KNOWLEDGE, PERCEPTION, ATTITUDES AND PRACTICES RELATING TO LONG -LASTING INSECTICIDAL NET AMONG MOTHERS OF UNDER–FIVES IN BUNDUAMA, PORT-HARCOURT LOCAL GOVERNMENT AREA, NIGERIA

BY

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DEDICATION

I dedicated this research work to God Almighty, who has seen me through in this academic pursuit. He has been re-assuring and working with me from the very first day I conceived the idea of coming for this my master's program. If not for Him, I wouldn't have accomplished this success story.

To my children who are the treasures of my life; they have made me believe in myself even when I could not see any reason to thrust forward.

ABSTRACT

Malaria is an infectious disease caused by the Plasmodium. There are five identified species of the parasite, namely, *Plasmodium viviax, P. falciparum, P. Ovale, P. Malariae* and *P. knowlesi*. The parasite is transmitted by the female anopheles mosquito. The disease is a major cause of morbidity and mortality among the under-fives worldwide. Mothers' of under-five have pivotal role to play in the prevention and control of the disease. However, level of knowledge of under-five mothers relating to the disease and its parasites, and the use of insecticide treated nets to prevent/control malaria has not been well documented. The study therefore focused on the determination of the knowledge and utilization of the Long Lasting Insecticidal Treated Nets (LLITNs) among mothers of under-five in Bundu-Ama, Port Harcourt Local Government Area and Nigeria.

A descriptive cross-sectional design was adopted and a systematic random sampling technique was used to select 370 consenting mothers of under-fives from the community. A semi-structure interviewer-administered questionnaire was employed to collect data from the respondents. The instrument included a 24-point knowledge scale, questions relating to the attitude and pattern of utilization of LLITNs. Quantitative data were analyzed using descriptive statistics and Chi-square test set at p=0.05.

Respondents' mean age was 31.0±6.4 years, 78.4% were married 90.3% were in a monogamous homes while 53.2% had primary education. All the respondents (100.0%) had heard about malaria while most (92.7%) stated that their children had had at least a case of malaria. Most (95.1%) of the respondents correctly stated that malaria is transmitted through bite of an infected mosquito. Knowledge score was 13.0±4.0 and the proportion of respondents with good and poor knowledge of malaria were 85.3% and 14.7% respectively. Majority (95.7%) had heard of mosquito nets, major sources of information include clinic (34.1%), radio (23.5%) and friends (21.5%). Majority (67.9%) perceived LLITNs could prevent mosquito bites but 59.6% perceived it as a difficult innovation to use during dry seasons while 72.2% and almost 46.0% respectively agreed that positive attitude to eliminating breeding sites and the use of Insecticide Treated Nets

(ITNs) are preventive measures against malaria infection. Most (94.1%) stated that keeping the environment clean could help prevent malaria. There was a significant association between knowledge of malaria and reported use of LLITNs among the respondents. Heat generation by LLITNs top the list (72.4%) of the factors which hinders its use among mothers of under-fives.

Despite the good knowledge of utilization of treated net and respondents' positive attitude, the use of LLITNs was still poor among the respondents. Health promotion interventions such as public enlightenment, advocacy and role modeling are needed to address the situation.

Keywords: Knowledge of malaria, Long Lasting Insecticidal Treated Net, Mother of under-5 children.

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CERTIFICATION

I certify that this work was carried out by **Aminadokiari, Aseinimieye Lovinah** in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

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ACRONYMS/ABBREVIATION

AIDS:	Acquired Immune Deficiency Syndrome
ANC:	Ante Natal Clinic
BCC:	Behaviour Change Communication
DPT3:	Diphtheria, Pertussis and Tetanus Vaccine (DPT3)
DHS:	Nigeria Demographic and Health Survey
GDP:	Gross Domestic Product
FMoH:	Federal Ministry of Health
HIV:	Human Immuno Virus
IEC:	Information, Education and Communication
LLITN:	Long Lasting Insecticidal Treated Net
ITNs:	Insecticide Treated Nets
IPT:	Intermittent Preventive Treatment
IMPAC:	ITN Massive Promotion and Awareness Campaign
IRS:	Indoor Residual Spraying
LGA:	Local Government Area
NDW:	Niger Delta Watch
M&E:	Monitoring and Evaluation
MDGs:	Millennium Development Goals
NMCSP:	National Malaria Control Strategic Plan
NMSP:	National Malaria Strategic Plan
PHC:	Primary Health Care
P:	Plasmodium
PHLGA:	Port-Harcourt Local Government Area
RBM:	Roll Back Malaria
RSMoH	Rivers State Ministry of Health
SMoH:	State Ministry of Health
SUFI:	Scale Up For Impact
UNICEF:	United Nations International Children Education Fund
WHO:	World Health Organization

DEFINITION OF KEY TERMS

High risk groups: Part of the population highly vulnerable to malaria and identified as children under-five years of age and pregnant women.

