, the study recommends that there should be a strict policy that governs free distribution of LLINs to pregnant mothers attending MCH and the people at risk of malaria. Following the study recommendations a future study should be done on should be done in cultural differences hindering treatment of patients by the opposite gender in fear of going against their cultural practices and beliefs.
AKNOWLEDGEMENT

I would like to first acknowledge my beloved supervisor Professor: Francis W. Wambalaba for his assistance and critique he has shown me all through during the study.

I would also like to acknowledge my comrades from USIU who encouraged me to continue even though it was tough sailing through.
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LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA: Analysis of Variance
FMOH: Federal Ministry of Health
IDPs: Internally Displaced Persons
ITN: Insecticide treated Nets
LLINs: Long Lasting Insecticidal Nets
MCH: Maternal Child Health
MIS: Malaria Indicator Survey
PE: Protective Effectiveness
SPSS: Statistical Package for Social Sciences
UN: United Nations
WHO: World Health Organization
CHAPTER ONE
1.0 INTRODUCTION
1.1 Background of the Study

Malaria has been ranked as a world health major catastrophe as the parasites that transmit the disease are found in almost half of the world’s habitat. According to various researchers, it has been estimated that more than three hundred individuals are infected every year. The African continent is the most affected by the disease followed by Amazon countries in South America where more than a million infections are reported every year. For instance, Brazil contributes to a third of malaria cases in Latin America where almost all cases reported were from Legal Amazona which lies at the north suburbs of the country. This is a tropical state and cities are found along waterways.

Snow, Guerra and Noor (2009) posits that globally, malaria causes a high rate of mortality of about one million deaths per year, while other researchers show that some calculations may even be as high as 3 million (Breman et al., 2010). There are those children that suffer from a condition known as cerebral malaria which is even worse. These include conditions like blindness, weakness, epilepsy and speech problems. The weak immune system in children under five puts them at risk of malaria which interferes with their growth and development. People with semi-immunity are infected, but do not get severe malaria attacks. In stable transmission areas newborns are protected by the IgM antibodies of their mother and through breastfeeding. After three months children have a higher susceptibility for an infection with the parasite. In high transmission areas this time period lasts until the age of 3-5 years. In areas with a seasonal transmission the period can last 10 years. Without re-infection the acquired immunity can disappear in a matter of years (Eddleston et al. 2008).

MatoGrosso state found in the Legal Amazon area has documented a substantial number of malaria cases especially during the 80s and 90s where a huge number of cases were witnessed in regions of new settlements and in open gold mines at the west suburbs of the state. As at 1992 the state had reached an IPA (Annual Parasimetic Index) of 96.1 per thousand occupants. This was followed by a decline of the IPA from 1993 in that by 2002 it had fallen to 2.7 cases per a thousand occupants. Since 2003, the frequency of malaria has been mainly observed in the extreme west of the state. In 2004, 720 blood smears which tested positive for malaria were spotted, corresponding to an IPA of 116.8 per
thousand inhabitants which signified a rise of 184.9% in the prevalence of positive blood smears relative to 2003 when the IPA was 41.0 per thousand inhabitants.

Individuals living in the rural areas in the state of MatoGrosso, have high incidences of malaria and thus it is importance to identify the issues that are involved in the transmission of the disease in areas of high prevalence so as to expand the programs of observation and control of malaria. Research shows that malaria causes a high rate of mortality that may even be as high as 3 million (Snow et al., 2009; Breman et al., 2010).

Due to weak immune system in children under five, they are at risk of malaria which interferes with their growth and development. In stable transmission areas, newborns are protected by the IgM antibodies of their mother and through breastfeeding. However, after three months children have a higher susceptibility for an infection with the parasite. In high transmission areas this time period lasts until the age of 3-5 years. In areas with a seasonal transmission the period can last 10 years. Without re-infection the acquired immunity can disappear in a matter of years (Eddleston et al. 2008).

South-East Asia and Western Pacific regions including America Samora (USA), Australia, Brunei Darussalam, China, CookIslands, Fiji and Polynesia (French) have the largest population at risk of malaria (Snow et al., 2009). It mainly occurs in countries and areas located in tropical and subtropical zones. Malaria becomes a heavy burden of disease and a threat to global prosperity, economic growth and development (Sachs et al., 2007). In some countries with a heavy malaria burden, the disease may account for as much as 40% of public health expenditure, 30 to 50% of inpatient admissions, and up to 50% of outpatient visits (WHO, 2005). There is a positive decline in the rate of transmission of malaria, mortality and morbidity rate according to WHO, (2009). This has been possible through administration of artemisinin-based combination treatment (ACT) and also practicing ways that hinder malaria transmission like using treated mosquito nets and maintaining general hygiene to keep away breeding places of mosquitoes (Roll Back Malaria Cabinet Project, 2009). The Human Resource for Health (HRH) is described as the stock of all individuals whose main intent is to maintain and restore the health of the population (World Health Organization, 2006). Decentralization of health systems is a health reform agenda meant to reduce spatial inequalities, enhance local participation, enhance horizontal as opposed to the traditional vertical health programme implementation, enhance quick managerial decisions and has been critical policy question
worldwide. It refers to the process of moving the delivery of services from larger organizations to smaller organizations characterized by proper structure, agility, and accountability. In a decentralized system, there is significant transfer of power from upper to lower level administrations that have a greater reach to the general population, thus brings services closer to the public (Falleti, 2005). However, many African nations are yet to achieve successful decentralization of their healthcare systems (Omar, 2002).

Nigeria has a population of approximately 123.9 million. Majority of its population resides in the rural areas and lack access to clean water with limited health care facilities, mainly because of poverty. As a result of a huge number of its population living below the poverty line, Nigeria has been ranked as a low-income country burdened with enormous foreign debt. A country’s economic growth solely depends on the ability of its citizens to deliver but for the case of Nigeria it has to allocate excess funding for the sick population which further sinks the country into debts.

In a traditional setting, pregnant mothers and infant children have a tendency of sleeping together considering that they are the most vulnerable group to malaria infections. It is therefore important to encourage policies relating to the use of long lasting insecticidal nets (LLINs) as it would be cost-effective in the rural areas. Mosquitoes are more attracted to dull colors thus the need to white wash the walls of the mud huts. Also, stagnant water serves as breeding sites for mosquitoes and therefore all cracks and gaps with the possibilities of collecting water should be sealed. Also the Nigerian government could collect levies from companies that engage in actions that pollute the environment which could be used to partially fund the projects that control malaria. Companies in marshy swamps where malaria is widespread, for instance oil companies in the parts of Niger Delta should be probed to donate to a general malaria control fund.

The only threat of a developing country is situations that promote poverty since this hinders the growth of a nation. Malaria is one of them as it is known to affect the growth of children by causing a lot of abnormalities like intellectual development capability which lowers productivity of an individual in the work place (Hotez et al., 2011). It is with the recognition that health systems are weak in the majority of health systems in Sub-Saharan African countries including Somalia that the World Health Organization established a common framework of action composed of the six building blocks of the health system. These are: Human Resources for Health, Health Financing, Medical
Products, Pharmaceuticals, Vaccines and Technologies, Health Information, Service Delivery, and Leadership and Governance. These essential parts must work in coherence with agreed global health agendas in specific countries to spearhead health reforms meant to improve health outcomes for the population (World Health Organization, 2007).

The debate around the most effective approaches that ensure wide and sustained coverage of LLINs continues. However, current approaches for distribution ITN/LLIN are mostly a combination of free continuous distribution through health clinics or through regular mass campaigns, with very few countries using cost-recovery approaches. Rapid increases in ownership of insecticide treated nets have been achieved through catch up campaigns in settings where ownership was previously extremely low, such as Niger and Togo, and Kenya achieved high and equitable levels of coverage by the combination of routine distribution and a mass campaign. Nevertheless, there has been little evaluation of systems that deliver nets through routine channels.

The use of long lasting insecticidal nets (LLINs) has been the main approach for vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, the study evaluated the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establishes the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

As one of the Millennium Development Goals, malaria abatement has been the target of various poverty-reducing campaigns throughout the developing world. Although the disease is both preventable and curable, malaria remains a primary public health concern in developing countries within the tropical zones. The disease occurs in 109 countries worldwide, and just 35 of those countries are responsible for the majority of total annual global deaths from malaria infection. Most of these high-risk countries lie in sub-Saharan Africa and Southeast Asia. While Nigeria, Democratic Republic of Congo, Uganda,
Ethiopia and Tanzania have the highest infection rates and account for 50 percent of total global deaths, malaria is still a serious threat to individuals and a burden on the economic and health systems of other highly affected countries with 300-500 million clinical cases reported each year (Roll Back Malaria Partnership, 2009).

In semi-arid and highland regions of Africa, malaria is epidemic and causes deaths annually (Worall et al, 2010). However, the risks of morbidity and mortality associated with malaria, particularly in semi-arid and highland regions varies spatially and temporally (Snow and Marsh, 2005). Most malaria infections, particularly in sub-Saharan Africa, are caused by Plasmodium falciparum. Malaria presents a major socio-economic challenge to African countries, considering that it is the most affected region. This challenge cannot go unnoticed given that good health is not only a basic human need, but also a fundamental human right and a prerequisite for economic growth (UN, 2009).

In South Central Somalia, ITNs were shown to be effective against malaria infection showing that age-specific protective effectiveness (PE) of bed nets ranged from 39% among < 5 years to 72% among 5-14 year old children. Overall, PE of bed nets was 54% (95% confidence interval 44%-63%) after adjusting for livelihood; sex; and age. Malaria is a major global public health problem and a leading cause of morbidity and mortality in many countries. There were 198 million (range, 124-283 million) cases and up to 584 000 (range, 367 000 - 755 000) deaths in 2013. Approximately 80% of the cases and 90% of the deaths occur in Africa. Nearly 95% of the population in the South Central of Somalia lives in malaria endemic areas. This region is also the most densely populated part of the country. In addition, the region has suffered the brunt of the conflict in Somalia and is where the main cities of Mogadishu and Kismayu are located. Since 2004, significant investments have been made in malaria control in the country and coupled with the most recent drought; significant reductions in the malaria burden have been observed.

The use of lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in
weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, this research evaluated the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establishes the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

In BeletHawo district in Somalia, LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. LLINs are also commonly distributed among internally displaced persons (IDPs) or targeted at focal areas in response to epidemics. Since 2007, approximately 2 million LLINs have been distributed in Somalia but data disaggregated to the districts was not available. Most of the distribution occurred in the Central South Zone where the burden of malaria is the highest. Somalia is a nation, located in the Horn of Africa, which has undergone prolonged periods of conflict since the fall of Said Barre in 2009 to 2012 when the first transitional government was formed (Qayad, 2007). The 21 years of civil conflict destroyed the country’s healthcare system through the loss of human resources and demolition of the physical infrastructure. Although Somalia has undergone a semblance of relative peace, it continues to face significant security challenges from Al Shabbab militia, a group associated with Al Qaeda. The radical militia group holds control over the rural areas, but it is expected that continuous support from its neighbours will help Somalia end the activities of the radical group.

The Federal Ministry of Health (FMOH) serves a population of 15 million people spread out over three distinct regions. They include Somaliland, Puntland, and South Central Zone, which covers Harshabele, Galmudug, Jubba land, and South-West. The country’s health indicators are worrying due to the devastating effects of the war and poor retention of health workers in the states. For instance, the infant mortality rate is 91/1000 births against the 51/1000 births reported in Eastern and Southern Africa. On the other hand, the mortality rate of children below five years is 147 deaths/1000 live births, versus the 77 deaths for 1000 live births in the neighbouring region.

In 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership and use of LLIN by household members the night before survey were both below 20%. Household members’ access to malaria information and understanding of the transmission of malaria were also inadequate. Although the MIS of 2014 was the first of
its kind in Somalia, the survey was undertaken under difficult logistical demands and standard sampling requirements were not always met. Furthermore, detailed qualitative investigations by key informants and through focused group discussions were not undertaken. Consequently, there could be problems of precision in the results.

Gedo is one of the regions with the highest malaria transmission intensity in Somalia. Although the MIS of 2013 provided recent information of malaria prevention, knowledge and attitudes, there are no detailed studies on knowledge, attitudes and practices (KAP) and their effect on the use of LLINs in this region. The aim of this study was to focus on BeletHawo district of Gedo region. It undertook a qualitative and quantitative survey in a bid to understand the level of ownership, rates of use of LLINs, the state of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their appropriate use. The major malaria vectors in Gedo are An. Gambians complex (gambiaespp, An. arabiensis, An. meras) and An. funestus. Somalia has got varying climatic conditions that become a challenge when it comes to malaria control and prevention. To be more specific, temperature and rainfall patterns make approximately 80% of the total Somalian population be at risk to malaria infection. Normally there are seasons of extreme temperatures recorded in the month of February and March in most parts of Gedo region of Somalia while July and August record low temperatures.

The species that are involved in malaria infection are all present in Somalia with the leading one being Plasmodium falciparum that causes about 98% of all infections in the entire country (Somalia Malaria Operation Plan, 2015). Therefore, it’s against this backdrop that a study is required to establish these facts and put Somalia on the global malaria map and hence do the necessary interventions measures. These districts, which are bordering both Ethiopia and Kenya, have a high human population movement and a high burden of malaria. The data collected will contribute to the prevention and vector control strategies to achieve objectives and goals of the national malaria control and elimination program. The result of the study will be used to improve malaria messaging for LLIN in South Central region.

1.2 Statement of the Problem

The debate around the most effective approaches that ensure wide and sustained coverage of LLINs continues. However, current approaches for distribution ITN/LLIN are mostly a combination of free continuous distribution through health clinics or through regular mass
campaigns, with very few countries using cost-recovery approaches. The rapid increase in ownership of insecticide treated nets has been achieved through catch up campaigns in settings where ownership was previously extremely low, such as Niger, Togo, and Kenya which have achieved high and equitable levels of coverage through a combination of routine distribution and mass campaigns, (Roll Back Malaria Cabinet Project, 2009). Nevertheless, there has been little evaluation of systems that deliver nets through routine channels. This gap has never been filled in Somalia since and Malaria still remains an important public health problem with varying degrees of transmission.

The use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs (World Health Organization, 2006). Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. Other researchers like (Mufti, 2000, p. 12) posit that these factors contribute to potentially large uncertainties in survey results. Consequently, this study evaluated the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and established the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use in BeletHawo district of Gedo region, Somalia.

The gap has been widening for over the years and the researchers have done their best to fix ownership and utilization of LLIN. In 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership of at least one LLIN and their use by household members the night before survey was both below 20%. Household member’s access to malaria information and understanding use of transmission of malaria were also inadequate. Although the MIS of 2014 was the first of its kind in Somalia, the survey was undertaken under difficult logistical demands and standard sampling requirements were not always met. Furthermore, detailed qualitative investigations by key informants and through focused group discussions were not undertaken. Consequently, there could be important precision problems in the results.
1.3 General Objective of the Study

The general objective of this study was to assess the implications of utilization of LLIN among household members in BeletHawo district in Somalia.

1.4 Specific Objectives of the Study

1.4.1 To assess the knowledge level about the effect of LLINs in malaria prevention

1.4.2 To determine the extent of LLIN ownership among households in BeletHawo district

1.4.3 To investigate the levels of LLIN usage among households in BeletHawo district

1.5 Significance of the Study

1.5.1 Pregnant Women and Children

The study will be important to pregnant women and children because they are the most vulnerable group for malaria disease. Children above 15 years are more knowledgeable about malaria disease and were involved in the study in every household to provide an opportunity for testing how knowledgeable the respondents were about the disease.

1.5.2 Community

The study is of importance to the community, both National and County governments of Somalia republic as provide them with a better understanding of the causes, control and prevention of malaria. This will help the Ministry of Health to decide where to put more focus on health care provision and to take stringent measures to curb any future spread of this pandemic illness. It will also assist researchers in revealing more factors affecting the community in Somalia.

1.5.3 Somali Government

Knowledge from the findings was crucial in helping the Somali government in making right decisions to curb the malaria menace. This information will also help the government to minimize the activities leading to spread of malaria and plan for intervention measures to curb it in the affected communities. They can therefore use the findings of the study to decide on areas to invest their resources. The Ministry of Health will use the information from the research findings to decide where to increase their investment in order to mitigate the malaria problem in Somalia.
1.5.4 Humanitarian Organizations in Somalia

The study may also be used by humanitarian aid organizations working in Somalia by revealing the factors that involve determinants of ownership and utilization of long-lasting insecticide treated bed nets among families for malaria control and prevention in BeletHawo district, Gedo region, Somalia. These institutions provide medical support including doctors, in the region.

1.5.5 Academicians and Researchers

This study may be used by both academicians and researchers for future reference on the topic a similar study or any study dealing with determinants of ownership and utilization of long-lasting insecticide treated bed nets among families for Malaria control and prevention in BeletHawo district, Gedo Region Somalia. Academicians in their research work may use this research work for policy implementation and recommendations for WHO and other bodies that deal with the issues of health.

1.6 Scope of the Study

The study findings were limited to BeletHawo district, Gedo Region, Somalia on a sample size of 330 people who included pregnant women and head of households. The data collection was done within a period of three months from March to May 2019.

1.7 Definition of Terms

1.7.1 Lasting Insecticidal Nets (LLINs)

These are the type of nets used in preventing or controlling the malaria vector from affecting students thus according (Siegel, 2004).

1.7.2 Human Resources

Human resources encompass all the employees working in an organization. Human resources in multi-specialty hospitals are medical and non-medical staffs that are involved in providing health services to the public (Kabene et al., 2006).

1.7.3 Financial Capacity

According to the study this term refers to the ability of an organization to manage its finances efficiently. It encompasses a wide range of activities including financial planning, money handling, and sound financial management decisions (Xu, & Zia, 2012).
1.7.4 Malaria

This is a life threatening disease that is transmitted through a mosquito bite through an anopheles mosquito which carries the plasmodium parasite as cited by Anand, C., Sharma, R., & Mishra, K. N. (2018).

1.8 Chapter Summary

This chapter reviews the factors affecting the determinants of ownership and utilization of long-lasting insecticide treated bed nets among families for malaria control and prevention in BeletHawo district, Gedo region, Somalia. In 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership of at least on LLIN and their use by household members the night before survey were both below 20%. Household members’ access to malaria information and understanding of the transmission of malaria were also inadequate. The general objective of this study was to assess the implications of utilization of LLIN among household members in BeletHawo district in Somalia. The specific research objectives were: to determine the extent of LLIN ownership among households in BeletHawo district; to investigate the levels of LLIN usage among households in BeletHawo district; and to assess the knowledge level about the effect of LLINs in malaria prevention.

Chapter two entails the literature review. It is followed by chapter three which focuses on the research design and methodology: it highlights the procedure that was used in carrying out the study. Chapter four is data analysis and findings: it will highlight the patterns observed from the research information. Lastly, chapter five provides a summary of the whole research, and gives recommendations to help solve the research problems.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents the relevant literature on the research objectives which are: to measure the LLIN ownership among households in BeletHawo district; to measure the LLIN usage among households in BeletHawo district; and to assess the knowledge level of the respondents on the role of LLINs in malaria prevention.

2.2 Assess the Knowledge Level about the Effect of LLINs in Malaria Prevention

When it comes to knowledge level and practice among study populations regarding malaria disease, prevention and the current treatment regime, studies have shown that although individuals are knowledgeable, when limited to financial capability their power of acting in response to malaria treatment becomes low. Women were seen delaying in seeking health care due to financial constrains while men were less willing when it came to spending towards the health of their children Franckel, A., & Lalou, R. (2009). ITNs ownership depends directly on knowledge, attitude and practice because it measures how knowledgeable mothers are when it comes to Malaria prevention that made them acquire treated bed-nets. Attitude also contributes to the act of acquiring ITNs (Minja, 2001).

In addition to the above literature the more knowledgeable a primary care giver is, the the healthier the children are and the vice versa is also true. There is a lot of research in describing the attitude of primary care givers and if they have enough knowledge/skills towards malaria prevention. Njama, Dorsey, Guwatudde, Greenhouse, Musis and Kamya (2008), when studying knowledge of care givers in Uganda, found out that when care givers are educated they would prefer malaria prevention methods than treatment. Therefore, use of bed-nets is the most appropriate method of malaria prevention.

2.2.1 Prevention of Disease through Better Knowledge and Awareness

Asery, Sunkaria, Marwaha, and Sharma, (2018), in their study on people’s perception of malaria in Mbarara, Uganda recommended that people should be educated on the connection between mosquitoes and malaria and on seeking biomedical treatment for convulsions. In addition, the successful malaria control programme requires sustained political commitments: integration of malaria control into the health system; coordination
with relevant non-health sectors; full participation of communities; and mobilization of adequate national and international human and financial resources.

It has been reported in countries in Sub-Saharan Africa that measures such as use of bed nets were mainly aimed at prevention of the nuisance of mosquito biting rather than against malaria (Thompson, 2018). In addition, Thompson, (2018), suggest that the finding that bed nets be used to prevent the malaria mosquito from biting rather than as protection from malaria or incomplete use of treatment strategies against malaria is an incorrect measure. The correct facts for the control of malaria should be included in all information, education and communication messages within the framework of a malaria control programme. Furthermore, barriers such as the high cost of the nets that impact negatively on the control programme, should always be considered when implementing interventions.

Another study was conducted in South-Western Nigeria to determine the knowledge of the symptoms of malaria, attitude towards preventive measures as well as treatment seeking behavior among the community members of Ile-life community in 2004 (Erhun, 2004). More than 60.0% of the respondents in this study were familiar with at least three signs/symptoms associated with malaria. The findings revealed that 35.5% of the respondents indicated that they made use of synthetic anti-malarial drugs; and 0.9% consulted herbalists’ while13.4% used local herbs to treat malaria. Some of the respondents, at 27.3% indicated that they went to the hospital, 18.2% just prayed and 1.7% administered spiritual/ritual waters as a cure. The remaining 3.0% of the respondents mentioned that they merely ignored the signs (Erhun, 2004).

In addition to these findings, factors such as cost, level of education, religious beliefs, perceived safety, and convenience and respondents’ state of health were found to influence the respondents’ choice of malaria treatment and preventive methods. The finding indicated that, convenience and severity of the disease affected respondents’ choice of treatment in more than 50.0% of the cases. The same study found that the use of untreated bed nets, fumigation and insecticide bed nets were not common among the studied communities though most of the respondents who are above secondary school education level expressed willingness to use such preventive measures. Based on these findings, the researcher recommended the intensification of malaria public enlightenment,
provision of affordable and effective malaria preventive methods and provision of free malaria treatment at public hospitals (Erhun, 2004).

Furthermore in Burkina Faso, knowledge of the cause of malaria and its seriousness on the health of people and its impact on the socio-economic status of households is known to the rural populations. Most of the respondents from rural areas attributed the cause of malaria to the mosquito bites (Thompson, 2018). In Burkino Faso in 2007, modern and traditional methods were most frequently used by the community members to prevent and treat malaria, but the level of cost of modern treatment and preventive methods determines the type of preventive measures. The commonly practiced modern treatment by the local community was self-medication with paracetamol and chloroquine. Despite the incorrect dosages of chloroquine (used as single dose or daily for weeks) used by the community for treating malaria, the respondents believed that it was an effective treatment (Thompson, 2018).

In most of the countries in Sub-Saharan Africa, depending on accessibility, cost and on whether malaria is perceived by the community as a normal or an out of order illness, the respondents reported that malaria patients were usually taken to health workers when traditional herbal remedies failed. Most respondents were found to be quite aware of the symptoms of malaria (Thompson, 2018). A study done in Zambia (Sharp, Wyk, Sikasole, Banda & Kleinschmidt, 2007), indicated that 80.0% of respondents stated that malaria was caused by mosquitoes while 43.0% believed it was caused by drinking bad water. Twenty-seven percent claimed to use bed nets. Sharp et al (2007), further recommended for community health education on malaria and its prevention.

De La Cruz et al (2006:2) also conducted a study in Ghana to determine who slept under the bed nets. In their study, they found that most of the respondents knew that malaria is transmitted by mosquitoes. However 20.6% of mothers whose children use bed nets and 12.3% of mothers whose children do not use the bed nets thought that over working causes malaria. De La Cruz et al (2006:2) also noticed that ninety percent (of 20.6%) of the mothers whose children slept under the bed nets and seventy-seven percent (of the 12.3%) of the mothers whose children do not use bed nets, felt that sleeping under a net would protect them against malaria. According to De La Cruz et al (2006), factors such as region of residence; greater food security; and caregivers’ beliefs about the symptoms; causation and groups who are most vulnerable to malaria; were found to be most closely
associated with bed net use. Based on these findings De La Cruz et al (2006:2) concluded that having knowledge about malaria does not always translate into improved bed net use. They further emphasized that cultural-based ideas about malaria may vary between communities but integrating it into traditional health education message may enhance the effectiveness of public efforts (De La Cruz et al., 2006).