Insecticide treated nets: A net or screen soaked in an insecticide for protection against mosquito bite during sleeping.

ITN utilization: Proportion of respondents that slept under a properly hanged ITN previously before the survey.

Long-lasting insecticidal nets: Factory-pretreated nets that require no further treatment during its expected lifespan of 4-5 years.

Possession of ITNs: Proportion of households, which own at least one ITN during the time of survey.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Malaria is a major global public health problem with over 3.2 billion people at risk annually (Briggs and Tobin, 2015; WHO, 2015). Most deaths from malaria occur in children under-five years of age. According to the World Health Organization (WHO) in 2013, the disease had globally caused an estimated 453, 000 under-five deaths in 2013 and caused an estimated 437, 000 African children deaths before their fifth birthday. The WHO also estimated that every 45 seconds, an African child dies of malaria while several others are seriously ill (WHO, 2013). In Nigeria, malaria is one of the four most common causes of illness and death among children, accounting for 70.0% of all illnesses and 30.0% of death (WHO, 2013).

Malaria is a potentially fatal tropical disease that is caused by Plasmodium (Salawu, 2012). There are five identified species of plasmodium that can cause human malaria, namely, *Plasmodium vivax, P. falciparum, P. ovale, P. malaria and P. knowlesi* (Salawu, 2012) but is commonly spread through the bite of an infected female anopheles mosquito (Salawu, 2012). Malaria is the fifth cause of death resulting from infectious diseases worldwide (after respiratory infections, HIV/AIDS, diarrhoea and tuberculosis) and the second in Africa, after HIV/AIDS (WHO, 2005; RSMoH, 2012).

Globally, malaria threatens the lives and livelihoods of 3.2 billion people worldwide and causes over one million deaths annually (WHO, 2005; Zambezi, 2008). According to the World Malaria Report of 2011, the number of cases of malaria rose from 233 million in 2000 to 244 million in 2005 but decreased to 225 million in 2009 and 216 million in 2010. Also according to this report, the number of deaths due to malaria decreased from 985,000 in 2000 to 781,000 in 2009 and 655,000 in 2010 (WHO, 2011). Malaria affects the lives of almost all people living in sub-Sahara Africa, with most people at risk of the disease living in areas of relatively stable malaria transmission (Salawu, 2012).

Estimates of the annual incidence of malaria vary widely. According to the estimates contained in the World Malaria Report published by the WHO in 2011, there were 216 million episodes of malaria in 2010, of which approximately 81.0% or 174 million cases were in the African Region, followed by South-East Asia (13.0%) and Eastern Mediterranean Regions (5.0%) (WHO, 2011). Nineteen countries in Africa (Rwanda, Angola, Zambia, Guinea, Chad, Mali, Malawi, Cameroon, Niger, Burkina Faso, Cote d'Ivoire, Ghana, Mozambique, Uganda, Kenya, United Republic of Tanzania, Ethiopia, Democratic Republic of the Congo and Nigeria) accounted for 90.0% of all WHO estimated cases in 2006 (UK Aid, 2010). Hay, Okiro, Gething, Patil, Tatem, Guerra and Snow (2010) reported that more than half of all estimated *P. falciparum* clinical cases occurred in Nigeria. About 91.0% of the malaria cases in the region were due to *P. falciparum*. But the actual number of cases may be much more than the number of confirmed cases reported by national malaria control programmes (WHO, 2005). Hay et al (2010) have estimated the number of clinical cases of *P. falciparum* malaria in 2007 to be at 451 million (95.0%).