Deressa, Ali and Enquoselassiel (2010), in their research in a rural community in Butajira District of Southern Ethiopia on the knowledge, attitude and practice of the community on malaria, as well as the transmission of malaria and anti-malarial drugs, reported that 89.7% of the respondents mentioned fever; 87.5% headaches; and 81.3% mentioned chills and shivering as the symptoms of malaria. Only 66.0% of the respondents in this research knew that malaria is caused by the bite of infective mosquitoes and almost a half (43.7%) of them believed that malaria could be transmitted from person to person -- through the bite of infective mosquitoes. Other factors mentioned are contact with malaria infected person, drinking unsafe water, eating contaminated food, and exposure to bad odour (Deressa et al 2005:101).

2.2.2 Vulnerability of Malaria Disease

There is a growing need to effectively decentralize Somalia’s healthcare system to solve the on-going health crises in the country. Foreign donors have been on the forefront of finding a permanent solution to the health problems affecting the nation, and decentralization is the first step towards their goal (Omar et al., 2002). Somalia’s government endorsed the decentralization policy ion 2014 to accelerate the rate of decentralization of healthcare in the nation. Besides, the Joint Programme on Local Governance (JPLG) was formed as collaboration between the Somalia governmental and the UN to aid in the pursuance of this goal. However, the government has made little progress in its journey to decentralize the health system.

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De La Cruz et al (2006) posits those factors, for example, district of living arrangement; more noteworthy sustenance security; and parental figures' convictions about the manifestations; causation and gatherings that are most defenseless against intestinal sickness; were observed to be most intently connected with bed net use. In light of these discoveries De La Cruz et al (2006:2) reasoned that knowing about intestinal sickness does not generally convert into enhanced bed net use. They further accentuated those social based thoughts regarding intestinal sickness may fluctuate between networks. However, incorporating it into conventional wellbeing training message may upgrade the adequacy of open endeavors. De La Cruz et al. (2002) also argues that the normally polished present day treatment by the nearby network was self-drug with paracetamol and chloroquine. According to Okrah et al. (2007) in spite of the off base measurements of chloroquine (utilized as single portion or day by day for a considerable length of time) utilized by the network for treating jungle fever, the respondents trusted that it was a successful treatment.

Müller, Traore, Becher and Kouyate (2008), conducted a study to describe malaria morbidity, treatment-seeking behavior, and mortality in a cohort of young children in rural settings of Burkino Faso. The common signs and symptoms by which the
respondents in this study described malaria were fever (89.0%) of which 55.0% were blamed to Falciparum Malariae. The respondents in the same study also noticed the association of febrile episodes with diarrhea, vomiting and cough. Vomiting was considered by 14.0% of the respondents as the most frequent symptom in febrile malaria; whereas 6.0% was of the opinion that vomiting was the more frequent symptom in non-febrile malaria.

2.3 Long Lasting Insecticidal Nets Ownership among Households

South-East Asia and Western Pacific locales including America Samoa, Australia, Brunei Darussalam, China, Cook Islands, Fiji and French Polynesia (French) are where the biggest populace in danger of malaria have been found by (Snow et al. 2009). It fundamentally happens in nations and zones situated in tropical and subtropical zones. Jungle fever turns into an overwhelming weight of illness and a danger to worldwide success, monetary development and advancement (Sachs et al. 2005). In a few nations with a substantial intestinal sickness load, the illness may represent as much as 40% of general wellbeing consumption, 30 to half of inpatient confirmations, and up to half of outpatient visits (WHO, 2005). The WHO (2009) scientists underscored a positive decrease in the rate of transmission of jungle fever, mortality and bleakness rate.

As one of the Millennium Development Goals, intestinal sickness decrease has been the objective of different destitution lessening efforts all through. Despite the fact that the infection is both preventable and reparable, intestinal sickness remains an essential general wellbeing worry in creating nations inside the tropical zones. The illness happens in 109 nations around the world, and only 35 of those nations are in charge of most of complete yearly worldwide passings from intestinal sickness disease. The greater part of these high-hazard nations lie in sub-Saharan Africa and Southeast Asia. While Nigeria, Democratic Republic of Congo, Uganda, Ethiopia and Tanzania have the most elevated contamination rates and record at 50 percent of all out worldwide passing’s, jungle fever is yet a genuine danger to people and problem on the monetary and wellbeing frameworks of other profoundly influenced nations with 300-500 million clinical cases detailed each year (Roll Back Malaria Partnership, 2009). Long-lasting insecticidal nets (LLINs) remain one of the most effective interventions against malaria. The African Summit on Roll Back Malaria held in Abuja, Nigeria in 2000 specified that 60% of at risk groups should use ITN/LLIN by 2005, a target that was subsequently raised to 80% by 2010. Although use
of insecticide treated nets remains well below the target level of 80%, recent analysis has shown significant progress in increasing ITN/LLIN use by children under 5 years living in stable malaria endemic settings. Another recent analysis concluded that expanded coverage of ITN/LLIN as part of a multifaceted malaria control strategy was likely to be among the factors contributing to the 68% decline in malaria morbidity in Africa between 2000 and 2015. Currently WHO recommends universal coverage of ITNs/LLINs (every person at risk sleeping under a quality insecticide-treated net).

The use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, we are proposing to evaluate the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establish the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

In South Central Somalia, ITNs were shown to be effective against malaria infection showing that age-specific protective effectiveness (PE) of bed net ranged from 39% among < 5 years to 72% among 5-14 years old. Overall PE of bed nets was 54% (95% confidence interval 44%-63%) after adjusting for livelihood; sex; and age. The debate around the most effective approaches that ensures wide and sustained coverage of LLINs continues. However, current approaches for distribution ITN/LLIN are mostly a combination of free continuous distribution through health clinics or through regular mass campaigns, with very few countries using cost-recovery approaches. Rapid increases in ownership of insecticide treated nets have been achieved through catch up campaigns in settings where ownership was previously extremely low, such as Niger and Togo, and Kenya achieved high and equitable levels of coverage by the combination of routine distribution and a mass campaign. Nevertheless, there has been little evaluation of systems that deliver nets through routine channels.
In Somalia, LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. LLINs are also commonly distributed among internally displaced persons (IDPs) or targeted at focal areas in response to epidemics. Since 2007, approximately 2 million LLINs have been distributed in Somalia but data disaggregated to the district was not available. Most of the distribution occurred in the Central South Zone where the burden of malaria is the highest.

Sound individuals are lively, vivacious, and have a progressively uplifting point of view. These attributes are not only meaning positive for the social foundation, but they also influence monetary improvement. The point of this study is to demonstrate that wellbeing has a positive and critical impact on monetary development. The World Health Organization characterizes wellbeing as "a condition of finish physical, mental and social prosperity and not simply the nonappearance of infection or ailment.

In 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership of LLIN and their use by household members the night before the survey was both below 20%. Household members’ access to malaria information and understanding of the transmission of malaria was also inadequate. Although the MIS of 2014 was the first of its kind in Somalia, the survey was undertaken under difficult logistical demands and standard sampling requirements were not always met. Furthermore, detailed qualitative investigations by key informants and through focused group discussions were not undertaken. Consequently, there could be important precision problems in the results. In this study, we focus on two districts of Gedo region, one of the highest malaria transmission areas in Somalia, to undertake a study on the prevalence of malaria infection, the coverage of LLINs and the knowledge on malaria prevention.

Gedo is one of the regions with the highest malaria transmission intensity in Somalia. Although the MIS of 2013 provided recent information of malaria prevention, knowledge and attitudes, there are no detailed studies on knowledge, attitudes and practices (KAP) and their effect on the use of LLINs in this region. This study focused on BeletHawo district of Gedo region to undertake a detailed qualitative and quantitative survey to understand the level of ownership, rates of use of LLINs, the state of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their appropriate use. These districts bordering both Ethiopia and Kenya a have high human
population movement and a high burden of malaria. The data collected will contribute to the prevention and vector control strategies to achieve objectives and goals of the national malaria control and elimination program. The result of the study will be used in malaria messaging for LLIN in South Central region. The researcher was interested in filling this gap.

2.3.1 Fever Prevalence, Incidence of Suspected and Confirmed Malaria Cases

The plasmodium parasite has both a gonotrophic cycle and longevity which plays a critical role in the rate at which multiplication of parasites is enhanced. More rapid growth of mosquitoes is experienced in warmer temperatures (WHO/AFRO, 2001). Scientist had realized that the temperature at which the incubation period of malaria parasite is at its best around 20°-27°C, while that of vectors and parasites is calculated at around 40% (MARA/ARMA, 2008). In support of this when temperatures are high then larval development is also at its best (Martens et al, 2008). Broker et al. (2007), conducted a study in Cameroon on the spatial distribution of parasites known as Helminthases by collecting all the epidemiological data required where-by land surface data was derived from NOAA-AVHRR and a regressing model was used for variable identification. The variables were mean; minimum and maximum temperatures for determining helminthes and the results stated that for determining helminthes the most important variable was maximum temperature.

Globally variation in temperature is a major factor when it comes to prevalence of malaria due to unreliability and resistance of the vector. Bearing in mind that malaria is a vector-borne disease which according to most recent studies conducted concluded that about 300-500 million people are affected yearly with the disease (GNA, 2010). Even though most countries in Africa have tried several ways and means of malaria eradication still some recent studies show that malaria is still on the increase posing a challenge on whether the countries are using the right method and equipment for the process or they lack skills and knowledge on how that should be done. This shows why most countries are stuck at the control stage of malaria infection which normally is regarded as the first step in dealing with the disease while there are several stages like; elimination of malaria disease and lastly eradication of the disease which requires the help of vaccines (GNA, 2010).
In Somalia there are several challenges when it comes to practices of malaria prevention, control and cause. First there is varying climatic differences due to temperature and rainfall pattern differences which may also be brought about by the topology of land and to some extent a forestation and deforestation practices in different areas. Normally there are seasons of extreme temperatures recorded in the month of February and March in most parts of Somalia while July and August records low temperatures. The species that are involved in malaria infection are all present in Somalia with the leading one being Plasmodiumfalciparum that causes about 98% of all infections in the entire country (Somalia Malaria Operation Plan, 2015).

2.3.2 Amount of Rainfall

The amount of rainfall creates favorable breeding places for mosquitoes like the anopheles mosquitoes which lays numerous eggs that grow to become next generation threat as adult mosquitoes when their life cycle is complete. When humidity is created due to rain then mosquito survival rate becomes high due to the fact that they lay numerous eggs which increase their survival level even if some of the eggs fail to survive. Several studies have been conducted in regard to malaria and rainfall relationship and it has been found that during the rainy seasons the species thrive at their best accounting for high incidences of malaria (Reid, 2009). On the contrary when breeding sites are less or absent, then there are less or no malaria infections at all and this is normally experienced in Somalia between the month of February and march when normally extreme temperatures are experienced (Reid, 2009).

Global variations in the amount of rainfall cause the differences in temperature and are a major factor when it comes to prevalence of malaria due to unreliability and resistance of the vector. Malaria is a vector-borne disease and according to most recent studies, about 300-500 million people are affected yearly with the disease (GNA, 2010). Even though most countries in Africa have tried several ways and means of malaria eradication, still some recent studies show that malaria is still on the increase posing a challenge on whether they are using the right method and equipment for the process or they lack skills and knowledge on how that should be done. This shows why most countries are stuck at the control stage of malaria infection which normally is regarded as the first step in dealing with the disease while there are several stages like; elimination of malaria disease and also eradication of the disease using vaccines (GNA, 2010).
To enjoy good health and longevity is fundamental to the human experience. Healthy people are more vibrant, energetic, and have a more positive outlook on life. These characteristics not only translate to a positive innocence on the social infrastructure, but also affect economic development. The aim of this study is to show that health does have a positive and significant effect on economic growth. The World Health Organization defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” Sprout et al. (2004) made a rundown of aftereffects of numerous investigations that demonstrate how wellbeing can influence development in economy. Over the examinations they refer to Barro and Lee, (1984); Bhargava et al., (2001); Barro and Martin, (2004); Sachs and Warner, (1997) that there is a noteworthy and constructive outcome between wellbeing advancement and monetary development.