A smaller proportion of people live in areas where risk of malaria is more seasonal and less predictable because of either altitude or rainfall patterns (Kent, 2010). People living in the peripheral areas North or South of the main endemic area or bordering highland areas are vulnerable to highly seasonal transmission and to malaria epidemics. In areas of stable malaria transmission, very young children and pregnant women are the population groups at highest risk for malaria morbidity and mortality (WHO, 2011). Most children experience their first malaria infections during the first years of life. This is the age when they are yet to acquire adequate clinical immunity which makes these early years prone to diseases, including tropical ones (Kent, 2010). As a result of this low clinical immunity among these vulnerable groups, 90.0% of all recorded malaria deaths in Africa occur among young children (WHO, 2011).

In Ethiopia, malaria is a major health problem. Due to climatic and geographic factors, the disease occurs in different parts of the country in epidemic form. About 75.0% of the total area is estimated to be malarious, with 65.0% of the total population (40 million people) being at risk of infection (Ethiopia Ministry of Health, 2000). The actual number of malaria cases that occur annually throughout the country are estimated to be about 4-5 million (Tulu, 1993). Studies in Uganda showed that malaria has continued to present a considerable risk to most households and is often stated as one of the top ten health problems (Kilian, 1998). According to Kilian (1998), malaria in Uganda is endemic and is the leading cause of mortality and morbidity among the population, especially among under-five children and it has accounted for about 20.0% of hospital admissions in Uganda and for 23.0% deaths among children under-five years.

Malaria is also a major public health problem in Nigeria with an estimated 100 million malaria cases and over 300,000 deaths per year. As reported by Renne, Kirby and Akkineni (2007), it accounted for 60.0% of outpatient attendance and 30.0% of hospitalizations among children under the ages of five and 11.0% maternal mortality. As such, it is a serious health challenge ravaging the health, manpower and economic growth of the country (Federal Ministry of Health (FMoH) Nigeria, 2005).

Community knowledge and perceptions relating to causation, transmission, prevention and treatment are the main socio-cultural factors that can influence malaria control (Agyepong, 1992). The success of malaria control programmes at present relies heavily on community knowledge, perceptions and practices relating to transmission, treatment and control of the disease. Incorrect perceptions or inappropriate attitude can interfere with the effectiveness of control measures, such as vector control (Wakgari, Ahmed and Fikre, 2000) and prevention activities involving the use of the Long Lasting Insecticidal Nets (LLITNs).

Studies on knowledge of malaria carried out in Uganda showed that communities' knowledge about malaria has generally improved over time with figures higher in urban areas and in the southern parts of the country compared to rural areas and some parts of

the northern regions of Uganda. In addition, communities generally feel that malaria is a serious health problem in these respective areas. With these perceptions, such areas seem to possess fairly high levels of knowledge of the major symptoms of malaria and understand that children under-five years are at a particular risk of infection. At the same time, however, there are still misconceptions among some communities about the causes of malaria and relatively low levels of knowledge of the symptoms of severe malaria (Ministry of Health Uganda, 2004).

Similarly, community members' attitude towards malaria as a disease is important in understanding their health seeking behaviour and use of preventive methods. A study in Uganda has shown that malaria is seen as a dangerous disease that can kill and affects people, especially children under the ages of five years than the adults. The study also indicates that most community members strongly felt that malaria can be prevented (Ministry of Health Uganda, 2004).

Such positive attitudes are essential opportunities for behavior change campaigns. One of the strategic approaches to preventing malaria is through effective vector control. Community perceptions and attitudes about malaria causation, symptom identification and prevention influence efforts to address malaria and are often overlooked in control efforts and it vary from community to community and among individual households (Singh, Musa, Sanjay and Ukatu, 2014).

Insecticide Treated Nets (ITNs) have proven to be an effective and cost-effective method for malaria prevention. Insecticide Treated Nets prevent mosquitoes from having access to biting man and this can therefore dramatically reduce malaria deaths (Ordinioha, 2012). Insecticide-treated bed nets (ITNs) are among major malaria control interventions globally. Reports show that ITNs, especially long-lasting insecticidal nets (LLITNSs), reduce the incidence of clinical malaria by 50.0 % (Yimer , Animut , Erko and Mamo , 2015). In view of the efficacy of this strategy, widespread use of LLITNSs can reduce child mortality by fifth or more (WHO, 2010). However, despite all the benefits of LLITNSs use, estimates of ITN use in Africa, including Nigeria, suggest that utilization

is low among mothers of under-five children (Fapohunda and Beth, 2004; WHO, 2005; Renne et al., 2007; Aluko and Oluwatosin, 2012). Low utilization of ITN is as a result of the perception that the chemicals used to treat them have dangerous effects on children (Aluko and Oluwatosin, 2012). Other factors identified by Mbonye, Neema and Magnussen (2004) in a study conducted in Uganda that influence the use of ITNs include husband's lack of interest in malaria prevention and the perception that primigravidae are at a low risk of getting malaria.