2.3.3 Temperature

Temperature is a general term used for both low and high temperatures that in one way or the other contributes towards malaria prevalence. High temperatures normally result into low breeding of mosquitoes which helps in reducing cases of malaria infection naturally without having to employ means of control or control mechanism of malaria. When temperatures are low then that could also mean that the humidity is low. This poses a challenge in malaria control because breeding places will be favorable for mosquitoes hence cases of new malaria infection will be on the rise compared to extreme temperatures. To be specific 16°C restricts parasite development in the aquatic life or reduces the rate at which the vectors spread in the aquatic while when the temperature is around 17°C parasites develop but at a very slow rate and do not cause an epidemic according to known scholars like (Lindsay and Martens, 2009).

2.4 Investigating Long Lasting Insecticidal Nets Usage among Households

Globally human health care has been taken very seriously making people living in the 21st century to have a longer lifespan due to improved technology in the healthcare sector despite the world increasing in population size due to better healthcare that has contributed towards economic growth increase. When there is good healthcare people tend to spend less in raising families due to reduced spending in healthcare therefore there is no fear of mortality and morbidity rate hence increase in family size. (IMF, 2004, p. 10). Quality healthcare is one of the most important factors in how individuals perceive
their quality of life. In most countries, alongside the economy, it is a major political issue. In some countries, the healthcare delivery organization is a part of the national identity. Anon, (2018). Suhrcke (2005) notes that health is an important component of human capital, and since human capital matters for economic outcomes, health also matters for economic outcomes. At the same time, economic outcomes matter for health. Suhrcke, (2005) further states that in the past 50 years, the globe witnessed a big development in the health field.

So as to support this improvement and keep addressing the necessities of the advancement in wellbeing, the US government and its accomplices proceeded with its help. (Heiberg, D. 2013). The human lifespan has risen and the fruitfulness has decreased all through the world is more in the course of recent years than amid the past 4000 years. Future is very nearly 25 years longer today (Preker A. et al 2000). The job and the significance of medicinal services frameworks in the personal satisfaction and social welfare in the current society have been comprehensively perceived. Likewise, because of their developing significance out in the open funds and the economy, they have turned into a prevailing financial and political issue. (Theodoropoulos, 2014).

Saudia Arabia being an Islamic Kingdom enjoys political stability with a stronger economy in this century. Due to the progress of the country it is of recognition that its healthcare is also stable and the gaps left in healthcare are filled with several investors that have managed to build private health facilities to fix the urgent need of health. If citizens of a country have ease to access to healthcare and better services, then the country is progressing in terms of health. An example is Saudi Arabia which is enjoying good health care services (Mufti, 2000).

Saudia Arabia has a 2.2 percent growth rate and a population close to 26 million. The government of Saudi Arabia has done a lot in making sure that it meets the demand of the country’s health care needs. The strategy the government of Saudi has used is to allow and also to provide support for private health care facilities towards contributing and filling the gap of healthcare demand. The government manages all the healthcare system’ and facilities in Saudi through the Ministry of health and therefore it becomes very easy to monitor newly registered facilities and the kind of services they offer (Mitchell, 2009). This leads to well-defined divisions and structure in which Saudi health care facilities are mandated to operate in, like clinics which are only licensed to provide preventive health
care services, normal health care check-ups, emergencies and to some extent in rural areas they can as well offer mobile clinics. Another licensed body is hospitals where specialized medical treatments are offered for example cancer treatment, diabetes, pneumonia and other type of diseases (Altuwaijri, 2008).

In the case of Saudi Arabia, the growing demand for health care services is being driven by a rapid increase in the country’s population, which reached 28.8 million by 2013. According to the Oxford Business Group (2018), investment in Saudi Arabia’s health sector continues to rise as the government addresses long-term challenges. Thus, it’s important to make sure that these funds come with a return to the benefit of the public and the country’s economy. It is also important to understand and determine the obstacles that face the Saudi investors when starting a business in the health industry, because of the time consumed to go through all the procedures, in addition to collecting the needed documents before officially starting up the business.

To enjoy good health and longevity is fundamental to the human experience. Healthy people are more vibrant, energetic, and have a more positive outlook on life. These characteristics not only translate to a positive influence on the social infrastructure, but also affect economic development. The aim of this study is to show that health does have a positive and significant effect on economic growth. Sprout et al. (2004), made a rundown of aftereffects of numerous investigations that utilize future as an intermediary for wellbeing in demonstrating how wellbeing can influence the development in economy.

Somalia is nation, located in the Horn of Africa, which has undergone prolonged periods of conflict since the fall of Saïd Barre in 2009 to 2012 when the first transitional government was formed (Qayad, 2007). In reference to BeletHawo and Dolow districts the 21 years of civil conflict destroyed the country’s healthcare system through the loss of human resources and demolishment of the physical infrastructure. Although Somalia has undergone a semblance of relative peace, it continues to face significant security challenges from Al Shabbab militia, a group associated with Al Qaeda. The radical militia group holds control over the rural areas, but it is expected that continuous support from its neighbours will help Somalia end the activities of the radical group.

The Federal Ministry of Health (FMOH) serves a population of 15 million people spread out over two distinct regions. They include BeletHawo and Dolow districts. The country’s
health indicators are worrying due to the devastating effects of the war and poor retention of health workers in the states. For instance, the infant mortality rate is 91/1000 births verses the 51/1000 births reported in Eastern & Southern Africa. On the other hand, the mortality rate of children below five years is 147 deaths/ 1000 live births, versus the 77 deaths/1,000 live births in the neighbouring region.

Notwithstanding the above writing with regards to essential parental figures the more educated a guardian is, the healthier the children. In portraying the mentality of essential parental figures and on the off chance that they have enough learning/aptitudes towards intestinal sickness avoidance, researchers led an examination on the equivalent (Njama, Dorsey, Guwatudde, Greenhouse, Musis and Kamya, 2008). Recommend that the finding that bed nets be utilized to keep the jungle fever mosquito from gnawing instead of as insurance from intestinal sickness or deficient utilization of treatment techniques against jungle fever is an off base measure.

The right actualities for the control of jungle fever ought to be incorporated into all data, training and correspondence within the system of an intestinal sickness control program. Besides, it is recommended that the expensing of the nets ought to be observed while executing mediations.

2.4 Factors Associated with Malaria Disease and its Outcomes

Every population has a unique socio-economic diversity which has influence on malaria incidences. Some communities have a larger percentage of un-educated members which contributes to the spread of malaria at the same time prevents control mechanisms of malaria due to high level of ignorance (Collins et al, 2008 & Yadav et al., 2010). This was also supported by a study conducted by Filmer 2007, that also added that when cost of malaria treatment is high then automatically there will be delay in treatment seeking behavior. The poor or those that can’t afford high facilities treatment in both public and private facilities did not seek medical care.

A study that was conducted in Benin found that most women were purely depending on their husbands for financial support which in return could not help them purchase ITN for themselves hence they could only support the prioritization of malaria bed nets (Krause G, et al 2009). The study also revealed how women who earned were much of help to their families to an extent of prioritizing the purchase of ITN for their households (Krause G, et
al 2009). When little or no protection against mosquitoes is practiced then the rate of infection rises (Alnwick, 2009). A survey which was done in Zambia also supports the fact that the poor are more at risk of malaria infection than the rich (Roll Back Malaria, 2001).

A study in Thailand showed a longer residence duration (adjusted OR = 0.36, 95% CI) and the use of anti-malarial self-medication (adjusted OR = 0.08, 95% CI) were significantly associated with protection from severe malaria (Nacher et al. 2001). Koram et al. (2008) also found that children living in poor quality housing and crowded dwellings were infected with malaria more frequently than other children living in better housing conditions in Periurban areas in Gambia. Ijumba et al. (2001) demonstrated that the disappearance of malaria in some areas of Europe was associated with economic development and there is enough historical evidence to support that economic development has a positive impact on health.

In Ghana the cost of malaria care is close to 1% of the rich income while poor households could spend up to approximately 34% (Akazili, 2007). Women who were unemployed had a bigger challenge of a number of illness which was linked to poor houses they lived in due to financial constrains (Kuate, 2008). The bed nets are bought at a price, insecticides and ITNs are expensive yet they are a basic requirement for both malaria prevention and control (World Health Organization, 2008). In Malawi for example researchers like Ziba et al. (2010) found that prevention measures of malaria such as insecticides mosquito coils, bed nets, and mosquito repellants were only affordable to the working class while those that could not afford had resorted to less expensive and natural methods of prevention like burning of leaves, dung or even wood in some places. A detailed research was done by (Krause, et al 2009), who found out that in most cases where a household could only afford a single bed net, then it could be given to the husband as the family breadwinner to cover himself for they needed more energy to look for more money in the aid of raising the family.

A similar study was conducted in Bagamoyo, Tanzania that discovered that only the adult men used the nets for protection followed by women then lastly those children under two that slept with their mothers while elder children were given the last priority (Makemba et al., 2008). Distribution of long lasting insecticidal nets (ITNs) that in Tanzania for example is conducted through public health facilities, campaigns and non-governmental
organizations (NGOs) with the main aim being to reduce mortality rate for both expectant mothers and children under five. The total number of household that can access ITN in Tanzania is about 63% of the total population. If this is done to a global perspective then at least 80% will be covered in the recent times possible (2007-2008 YHMIS). According to (MoHSW, 2006) report, the only cost-effective method of malaria prevention is ITNs which is also known to many within a given community (Teklehaimonot et al., 2007).

2.4.1 Affordability of Bed Nets

A detailed research was done by (Krause, et al 2009), who found out that in most cases where a household could only afford a single bed net then it could be given to the husband as the family breadwinner to cover himself for they needed more energy to look for more money in the aid of raising the family. A similar study was conducted in Bagamoyo, Tanzania that discovered that only the adult men used the nets for protection followed by women then lastly those children under two that slept with their mothers while elder children were given the last priority (Makemba et.al.2008). Distribution of long lasting insecticidal nets (ITNs) that in Tanzania for example is conducted through public health facilities, campaigns and non-governmental organizations (NGOs) with the main aim being to reduce mortality rate for both expectant mothers and children under five. The total number of household that can access ITN in Tanzania is about 63% of the total population. If this is done to a global perspective then at least 80% will be covered in the recent times possible (2007-2008 YHMIS). According to the MoHSW (2006) report, the only cost-effective method of malaria prevention is ITNs which is also known to many within a given community (Teklehaimonot et al., 2007).

In South Central Somalia, ITNs were demonstrated to be compelling against intestinal sickness demonstrating that age-explicit defensive adequacy (PE) of bed net extended from 39% among < 5 years to 72% among 5-14 years of age. Generally speaking PE of bed nets was 54% (95% certainty interim 44%-63%) in the wake of modifying for vocation; sex; and age. In any case, current methodologies for conveyance ITN/LLIN are for the most part a mix of free nonstop circulation through wellbeing centers or through ordinary mass crusades, with not very many nations utilizing cost-recuperation approaches. Fast increments in responsibility for treated nets have been accomplished through get up to speed battles in settings where possession was beforehand incredibly low. Niger and Togo, and Kenya for example accomplished high and impartial degrees of
inclusion by the blend of routine conveyance and a mass crusade. By the by, there has been little assessment of frameworks that convey nets through routine channels.

In Somalia, LLINs are conveyed for free routinely in MCH facilities to pregnant ladies and infant children. LLINs are likewise generally disseminated among IDPs or focused at central territories because of plagues. Since 2007, roughly 2 million LLINs have been appropriated in Somalia yet information disaggregated to the area was not accessible. A large portion of the appropriation happened in the Central South Zone where the weight of jungle fever is the most noteworthy.

In 2014, an intestinal sickness marker review (MIS) was made in Somalia and demonstrated that ownership of LLINs and their utilization by individuals was beneath 20%. Comprehension of the transmission of jungle fever was also insufficient. In spite of the fact that the MIS of 2014 was the first of its sort in Somalia, the study was embraced under troublesome calculated requests and standard inspecting prerequisites were not generally met. Moreover, itemized subjective examinations by key sources and through centered gathering exchanges were not embraced. Subsequently, there could be significant accuracy issues in the outcomes. In this investigation, we center around two locale of Gedo district, one of the most noteworthy jungle fever transmission territories in Somalia, to attempt an examination on the predominance of intestinal sickness disease, the inclusion of LLINs and the learning.