The Roll Back Malaria Initiative has identified the under-five children as one of the high risk groups for malaria, and one of the strategies to fight malaria in this group is increasing mosquito net use. A major objective of the (RBM) campaign is to have at least 80% of pregnant women and children aged under-five sleep under ITNs by 2010 (WHO, 2005). Thus, the WHO now recommends that the national malaria control programmes and their partners purchase Long Lasting Insecticide Treated Nets (LLITNs) (WHO, 2006) , since ITNs are among major malaria control interventions globally.

The effectiveness of ITN practice is largely influenced by attitudinal factors and the impact of ITN interventions under real life conditions is known to be influenced by a number of important socio-economic, cultural and ecological determinants (Aluko and Oluwatosin, 2012). Other reasons for low compliance during the dry season were high temperatures inside houses and problems related to changing sleeping places during the night (Claudia, Corneille, Manuela, Boxcar and Olaf, 2006), distance from manufacturers /suppliers, limited acceptability of ITNs provided through interventions, crowding out of the commercial sector and the price, infrastructure and information in promoting the use of ITN (Chuma, Okungu, Ntwiga and Molyneux, 2010). This study therefore investigated knowledge, perception, attitude and level of practice of Long Lasting insecticidal nets by mothers of under-five towards malaria prevention and control.

1.2 Statement of the Problem

In Nigeria, about 300,000 children die of malaria annually (FMoH Nigeria, 2000). Malaria causes about 30% of death of under-five children and kills about 4,500 pregnant women yearly (FMoH Nigeria, 2000). The same report by FMoH shows that at least 50.0% of Nigeria population has an episode of malaria annually causing 1 in every 4 cases of anaemia (blood shortage) in Nigeria and out of about 150 million population of Nigeria, about 90.0% of them are at risk while about 25.0% of household income is expended on malaria control and treatment. About 98.0% of all cases of malaria are due to *plasmodium falciparum* which is responsible for severe form of malaria and this same *plasmodium falciparum* can kill a child within two days of contacting the disease (FMoH Nigeria, 2005)

Malaria is holo-endemic in Bundu-Ama, the study area, and is known to be the most important cause of illness and deaths in children below the age of five years (Rivers State Ministry of Health (RSMoH), 2012). As reported by RSMoH in 2012, malaria accounted for 10.0% of the disease burden in Rivers State and is responsible for 1 in 4 deaths of children below the age of 5 years (RSMoH, 2012). The burden of malaria in childhood includes disability and impairment of cognitive development (Salawu, 2012).

The Vector control approaches has remain the most generally effective and cheap measure to prevent malaria transmission and one of the best ways to achieve this is to prevent mosquito bites through the use of LLITNs (Salawu, 2012; WHO, 2010). Insecticide treated nets, if used by the total population, have been shown to be able to lower transmission by 90%, malaria incidence by 50% and all cases of child mortality by 18% (WHO, 2010).

An effective strategy to combat the widespread malaria morbidity among children aged under-five is the use of LLITNs by their mothers (Nketiah-Amponsah, 2010). However, despite this demonstrated efficacy, the choice, use and acceptance of ITNs continue to face major socio-economic and cultural challenges in most malaria endemic areas (Adongo, Kirkwood and Kendall, 2005).

A study on utilization of ITN among postpartum women in Ibadan for instance showed a 31.6% utilization rate and 18.8% compliance rate (Aluko and Oluwatosin, 2012). In spite of the various preventive measures put in place by the Roll Back Malaria Initiative for over 10 years now, the magnitude of the disease has remained high. The disease is the leading cause of morbidity and mortality among under-five children in Bundu-Ama, Port Harcourt Local Government Area. Knowledge and usage of LLITNS among mothers of under-five have not been adequately investigated in Rivers State (Tobin- West and Briggs, 2015).

This study was therefore designed to focus on knowledge, perception, attitudes and practices relating to long -lasting insecticidal net among mothers of under fives in Bundu-Ama, Port-harcourt local government area in Nigeria.

1.3 Justification for the Study

The data generated from this study could be used by the Local Government Health Authorities and the Rivers State Ministry of Health for the design, implementation and evaluation of malaria control intervention activities in the study area with low use of the LLITNs. In addition, the results of the study are potentially useful for the formulation of policies relating to malaria prevention in the study area with special reference to the use of LLITNs.

1.4 Research Questions

1. What is the level of knowledge of the respondents on the causes and prevention of malaria?
2. What are the socio-cultural factors that influence the use of long lasting insecticide treated nets (LLITNs) among mothers of under-five?
3. To what extent are mothers of under-five utilizing LLITNs?
4. What are the perceptions of mothers of under-five towards malaria prevention?
5. What are the attitudes of mothers of under-five relating to the use of LLITNs?

1.5.1 Broad Objective

The broad objective was to investigate knowledge of malaria and utilization of LLITNs among mothers of under five children in Bundu-Ama, Port Harcourt Local Government Area of Rivers State.

1.5.2 Specific Objectives

The specific objectives of the study were to:

1. Assess the level of knowledge, causes and prevention of malaria by mothers of under-five children in Bundu-Ama, Port Harcourt Local Government Area
2. Identify the factors that influence the use of ITNs/LLITNs among mothers of under-five children in Bundu-Ama.
3. Assess utilization of ITNs/LLITNs by mothers of under-five children in Bundu-Ama, Port Harcourt Local Government Area
4. Determine the perception of mothers of under-five children relating to malaria prevention.
5. Determine the attitudes of mothers of under-five children towards the use of LLITNs.

CHAPTER TWO

LITERATURE REVIEW

2.1 Nature, magnitude, causes, transmission and economic burden of the disease.

Malaria is an infectious disease caused by the parasites called Plasmodia. There are five identified species of this parasite causing human malaria, namely, *Plasmodium viviax, P. falcuiparum, P. olvale, P. malariae* and *P. knowlesi.* It is transmitted by the female anopheles mosquito.

Malaria threatens the lives of 3.2 billion people globally and leads to over one million deaths annually. The use of ITNs could save the lives of more children than any other single intervention. At an estimated cost of US $ 1.20 per person protected per year, ITNs are considered to be one of the most effective health interventions in Nigeria. Despite evidence demonstrating that the use of ITNs decreases malaria related morbidity and mortality, it is difficult to encourage consistent and appropriate use of bed nets. Estimation from Africa as a whole suggests that only three percent of children less than five years of age sleep under ITN (RSMoH 2012; Parker, 2014).

It is re-emerging as the Number one infectious killers and it is the Number one priority tropical disease of the World Health Organization (WHO, 2005).Known since millennia, malaria has played a major role in the history of mankind and it has continued to wreak havoc on millions, particularly in the poorest parts of our world. Malaria is the fifth cause of death from infectious diseases worldwide (after respiratory infections, HIV/AIDS, diarrhea diseases, and tuberculosis) and the second in Africa, after HIV/AIDS (WHO, 2005).

According to the World Malaria Report 2011, malaria is prevalent in 106 countries of the tropical and semi-tropical world (Africa; Amazon, Central and Southern America; Central South and SE Asia; Pacific) that are home to more than half of the world's

people. In most of these areas, malaria is a perennial problem. The estimates of malaria burden vary: every year, malaria is reported to cause more than 250-660 million infections and more than a million deaths (mostly among African children). However, the World Malaria Report estimates that the number of cases of malaria rose from 233 million in 2000to 244 million in 2005 but decreased to 225 million in 2009 and 216 million in 2010. According to this same report, the number of deaths due to malaria decreased from 985,000 in 2000 to 781,000 in 2009 and 655,000 in 2010 (WHO, 2011).