2.4.2 Ownership of LLIN

In 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership of at least on LLIN and their use by household members the night before survey was both below 20%. Household member’s access to malaria information and understanding of the transmission of malaria were also inadequate. Although the MIS of 2014 was the first of its kind in Somalia, the survey was undertaken under difficult logistical demands and standard sampling requirements were not always met. Furthermore, detailed qualitative investigations by key informants and through focused group discussions were not undertaken. Consequently, there could be important precision problems in the results. In this study, we focus on two districts of Gedo region, one of the highest malaria transmission areas in Somalia, to undertake a study on the prevalence of
malaria infection, the coverage of LLINs and knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of the sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, we are evaluating the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establishing the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

The study is expected to fix the problem of the use of long lasting insecticidal nets (LLINs) which has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of the sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, this study evaluates the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establishes the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use in BeletHawo district of Gedo region, Somalia.

2.5 Chapter Summary

The literature review provides critical information about assessing the current ownership and utilization of LLIN among household members in BeletHawo district so as to determine reasons, barriers and behaviors around the effective use of LLINs. The literature review was done as per research objectives followed by conceptual framework, the dependent variable, the moderating and the dependent variables. OB1: Assess the knowledge level about the effect of LLINs in Malaria Prevention: Prevention of Disease
through Better Knowledge and Awareness; Vulnerability of Malaria Disease. OB2. Long Lasting Insecticidal Nets Ownership among Households: Determining Fever Prevalence, Incidence of Suspected and Confirmed Malaria of rainfall; temperature OB3. Factors Associated with Malaria Disease and its Outcomes; Affordability of Bed Nets and Ownership of LLIN. The study is expected to fix the problem of the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. The following chapter will explain the study design and methodology. The research design, target population, sample size and ethical review will be reviewed.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology for carrying out the study. The section is divided into the research design, population and sampling design, data collection, research procedures, data analysis methods, and chapter summary.

3.2 Research Design

This research took the form of an inquiry, and the overall plan for connecting the conceptual research problem to the empirical research. A research design describes what data is required, the method of data collection and data analysis in relation to answering the research questions (Wyk, 2012). The major role of research design is to reduce the chance of drawing incorrect interpretations from data. A research design ensures that the evidence collected enables one to answer the questions in the study or to test the theories appropriately. There are three major types of research designs: descriptive, exploratory and explanatory research design. Essentially, the descriptive research design captures the key characteristics of a situation from a neutral point of observation with direct references to the variables (Lambert & Lambert, 2012). A descriptive research design illustrates the way a situation is, and the finding was the basis for. The descriptive research design was appropriate for this study because it portrayed the status of assessing the current ownership and utilization of LLIN among household members in BeletHawo district and helped determine reasons, barriers and behaviors around the effective use of LLINs. The research findings are useful in the formulation of future company plans and policies relating to the acquisition of new technology in health facilities.

3.3 Population and Sampling Design

3.3.1 Target Population

The target population is the total number of people that the research seeks to cover. Unambiguous selection of the target population is essential to ensure inclusion of the most eligible subjects in the study, and exclusion of irrelevant units. There are different methods of defining population including occupation, geographical location, gender, religion, and ethnicity groups among others. The total population targeted was the 1100
pregnant women attending MCH clinics and the 2,200 heads of households hence making a total number of 3,300.

3.3.2. Sampling Design
3.3.2.1 Sampling Technique

Sampling technique is the method used to pick a sub-section of the population to participate in the study. The study employed probability samplings, specifically, the simple random sampling technique (Banerjee & Chaudhury, 2010). The probability of inclusion of each member of the population is known under probability sampling, and unknown in the non-probability sampling technique. Researchers use sampling when it is impractical for them to study all the elements of a significant population with the aim of using a small manageable data for the freer study. Therefore simple random sampling was more appropriate for the study as it captures the real characteristics of the sample size.

3.3.2.2 Sample Size

Sample size encompassed the number of units included in the study sample. Sample size plays a significant role in the generation of accurate results for the research. A very large sample size requires a lot of time and resources to study, while too small a sample size leads to the generation of results with low statistical power. The total population targeted was the 1,100 pregnant women attending MCH clinics and the 2,200 heads of households hence making a total number of 3,300. According to Orodho and Orodho 10% of the study population is enough to generalize the study findings. Therefore, using 10 *(T.P X 330) the study had sample size involved 110 pregnant women attending MCH and 220 head of households within Belt Hawo district in Gedo region Somalia. The researcher chose 10% of the total population because that is enough for generalization of findings based on the population to be targeted. This is divided as shown below:

<table>
<thead>
<tr>
<th>Profession</th>
<th>Target Population</th>
<th>Sample size(10*T.P)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant women attending MCH</td>
<td>1,100</td>
<td>110</td>
<td>33.33%</td>
</tr>
<tr>
<td>Head of households</td>
<td>2,200</td>
<td>220</td>
<td>66.67%</td>
</tr>
<tr>
<td>Total</td>
<td>3,300</td>
<td>N=330</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
3.4 Data Collection Method

A data collection method encompasses all the activities carried out in gathering the data for the research. The study used a structured close-ended questionnaire that will be distributed to the entire study population. The decision to use the close-ended questionnaires was driven by the reason that it allows the researcher to collect a wide range of information within a short time and convenient manner. Besides, questionnaires was easy and quick to answer conclusive questions and facilitate fast data analysis.

According to Mugenda and Mugenda, (2003), a good data collection method should be accurate, less expensive, and easy to explain and fast. Basing on this fact, questionnaires and focus group discussions were used for the study to achieve the research objectives. Questionnaires research instrument that gathers information over a large sample (Kombo & Tromp, 2006). Therefore the researcher administered questionnaires to pregnant women attending MCH and the head of households.

3.5 Research Procedures

The research was conducted through the following procedures. Step one was pilot testing the questionnaire among ten respondents to detect problems with the questionnaire and establish the research protocols. A pilot test was done on five employees of Belet district in 5 rural health facilities which involved finding out the respondents' ability to understand the research questions in the same way. After the completion of the pilot study, the questionnaire was amended to improve on the phrasing of the questions. A closed-ended questionnaire was used which the researcher used to drop and pick method for the respondents in their respective department, and they received guidance on filling the questions. Hand admitted questionnaires received a higher response rate than questionnaires distributed using other methods.

Reliability refers to the neutrality of the research instrument and the consistency with which the research instrument produces the same result when applied repeatedly. Validity is defined as the test of whether a questionnaire is measuring what it is intended to measure (Bryman & Cramer, 1997). It is also referred to as the accuracy and precision of data and the appropriateness of the data in terms of the research question being investigated, (Denscombe & Martyn, 2014). To measure construct validity, the questionnaire was divided into several sections to ensure that each section assesses the
information for a specific objective, and that the information is in line with the conceptual framework for this study. To ensure content validity, the questionnaire was examined by two independent managers who then identified any flaw in the design or logic. The feedback was incorporated to ensure the data collection tool was well designed for actual data collection.

Internal validity is the ability of the research instrument to produce accurate results based on observation of the research items and not external factors. External validity is the measure of how much the research findings can be applied in the real world. For data data analysis to be valuable and accurate, the research instrument needs to be tested over and over. To test for reliability, the data was split into two and the findings of the two data sets compared to check for variance in the results.

### 3.6 Data Analysis Methods

Descriptive statistics was used to analyze the data by obtaining measures of central tendency (mean, mode, median) as well as the measures of dispersion specifically the standard deviation and the variance. The Statistical Package for Social Sciences (SPSS) version 21.0 was used to analyze data. The data was then presented using frequency tables, percentages, and graphical presentations including pie charts and bar graphs where necessary. According to Saunders, Lewis, and Thornhill (2016), since data obtained from the field in the raw form is difficult to interpret there is need for editing, coding, classification, and tabulation so as to stage to enable the researcher to enter data quickly with minimally acceptable errors. The variables to control the study involved independent variables: to assess the knowledge level about the effect of LLINs in malaria prevention; to determines the extent of LLIN ownership among households in BeletHawo district and to investigate the levels of LLIN usage among households in BeletHawo district. This was followed by the intervening variable which in this case was government involvement and lastly, the dependent variable: malaria control and prevention. Data was analyzed using the SPSS software where a regression analysis was undertaken to determine the type of relationship between the independent and dependent variables. In situations where numerical analysis was not clear the Macon software tool was used. This was followed by an ANOVA test to determine whether there is a significant relationship between the independent variables. Finally, data was presentation using tables and figures to simplify the analysis, showcase the responses and comparison easier.
3.7 Chapter Summary

This chapter described the systematic methodology used to conduct the study. A descriptive research design was adopted to explain the methods and techniques of the research. The target population was 3,300 and sample size was 330. The data was analyzed through the SPSS software. The following chapter provides the research findings and data analysis.
CHAPTER FOUR
4.0 PRESENTATION ANALYSIS AND DISCUSSION OF FINDINGS
4.1 Introduction

This chapter provides presentation, analysis and discussion of the empirical findings implications of utilization of LLIN among household members. The findings are organized according to the specific objectives of the study: to assess the knowledge level about the effect of LLINs in malaria prevention; to determine the extent of LLIN ownership among households and to investigate the levels of LLIN usage among households in BeletHawo district of Somalia.

4.2 Demographic Characteristics of the Respondents

The researcher collected information on demographic characteristics of the respondents including gender, age, department, educational level and number of years worked. The tabulations are presented in figures, tables and histograms which summarizes the results.

4.1.1 Gender

Table 4.2: Gender Distribution

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>114</td>
<td>34.55</td>
</tr>
<tr>
<td>Female</td>
<td>216</td>
<td>65.45</td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>100.00</td>
</tr>
</tbody>
</table>

From Table 4.2 above, it is clear that the females were more than the males within the organization with 216(65.45%) and 114(34.55%) respectively. This was as a result of heads of households being men but in reality some houses were headed by females who were either widowed or single mothers.
4.2.2 Age of Respondents

Table 4.3: Age Distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 years and below</td>
<td>23</td>
<td>6.97</td>
</tr>
<tr>
<td>20 to 29 years</td>
<td>87</td>
<td>26.36</td>
</tr>
<tr>
<td>30 to 39 years</td>
<td>78</td>
<td>23.64</td>
</tr>
<tr>
<td>40 to 49 years</td>
<td>64</td>
<td>19.39</td>
</tr>
<tr>
<td>50 to 59 years</td>
<td>58</td>
<td>17.56</td>
</tr>
<tr>
<td>60 years and above</td>
<td>20</td>
<td>6.08</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>330</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Frequency tabulation was used to present the age distribution of the respondents. The study, in Table 4.3 above, revealed that 60 years and below recorded the lowest percentage with a frequency of 20(6.08%), followed by 20 years and below 23(6.97%), followed by 50 to 59 years 58(17.56%), followed by 40 to 49 years 64(19.39%), followed by 30 to 39 years 78(23.64%), followed by 20 to 29 years 87(26.36%).

4.2.3 Educational Level

Frequency tabulation was used to present the level of education distribution of the respondents.

Table 4.4: Educational level of the respondents

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Frequency</th>
<th>Percentages (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral degree</td>
<td>10</td>
<td>3.03%</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>16</td>
<td>4.84%</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>19</td>
<td>5.76%</td>
</tr>
<tr>
<td>Diploma</td>
<td>51</td>
<td>15.45%</td>
</tr>
<tr>
<td>Other</td>
<td>234</td>
<td>70.91%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>330</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

When all the respondents, that is all pregnant women attending MCH and the heads of households were interviewed depending on their highest level of education, the findings revealed that among, all of the respondents, doctoral degree had the least frequency 10(3.03%), followed by Master’s degree 16(4.84%), bachelor’s degree 19(5.76%), diploma
qualification at 51(15.455) and lastly the highest frequency seen at others that the study revealed to be either primary school drop-outs, secondary school drop outs, form four leavers or those that never attended school at all dominating the region at 234(70.91%).

4.2.4: Response Rate

The total population targeted was 1100 pregnant women attending MCH and 2200 heads of households making a total number of 3,300. According to Nardi, P. M. (2018), 10% of the study population is enough to generalize the study findings. Therefore, the researcher multiplied the total target population with 10% which is deemed fit for the study as shown 10 *(T.P X 330). Hence, the sample size involved 110 pregnant women attending MCH and 220 heads of households within Belt Hawo district in Gedo region Somalia. Out of all the 330 questionnaires given, the total number of returned questionnaires was 300, hence making percentage of 90.91% response rate.

Table 4.5: Response Rate

<table>
<thead>
<tr>
<th>Profession</th>
<th>Target Population</th>
<th>Sample size (10*T.P)</th>
<th>Returned Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant women attending MCH</td>
<td>1,100</td>
<td>110</td>
<td>300</td>
</tr>
<tr>
<td>Head of households</td>
<td>2,200</td>
<td>220</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>3,300</td>
<td>N=330</td>
<td>90.91%</td>
</tr>
</tbody>
</table>

4.3 Knowledge Level about Effect of LLINs in Malaria Prevention

The researcher interviewed the respondents on the use of knowledge level about the effect of LLINs on malaria prevention. On a scale of 1 to 5, where 1: Strongly agree (SA), 2: Agree (A), 3: Disagree (D) and 4: Strongly disagree (SD) and 5: not applicable (NA), indicate the level of your agreement with the statements below by ticking the applicable box. The findings are given in table 4.6 below.
Table 4.6: Knowledge level about effect of LLINs in Malaria Prevention

<table>
<thead>
<tr>
<th>Knowledge Level about Effect of LLINs in Malaria Prevention</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>Mean</th>
<th>S.t.d</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. You are knowledgeable about the effect of LLINs in malaria prevention.</td>
<td>82</td>
<td>79</td>
<td>41</td>
<td>48</td>
<td>80</td>
<td>3.76</td>
<td>0.21</td>
</tr>
<tr>
<td>6. People are knowledgeable about malaria disease.</td>
<td>81</td>
<td>81</td>
<td>40</td>
<td>58</td>
<td>70</td>
<td>4.32</td>
<td>0.23</td>
</tr>
<tr>
<td>7. Limited financial capacity causes lack of malaria prevention.</td>
<td>80</td>
<td>74</td>
<td>47</td>
<td>50</td>
<td>79</td>
<td>4.28</td>
<td>0.19</td>
</tr>
<tr>
<td>8. Men are usually the first in-terms of seeking health care.</td>
<td>82</td>
<td>72</td>
<td>49</td>
<td>51</td>
<td>76</td>
<td>4.18</td>
<td>0.20</td>
</tr>
<tr>
<td>9. Women delay in-terms of seeking for health services.</td>
<td>72</td>
<td>82</td>
<td>51</td>
<td>48</td>
<td>77</td>
<td>4.29</td>
<td>0.17</td>
</tr>
<tr>
<td>10. Men are less willing when it comes to spending towards the health of their children.</td>
<td>80</td>
<td>81</td>
<td>41</td>
<td>48</td>
<td>80</td>
<td>4.24</td>
<td>0.25</td>
</tr>
<tr>
<td>11. Prevention of disease through better knowledge is appropriate way to prevent the disease.</td>
<td>78</td>
<td>83</td>
<td>41</td>
<td>47</td>
<td>81</td>
<td>3.80</td>
<td>0.23</td>
</tr>
<tr>
<td>12. Prevention of disease through better awareness is the appropriate way to prevent the disease.</td>
<td>81</td>
<td>81</td>
<td>40</td>
<td>58</td>
<td>70</td>
<td>4.44</td>
<td>0.16</td>
</tr>
<tr>
<td>13. Insecticide fumigation has an impact on socio-economic status of households</td>
<td>85</td>
<td>81</td>
<td>41</td>
<td>48</td>
<td>75</td>
<td>3.88</td>
<td>0.18</td>
</tr>
<tr>
<td>14. Prevention of disease through use of LLINs is the appropriate way to prevent the disease.</td>
<td>76</td>
<td>85</td>
<td>41</td>
<td>47</td>
<td>81</td>
<td>3.75</td>
<td>0.21</td>
</tr>
<tr>
<td>15. Successful malaria control programme requires sustainable political commitments.</td>
<td>83</td>
<td>83</td>
<td>40</td>
<td>49</td>
<td>75</td>
<td>4.32</td>
<td>0.23</td>
</tr>
</tbody>
</table>

From the study findings, the results revealed that the respondents strongly agreed with most factors although some factors were faced with a lot of opposition. The highest mean recorded was mean = 4.44 where the respondents strongly agreed that ‘prevention of disease through better awareness is the appropriate way to prevent the disease’, followed by ‘People are knowledgeable about malaria disease’ mean = 4.32, ‘women delay in-terms of seeking for health services’ mean = 4.29, ‘limited financial capacity cause lack
of malaria prevention’ mean = 4.28, ‘men are usually first in-terms of seeking health care’ mean = 4.18, ‘followed by insecticide fumigation has an impact on socio-economic status of households’ and lastly, ‘prevention of disease through better awareness is the appropriate way to prevent the disease’ with a mean of mean = 3.75. The study highest STD = 0.21 where the respondents agreed that ‘you are knowledgeable about the effect of LLINs in malaria prevention’ and with the lowest STD = 0.16 with ‘prevention of disease through better awareness is the appropriate way to prevent the disease’.

The use of lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results. Consequently, sought to evaluate the ownership of ITNs/LLINs at household level, their appropriate use by the household members, and establish the condition of the LLINs and the knowledge and awareness of the role of LLINs in malaria prevention and their correct use.

4.3.1 Regression Model on Knowledge Level about Effect of LLINs in Malaria Prevention

Table 4.7: Regression Model

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.723&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.651</td>
<td>.715</td>
<td>.17348</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), V<sub>1</sub>Q<sub>1</sub>. Dependent Variable: Knowledge level about effect of LLINs in Malaria Prevention

The regression model in table 4.7 above explains into details that R value is at the Estimate = .17348. This can be interpreted to mean that the predictor constant is directly significant to the dependent variable which in this case happens to be our study main objective.
4.3.2 ANOVA on Knowledge Level about Effect of LLINs in Malaria Prevention
The researcher determined the analysis of variance (ANOVA) output indicating the significance value of 0.000 in implications of LLINs bed nets for malaria control and knowledge level about effect of LLINs in malaria prevention. This can be interpreted to mean that the significance test for the analysis is reflected by the p-value which recorded less than 0.05. This was used to compare the null hypotheses between the variables which revealed the value of F-statistics 1164.041, therefore 1 degree of freedom for the dependent variable implications of LLINs with F-statistics of 672.944 recording one degree of freedom. The test revealed a statistical significant correlation hence we can reject the null hypothesis by making a conclusion that there is a relationship between the two variables.

### Table 4.8: Analysis of variance

<table>
<thead>
<tr>
<th>Implications of long–lasting insecticide treated bed nets for malaria control and prevention</th>
<th>ANOVA</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge level about effect of LLINs in Malaria Prevention</td>
<td>251.617</td>
<td>1</td>
<td>251.617</td>
<td>1164.041</td>
<td>.000</td>
</tr>
<tr>
<td>Implications of long–lasting insecticide treated bed nets for malaria control and prevention</td>
<td>598.439</td>
<td>1</td>
<td>598.439</td>
<td>672.944</td>
<td>.000</td>
</tr>
</tbody>
</table>

When ANOVA was run on implications of LLNs on malaria control and prevention then the study found out that even though the sum of square values were different at =2.51617 and = 598.439 respectively; followed by the mean square value at =251.617 and 672.944 the significance value was strongly correlated at 0.000.

4.3.3 Coefficient on Knowledge Level about Effect of LLINs in Malaria Prevention
The coefficient table reveals that the relationship between the tested variables is linear. The linear relationship is positive in nature where the R-value =0.362, multiple R-squared is 0.131 and the adjusted R-value is 0. 130. The p-value lies at 0.000<0.05 showing a significant relationship. In addition to that the better coefficient of knowledge level about effect of LLINs in Malaria prevention at 0.718 with the value of the constant standing at
7.947. This can be interpreted to mean that the constant value must affect the variable like avoiding using LLINs leads to malaria due to prevention avoidance.

Implications of LLINs = 7.947+.718 Knowledge level about effect of LLINs in Malaria Prevention

Table 4.9: Coefficient Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients&lt;sup&gt;a&lt;/sup&gt;</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>7.947</td>
<td>.579</td>
</tr>
<tr>
<td></td>
<td>Knowledge level about effect of LLINs in Malaria Prevention</td>
<td>.718</td>
<td>.041</td>
</tr>
</tbody>
</table>

a. Independent Variable: Implications of LLINs
b. Dependent Variable: Knowledge level about effect of LLINs in Malaria Prevention

4.4 Extent of LLIN Ownership among Households

The researcher also investigated the extent of LLINs ownership among households. Long-lasting insecticidal nets (LLINs) remain one of the most effective interventions against malaria. On a scale of 1 to 5, where 1: Strongly agree (SA), 2: Agree (A), 3: Disagree (D) and 4: Strongly disagree (SD) and 5: not applicable (NA), the respondents indicated that the level of agreement with the statements given. The results are posted below in table 4.10.

The study findings revealed that the highest STD=2.88 which stood for the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country while the lowest STD=2.14 where some of the interviewed respondents confessed that they know of people in their villages that died due to malaria in the past and the main cause was that they didn’t use LLINs.

The highest recorded mean and STD=2.88 was seen to be the main cause of malaria disease as seen in the analysis confirming the literature review that the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of
ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results.

Table 4.10: Determining the Extent of LLIN Ownership among Households

<table>
<thead>
<tr>
<th>Determining the extent of LLIN ownership among households in BeletHawo district</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>Mean</th>
<th>S.t.d</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. The use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country?</td>
<td>80</td>
<td>74</td>
<td>47</td>
<td>50</td>
<td>79</td>
<td>4.28</td>
<td>2.88</td>
</tr>
<tr>
<td>17. There is free delivery of LLINs through mass campaigns.</td>
<td>82</td>
<td>72</td>
<td>49</td>
<td>51</td>
<td>76</td>
<td>3.44</td>
<td>2.17</td>
</tr>
<tr>
<td>18. There is free delivery of LLINs to MCH clinics to prevent pregnant women from malaria?</td>
<td>72</td>
<td>82</td>
<td>51</td>
<td>48</td>
<td>77</td>
<td>4.18</td>
<td>2.23</td>
</tr>
<tr>
<td>19. High temperatures normally results into low breeding of mosquitoes which helps in reducing cases of malaria infection.</td>
<td>80</td>
<td>81</td>
<td>41</td>
<td>48</td>
<td>80</td>
<td>4.29</td>
<td>2.22</td>
</tr>
<tr>
<td>20. Malaria is a risk in my area.</td>
<td>78</td>
<td>83</td>
<td>41</td>
<td>47</td>
<td>81</td>
<td>3.88</td>
<td>2.19</td>
</tr>
<tr>
<td>21. I have been exposed to health education about malaria.</td>
<td>81</td>
<td>81</td>
<td>40</td>
<td>58</td>
<td>70</td>
<td>3.76</td>
<td>2.20</td>
</tr>
<tr>
<td>22. I have had malaria myself.</td>
<td>85</td>
<td>81</td>
<td>41</td>
<td>48</td>
<td>75</td>
<td>4.34</td>
<td>2.15</td>
</tr>
<tr>
<td>23. My household member had malaria in the past.</td>
<td>76</td>
<td>85</td>
<td>41</td>
<td>47</td>
<td>81</td>
<td>4.28</td>
<td>2.12</td>
</tr>
<tr>
<td>24. I know of someone in my village that died from malaria in the past.</td>
<td>80</td>
<td>74</td>
<td>47</td>
<td>50</td>
<td>79</td>
<td>3.88</td>
<td>2.14</td>
</tr>
</tbody>
</table>
4.4.1 Regression of LLIN Ownership among Households

The variable V2 was taken on a regression and the findings are revealed as indicated in the following table where $R^2=0.527$ while adjusted $R^2=0.685$. This is according to the study where $r$ and $R$-square values are valid the regression model is deemed fit by the researcher to conduct the study.

Table 4.10: Regression of LLIN Ownership among Households

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted R</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.677$^a$</td>
<td>.527</td>
<td>.685</td>
<td>.26542</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), V2. Dependent Variable: Regression of LLINs ownership among households.

Regression of LLIN ownership among households was tested and $R=0.677^a$ followed by $R$-square=0.527 and adjusted R Square=0.685 and std.error of estimate =0.26542. This can be analyzed to mean that the regression analysis had a direct significance influence on the dependent variable.

4.4.2 Analysis of Variance on LLIN ownership among households

The ANOVA output illustrates that the level of significance is standing at 0.000 meaning that the relationship between the variables is positively significant. This indicates that the test is ambiguous because the p-values are below 0.05. The degree of opportunity for F-value = 546.764 for a factual test. Hence, there is no relationship between the variables.

Table 4.11: Analysis of variance

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted R</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.677$^a$</td>
<td>.527</td>
<td>.685</td>
<td>.26542</td>
</tr>
</tbody>
</table>

The existing relationship is linear in nature meaning that there is appositive relationship between the study variables. The R-value is at $R=0.452$, the multiple $R^2=0.123$ with the
adjusted R at 0.133. The value of p=0.000<0.05 meaning that the regression is significant. The beta value is $b=0.718$ with the constant value at 7.512 meaning that any change in variable affects the other study variable.

Implications of LLINs on malaria control and prevention = 7.512+.702 LLIN ownership among households.

Table 4.12: Coefficient table on LLIN ownership among households

<table>
<thead>
<tr>
<th>Implications of LLINs</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of Squares</td>
<td>Df</td>
</tr>
<tr>
<td>Implications of LLINs</td>
<td>152.541</td>
</tr>
<tr>
<td>ANOVA on LLIN ownership among households</td>
<td>446.224</td>
</tr>
</tbody>
</table>

The existing relationship is linear in nature meaning that there is a positive relationship between the study variables. The B value = .702, Beta value .452 and lastly, the level of significance stands at = .000.

4.2.3 Correlation Analysis

The study findings revealed an existing relationship between implications of LLINs and LLINs ownership. It showed a significant correlation analysis of 0.05 levels with a supporting person tailed at 622**. This is given in table 4.13 below.
Table 4.13: Correlation relationship between implications of LLINs and LLINs ownership

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficientsa</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>7.512</td>
<td>1.013</td>
<td>7.323</td>
</tr>
<tr>
<td></td>
<td>Implications of LLINs on malaria control and prevention</td>
<td>.702</td>
<td>.043</td>
<td>.452</td>
</tr>
</tbody>
</table>

a. Independent Variable: Implications of LLINs
b. Dependent Variable: LLINs ownership

The correlation between the study objective and the dependent variable revealed that the person correlation stood at =.622** where the significance level revealed sig. (2-tailed) =0.13. This is to mean that the relationship was highly positive.

4.5 Investigating the levels of LLIN usage among households

The researcher also felt that this study objective concerning LLINs usage would reveal a lot of things concerning malaria and its prevention and this also made the researcher to investigate ways in which malaria is prevented and the type of drugs used in treating and preventing malaria in Somalia. On a scale of 1 to 5, where 1: Strongly agree (SA), 2: Agree (A), 3: Disagree (D) and 4: Strongly disagree (SD) and 5: not applicable (NA), the respondents indicated their level of agreement with the statements given. The findings are presented below in table 4.14.
Table 4.14: Investigating the levels of LLIN usage among households in BeletHawo district

<table>
<thead>
<tr>
<th>Investigating the levels of LLIN usage among households in BeletHawo district</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
<th>Mean</th>
<th>S.t.d</th>
</tr>
</thead>
<tbody>
<tr>
<td>25. Better health care is related to economic problems.</td>
<td>79</td>
<td>83</td>
<td>40</td>
<td>58</td>
<td>70</td>
<td>3.44</td>
<td>2.64</td>
</tr>
<tr>
<td>26. Good health has a positive and significant effect on economic growth.</td>
<td>78</td>
<td>76</td>
<td>47</td>
<td>50</td>
<td>70</td>
<td>3.22</td>
<td>2.52</td>
</tr>
<tr>
<td>27. Ignorance causes increased rate of malaria infection and prevention.</td>
<td>80</td>
<td>74</td>
<td>49</td>
<td>51</td>
<td>70</td>
<td>3.14</td>
<td>2.48</td>
</tr>
<tr>
<td>28. Children living in crowded dwellings are infected with malaria more frequently than other children living in better housing conditions.</td>
<td>70</td>
<td>84</td>
<td>51</td>
<td>48</td>
<td>70</td>
<td>2.89</td>
<td>2.19</td>
</tr>
<tr>
<td>29. Children living in poor quality housing are infected with malaria more frequently than other children living in better housing conditions.</td>
<td>80</td>
<td>81</td>
<td>41</td>
<td>48</td>
<td>80</td>
<td>3.06</td>
<td>2.28</td>
</tr>
<tr>
<td>30. Use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country</td>
<td>78</td>
<td>81</td>
<td>47</td>
<td>41</td>
<td>70</td>
<td>3.01</td>
<td>2.18</td>
</tr>
<tr>
<td>31. The community uses traditional methods treating malaria disease instead of going to the hospital</td>
<td>81</td>
<td>81</td>
<td>40</td>
<td>58</td>
<td>70</td>
<td>3.77</td>
<td>2.77</td>
</tr>
</tbody>
</table>

The findings revealed that on investigation of LLN usage the highest recorded standard deviation was STD=2.77, ‘the community uses traditional methods treating malaria disease instead of going to the hospital,’ followed by ‘better health care is related to economic problems’ at STD=2.64 and lastly STD=2.19 ‘children living in crowded dwellings are infected with malaria more frequently than other children living in better housing conditions.'
4.5.1 Model analysis regression investigating the levels of LLIN usage

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R square</th>
<th>Adjusted R</th>
<th>Std. Error of the square</th>
<th>Std. Error of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.633^a</td>
<td>.601</td>
<td>.714</td>
<td>.121445</td>
<td></td>
</tr>
</tbody>
</table>

On regression the study revealed that the R-value = .633^a and R-square value was at .601 with the std. error of the estimated recorded at .121445.

4.5.2 Analysis of variance investigating the levels of LLIN usage

The researcher determined the analysis of variance (ANOVA) output indicating the significance value of 0.000 in implications of LLINs bed nets for malaria control and knowledge level about effect of LLINs in malaria prevention. This can be interpreted to mean that the significance test for the analysis is reflected by the p-value which recorded less than 0.05. This was used to compare the null hypotheses between the variables which revealed the value of F-statistics 1012.32. Therefore one degree of freedom for the dependent variable implications of LLINs with F-statistics of 488.10 recording one degree of freedom. The test revealed a statistical significant correlation; hence we can comfortable reject null hypothesis by making a conclusion that there is a relationship between the two variables.

<table>
<thead>
<tr>
<th>Investigating the levels of LLIN usage</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implications of LLINs on malaria</td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>control and prevention</td>
<td>142.232</td>
</tr>
<tr>
<td>Investigating the levels of LLIN usage</td>
<td>444.404</td>
</tr>
</tbody>
</table>

Investigating the levels of LLIN usage = 7.121+.582 LLIN usage
The existing relationship is linear in nature meaning that there is a positive relationship between the study variables. The sum of squares = 142.232 for Implications of LLINs on malaria control and prevention and = 444.404 on Investigating the levels of LLIN usage. The F-value at 1012.32 and 488.10 respectively.

4.6 Inferential Statistics

Table 4.17: Testing of Analysis of variance (ANOVA) for multiple variables

<table>
<thead>
<tr>
<th>Model</th>
<th>V₁</th>
<th>V₂</th>
<th>V₃</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>206.631</td>
<td>32</td>
<td>64.433</td>
<td>6.326</td>
<td>.0086</td>
</tr>
<tr>
<td>Residual</td>
<td>2876.218</td>
<td>28</td>
<td>10.809</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3,082.851</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ANOVA coefficients were determined to find out the major institutional capacity gaps at the Federal Ministry of Health, Somalia and the coefficients were deemed the main reason behind BeletHawo district usage of LLINs.

4.6.1 Multiple Correlations

Table 4.18: Coefficient table

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>7.5412</td>
<td>1.214</td>
<td>7.5412</td>
</tr>
<tr>
<td></td>
<td>Assessing the knowledge level about the effect of LLINs in malaria prevention</td>
<td>.742</td>
<td>.032</td>
<td>.244</td>
</tr>
<tr>
<td></td>
<td>Determining the extent of LLIN ownership among households in BeletHawo</td>
<td>1.0124</td>
<td>.488</td>
<td>.080</td>
</tr>
<tr>
<td></td>
<td>Investigating the levels of LLIN usage among households</td>
<td>1.0244</td>
<td>.007</td>
<td>.068</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Investigating the levels of LLIN usage
When the study objectives were tested together with the dependent variable, all the results were different as shown in the table 4.18 above except the significance level.000. This is interpreted to mean that all the objectives tested positive.

### 4.6.2 Multiple Regressions

#### Table 4.19: Regression summary model

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adjusted R²</th>
<th>Std.error of estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.660a</td>
<td>.428</td>
<td>.354</td>
<td>2.428022</td>
</tr>
</tbody>
</table>

- a. Predictors (K-constant), assessing the knowledge level about the effect of LLINs in malaria prevention, determines the extent of LLIN ownership among households in BeletHawo and investigating the levels of LLIN usage among households.
- b. Investigating the levels of LLIN usage

This can be interpreted that in order to hold the three IVs (independent variables) against DV (dependent variable together then the factor must be maintained at 2.428022 when $R = .660a$ and $R^2 = .428$.

### 4.7 Chapter Summary

The study findings revealed that the respondents strongly agreed with most factors although they disagreed with some of them. This chapter provides a presentation, analysis and discussion of the empirical findings on implications of utilization of LLIN among household members. The findings are organized according to the specific objectives of the study: to assess the knowledge level about the effect of LLINs in malaria prevention; to determines the extent of LLIN ownership among households and to investigate the levels of LLIN usage among households in BeletHawo district. The findings revealed the value of $R = .723a$ and $R^2$ value = .651 and adjusted $R^2$ = .715 and lastly the estimated std. error of the estimate at $.17348$. This can be interpreted to mean that majority of the respondents had knowledge on the level of effect of LLINs in Malaria prevention but the std. error of the estimate can be interpreted to mean that even though majority are much aware but a few individuals are not aware as well. This was followed by chapter five on summary, conclusions and recommendations.
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
This chapter summarizes the research findings in line with the specific research objectives, gives conclusions and makes recommendations for the study. It also provides suggestions for further research which involves the gaps which the researcher feels still need to be investigated.

5.2 Summary of Research Findings
The purpose of this study was to assess the implications of utilization of LLIN among household members in BeletHawo district in Somalia. The research questions that were looked into involved assessing the knowledge level about the effect of LLINs in malaria prevention; the extent of LLIN ownership among households in BeletHawo district; and the levels of LLIN usage among households in BeletHawo district of Somalia.

A descriptive research design was utilized to investigate the situation and the findings were the basis for assessing the current ownership and utilization of LLIN among household members in BeletHawo district and for determining the reasons, barriers and behaviors around the effective use of LLINs. The research findings were used in the formulation of future plans and policies relating to the acquisition of new technology in the health sector. The study used a structured close-ended questionnaire that was distributed to the entire study population. The decision to use the close-ended questionnaires was driven by the ability of the method to collect a wide range of information within a short time in a convenient manner. Besides, questionnaires were easy and quick to answer conclusively and facilitated faster data analysis.

Regarding research question one, the respondents strongly agreed that they are aware of ideas of preventing malaria and they are also knowledgeable on how to control malaria by clearing of bushes around them, removing of water loggings to destroy breeding places of mosquitos and also sleeping under treated mosquito nets even though there was no fair distribution of long-lasting insecticidal nets (LLINs).

Regarding research question two, the respondents strongly agreed that it is true that LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. The only challenging fact is that some families
have no pregnant mothers attending MCH clinics and none born as well and they live below a dollar in a day so accessing treated mosquito nets is a problem hence not everyone is in apposition own LLINs leading to spread of malaria disease. In addition to that, some households are overpopulated, therefore LLINs ownership is cumbersome.

In response to the third research question, the respondents strongly agreed that LLINs usage among households is seen through creating of awareness and knowledge that helps the respondents in the prevention of malaria disease and spread of the disease. On the other hand, women were seen to delay in-terms of seeking health services which were linked to limited financial capacity causing lack of malaria prevention. Contrarily men were seen to be usually first in-terms of seeking health care. This revealed the reasons as to why households were men were the head of the houses had access to treated mosquito nets as compared to houses that were headed by women.

5.3. Discussions
5.3.1 Assessing the Knowledge Level about the Effect of LLINs in Malaria Prevention

The researcher investigated on the first research question RQ1: How to assess the knowledge level about the effect of LLINs in malaria prevention?

The researcher got interested in interviewing the respondents on the use of knowledge level about effect on LLINs on malaria prevention. When it comes to knowledge level and practice among study populations regarding malaria disease, prevention and the current treatment regime, studies have shown that although a woman or a man is knowledgeable, when there is limited to financial capability then their power of acting in response to malaria treatment also becomes low. Women were seen delaying in-terms of seeking health care due to financial constrains while men were less willing when it came to spending towards the health of their children (Oberlander & Elverdan 2009).

This affirms that in BeletHawo district in Somalia, LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. LLINs are also commonly distributed among internally displaced persons (IDPs) or targeted at focal areas in response to epidemics. Since 2007, approximately 2 million LLINs have been distributed in Somalia. Most of the distribution occurred in the Central South Zone where the burden of malaria is the highest. Although Somalia has undergone a semblance of relative peace after the 21 years of civil conflict since the fall
of Siad Barrein 2009, it continues to face significant security challenges from the Al Shabbab militia. The radical militia group holds control over the rural areas, but it is expected that continuous support from its neighbours will help Somalia end the activities of the radical group.

According to the literature review prevention of disease through better knowledge and awareness is the appropriate way to prevent (Tyagi et al., 2005). Muwaha (2007) in his study on people’s perception of malaria in Mbarara, Uganda recommended that people should be educated on the connection between mosquitoes and malaria and on seeking biomedical treatment for convulsions. In addition, the successful malaria control programme requires sustained political commitments: integration of malaria control into the health system; coordination with relevant non-health sectors; full participation of communities; and mobilization of adequate national and international human and financial resources.

It has been reported in countries in Sub-Saharan Africa that measures such as use of bed nets were mainly aimed at the prevention of the nuisance of mosquito biting rather than against malaria Okrah (2007), suggests that the finding that bed nets be used to prevent the malaria mosquito from biting rather than as protection from malaria or incomplete use of treatment strategies against malaria is an incorrect measure. The correct facts for the control of malaria should be included in all information, education and communication messages within the framework of a malaria control programme. Furthermore, they suggest that barriers, such as the high cost of the nets that impact negatively on the control programme, should always be considered when implementing interventions.

5.3.2 Determining the Extent of LLIN Ownership among Households

The researcher investigated on the research question RQ2: What is the extent of LLIN ownership among households in BeletHawo district?

The respondents strongly agreed that it is true that LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. The only challenging fact is that some families have no pregnant mothers attending MCH clinics and none born as well and they live below a dollar in a day so accessing treated mosquito nets is a problem hence not everyone is in apposition own
LLINs leading to spread of malaria disease. In addition to that, some households are overpopulated, therefore LLINs ownership is cumbersome.

In comparison to the literature review, the findings confirm that in 2014, a malaria indicator survey (MIS) was conducted in Somalia and showed that ownership and use of LLINs by household members was below 20% (Tyagi et al., 2005). Household member’s access to malaria information and understanding of the transmission of malaria was also inadequate. Although the MIS of 2014 was the first of its kind in Somalia, the survey was undertaken under difficult logistical demands and standard sampling requirements were not always met. Furthermore, detailed qualitative investigations by key informants and through focused group discussions were not undertaken. This study focused on two districts of Gedo region, one of the highest malaria transmission areas in Somalia, to undertake a study on the prevalence of malaria infection, the coverage of LLINs and the knowledge level about the effect of LLINs in malaria prevention.

According to Giacomini, et al, (2001), the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall, access to malaria information (19%) and knowledge of its cause (circa 60%) was also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of the sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results.

Long-lasting insecticidal nets (LLINs) remain one of the most effective interventions against malaria. The African Summit on Roll Back Malaria held in Abuja, Nigeria in 2000 specified that 60% of at risk groups should use ITN/LLIN by 2005, a target that was subsequently raised to 80% by 2010. Although use of insecticide treated nets remains well below the target level of 80%, recent analysis has shown a significant progress in increasing ITN/LLIN use by children under 5 years living in stable malaria endemic settings. Another recent analysis concluded that expanded coverage of ITN/LLIN as part of a multifaceted malaria control strategy was likely to be among the factors contributing to the 68% decline in malaria morbidity in Africa between 2000 and 2015. Currently the
WHO recommends universal coverage of ITNs/LLINs (every person at risk sleeping under a quality insecticide-treated net (Tyagi et al. 2005).

The use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. According to (Tyagi et al 2005:30), a recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of a sampling frame and subsequent difficulties in weighting statistical results. According to Bharaj, et al, (2009). These factors contribute to potentially large uncertainties in survey results.

5.3.3 Usage of LLN among Households

The researcher investigated on the first research question RQ3: the levels of LLIN usage among households in BeletHawo district?

The findings show that children living in crowded dwellings are infected with malaria more frequently than other children living in better housing conditions. In conclusion, with respect to the researcher’s findings, strategy formulation in general may not be enough: there must be effective implementation of the same strategies and this must gain support from the management team as this has implications of LLINs for malaria control and prevention. This can only be achieved through good leadership which in most cases is lacking in most organizations and this has contributed to the challenges the researcher realized are faced by most facilities within the area of research in Somalia.

The usage of lasting insecticidal nets among households (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall, access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, poor definition of the sampling frame and subsequent difficulties in weighting statistical results. These factors contribute to potentially large uncertainties in survey results.
This confirms the fact in literature review that in BeletHawo district in Somalia, LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. LLINs are also commonly distributed among internally displaced persons (IDPs) or targeted at focal areas in response to epidemics. Since 2007, approximately 2 million LLINs have been distributed in Somalia. Most of the distribution occurred in the Central South Zone where the burden of malaria is the highest. Somalia is a nation, located in the Horn of Africa, which has undergone prolonged periods of conflict since the fall of Said Barre in 2009 to 2012 when the first transitional government was formed (Qayad, 2007). The 21 years of civil conflict destroyed the country’s healthcare system through the loss of human resources and demolition of the physical infrastructure. Although Somalia has undergone a semblance of relative peace, it continues to face significant security challenges from Al Shabbab militia, a group associated with Al Qaeda. The radical militia group holds control over the rural areas, but it is expected that continuous support from its neighbours will help Somalia end the activities of the radical group.

Donor countries seek to enable the developing nations to look after the welfare of their citizens in all aspects including health, education, and financial management among others (Bhagavan, & Virgin, 2015). However, weak institutional capacity gaps inhibit the foreign donors’ objective of creating better health systems in the developing nations. Six years after the creation of the Federal Government of Somalia; numerous institutional capacity gaps continue to affect the FMOH. The capacity gaps can be identified in four critical dimensions. They include leadership and governance capacity, regulatory framework, policies, and financing. Significant challenges affecting the availability of these critical resources in Somalia’s healthcare sector are to blame for the numerous health related challenges reported in the country.

5.4 Conclusion
5.4.1 Conclusion on assessing the knowledge level about the effect of LLINs in malaria prevention

In conclusion, poor coordination and distribution of LLINs is one of the biggest challenges in the execution of organizational policies and strategies all over the world. Coordination is the interdependence of different organizational structures; it is a mandatory requirement in situations where multiple parties are required to complete the same task.
5.4.2 Conclusion on Determining the Extent of LLIN Ownership among Households

In conclusion, the use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country. A recent malaria indicator survey (MIS), however, showed low levels of ownership (19%) and use (20%) of ITNs/LLINs. Overall access to malaria information (19%) and knowledge of its cause (circa 60%) were also inadequate. Furthermore, the MIS suffered from a number of sampling and logistical challenges including oversampling of urban populations, disproportionate sampling of male household members, and subsequent difficulties in weighting statistical results.

5.4.3 Conclusion on investigating the levels of LLIN usage among households

In conclusion LLINs are delivered for free either through mass campaigns or routinely in MCH clinics to pregnant women and newborn children. LLINs are also commonly distributed among internally displaced persons (IDPs) or targeted at focal areas in response to epidemics. Since 2007, approximately 2 million LLINs have been distributed in Somalia but data disaggregated to the district was not available.

5.5.1 Recommendations

5.5.1 Recommendation for Improvement

The study recommends that the distribution of LLINs should be done without bias in order to make sure that every household gets the nets that help in preventing mosquitoes from attacking them.

5.5.1.1 Recommendation on Assessing the Knowledge Level about the Effect of LLINs in Malaria Prevention

The study recommends that the government and the Ministry of health should have a budget dedicated to teaching individuals on matters concerning the knowledge level about the effect of LLINs in malaria prevention.

5.5.1.2 Recommendation on Determining the Extent of LLIN Ownership among Households

The study recommends the frequent use of LLINs among households and fair distribution of the LLINs as well.
5.5.1.3 Recommendation on investigating the levels of LLIN usage among households

The study recommends that there should be a strict policy that governs free distribution of LLINs to pregnant mothers attending MCH and the people at risk of malaria.

5.5.1.4 Suggestions for Further Research

The researcher recommends that a further study should be done in cultural differences hindering treatment of patients by the opposite gender in fear of going against their cultural practices and beliefs. This is because in the course of the research, the researcher realized men who had malaria did not agree to be treated by lady doctors, and the women patients were also not free to be examined by male health practitioners because of the Somali culture which prohibits intermingling of the male and female persons that are not related.
REFERENCES


Golafshani, N. (2003). *Understanding Reliability and Validity in Qualitative Research*


APPENDIX I: QUESTIONNAIRES

PART A: GENERAL INFORMATION

1. Please tick your appropriate age in years

   20 years or below ( )

   20 - 30 ( )

   30 - 39 ( )

   40 - 49 ( )

   50 - 59 ( )

   60 years and above ( )

2. What is your gender?

   Male ( )

   Female ( )

3. What is your highest educational qualification?

<table>
<thead>
<tr>
<th>Doctoral degree</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Master’s degree</td>
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<tr>
<td>Bachelor’s degree</td>
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<tr>
<td>Diploma</td>
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<tr>
<td>Other</td>
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</table>
Part B: Knowledge Level about Effect of LLINs in Malaria Prevention

On a scale of 1 to 5, where 1: Strongly agree (SA), 2: Agree (A), 3: Disagree (D) and 4: Strongly disagree (SD) and 5: not applicable (NA), indicate the level of your agreement with the statements below by ticking the applicable box.

<table>
<thead>
<tr>
<th>Knowledge Level about Effect of LLINs in Malaria Prevention</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
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</thead>
<tbody>
<tr>
<td>4. You knowledgeable about the effect of LLINs in malaria prevention.</td>
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<td>5. People are knowledgeable about malaria disease.</td>
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<td>7. Men are usually first in-terms of seeking health care.</td>
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<td>8. Women delay in-terms of seeking for health services.</td>
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<td>9. Men are less willing when it comes to spending towards the health of their children.</td>
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<td>10. Prevention of disease through better knowledge is appropriate way to prevent the disease.</td>
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<tr>
<td>11. Prevention of disease through better awareness is the appropriate way to prevent the disease.</td>
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<tr>
<td>12. Insecticide fumigation” has an impact on socio-economic status of households</td>
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<tr>
<td>13. Prevention of disease through better awareness is the appropriate way to prevent the disease.</td>
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<td>14. Successful malaria control programme requires sustainable political commitments.</td>
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</tbody>
</table>
**Part C:** Determining the extent of LLIN ownership among households in BeletHawo district

On a scale of 1 to 5, where 1: Strongly agree (SA), 2: Agree (A), 3: Disagree (D) and 4: Strongly disagree (SD) and 5: not applicable (NA), indicate the level of your agreement with the statements below by ticking the applicable box.

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. The use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>16. There is free delivery of LLINs through mass campaigns.</td>
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<tr>
<td>17. There is free delivery of LLINs to MCH clinics to prevent pregnant women from malaria?</td>
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<td>18. High temperatures normally results into low breeding of mosquitoes which helps in reducing cases of malaria infection.</td>
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<td>19. Malaria is a risk in my area.</td>
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<td>20. I have been exposed to health education about malaria.</td>
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<td>21. I have had malaria myself.</td>
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<td>22. My household member had malaria in the past.</td>
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<tr>
<td>23. I know of someone in my village that died from malaria in the past.</td>
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</tbody>
</table>
**Part D:** Investigating the levels of LLIN usage among households in Belet Hawo district.

On a scale of 1 to 5, where **1:** Strongly agree (SA), **2:** Agree (A), **3:** Disagree (D) and **4:** Strongly disagree (SD) and **5:** not applicable (NA), indicate the level of your agreement with the statements below by ticking the applicable box.

<table>
<thead>
<tr>
<th>Investigating the levels of LLIN usage among households in Belet Hawo district</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Better health care is related to economic problems.</td>
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<tr>
<td>25. Good health has a positive and significant effect on economic growth.</td>
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<td>26. Ignorance causes increased rate of malaria infection and prevention.</td>
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<tr>
<td>27. Children living in crowded dwellings are infected with malaria more frequently than other children living in better housing conditions.</td>
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<tr>
<td>28. Children living in poor quality housing are infected with malaria more frequently than other children living in better housing conditions.</td>
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<tr>
<td>29. Use of long lasting insecticidal nets (LLINs) has been the main approach to vector control in most areas of the country</td>
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<tr>
<td>30. The community uses traditional methods treating malaria disease without going to the hospital</td>
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</table>
APPENDIX II: MAP OF STUDY LOCATION

Political Situation in Somalia
April, 2017