The goals set by the World Health Assembly and the Roll Back Malaria (RBM) Partnership to reduce the numbers of malaria cases and deaths recorded in 2000 by 50% or more by the end of 2010 and by 75% or more by 2015 have not been achieved yet (Ordinioha, 2012). Instead, over the past 35 years, the incidence of malaria has increased 2-3 fold and this continuing upsurge has come from several factors like the weakening of public health systems in some poor countries, continuing poverty and political instability, drug-resistant parasites, insecticide-resistant mosquitoes, global climate change, population movements into malarious regions, changing agricultural practices including the building of dams and irrigation schemes, deforestation etc (World Malaria Report, 2005).

In most areas, malaria and poverty co-exist, with the average GDP and average growth of per capita GDP in malarious countries being about one fifth of those in non-malarious countries. The economic burden of malaria is huge, estimated to be $12 billion a year in Africa alone. But the global spending on malaria control is only meager, with US$ 652 million disbursed in 2007 and US$ 1.7 billion committed in 2009. (In comparison, in the year 2008, HIV/AIDS accounted for 33.4 million case prevalence, 2 million deaths and a total global spending of US $13.7 billion) (World Malaria Report, 2005).

More than 30,000 cases of malaria are reported annually among travelers from developed world visiting malarious areas. With the shrinking globe, perennially prevalent malaria remains an ever existing danger for humanity in every part of the globe (World Malaria Report, 2005).

The economic burden of malaria worth reviewing

According to Akazili (2002), direct and indirect costs associated with a malaria episode represent a substantial burden on communities especially, the poorer households in Africa. The economic cost of malaria arising from cost of treatment and cost of productivity was estimated to be over US l800 million annually (Foster, 1998). Foster (1998) also reported that earnings due to days lost from illness may be as high as 1.3% of economic growth per annum, and in this regard, malaria accounted for almost 15.0% of all the Disability Adjusted Life Years (DALY) lost annually in this Africa region, among which Nigeria is among.

A survey carried out by Akazili in 2002 in Zambia found a substantially higher prevalence of malaria infection among the poorest population. Poor families live in dwellings that offer little protection against mosquitoes, as such, they are less able to afford insecticide-treated nets. As observed by Akazili (2002) and Foster (1998), these poor people are less likely to be able to pay either for effective malaria treatment or for transportation to a health facility capable of treating the disease. In view of these, the poor spent much (if not all) of their earnings on treatment of malaria day-in-day out (Akazili, 2002).

In Nigeria, malaria results in high morbidity and loss of productive man-hours in all the facets of the nation's economic activities. As reported by The Nigeria Federal Ministry of Health (FMoH), Nigeria losses about 336 million man-hours every year due to sickness, absenteeism and passive presence at work (FMoH, 1997). As observed by Onwujekwe et al (2002) in 5 malaria holo- endemic communities in Nigeria, the cost of treating malaria illness accounted for 49.7% of curative health cost incurred by households; average expenditure on malaria was US$ 1.84 per household per month but was US$ 2.60 per month for treatment with combination other illness episode. As a consequence this depletes the monthly average income by about 3.0% (Onwujekwe et al., 2000).

2.2 Knowledge and attitude relating to malaria

Community knowledge and perceptions relating to causation, transmission, prevention and treatment of malaria are the main socio-cultural factors that can influence malaria control (Agyepong, 1992). The success of malaria control programmes at present as observed by Agyepong (1992) relied heavi1y on community knowledge, perceptions and practices in the transmission, treatment and control of the disease. Incorrect perception or inappropriate attitude can therefore interfere with the effectiveness of a control measure, such as vector control (Wakgari et al., 2000).

In Uganda, general awareness of malaria has been shown to be high. For instance, a Net Mark baseline survey in 2001 in five districts in from all regions of the country in Uganda indicated 99.0% level of awareness. Similarly, Tamiru (2009) found out in his study that respondents who were asked about malaria education message, 64.1% of respondents said they have heard about malaria education message in the last one year, while the remaining 35.9% didn't have any information about malaria throughout the year. Among those who had malaria education message during the last one year, 90.7% obtained from health worker, 20.2% from radio, 10.9% from the development agent, 3.2% from school, the rest from posters and other sources are 2.8%, and 1 .5% respectively. Similarly, Okello (2001) Commercial Market Strategies (CMS) study carried out in Mukono, Jinja and Arua indicated 99.0% level of awareness. Study by Kilian (2003) on malaria related knowledge and attitude in three districts in western Uganda also indicated significant improvement in general knowledge about malaria.

Therefore, a number of studies have shown that community members' knowledge about the cause of malaria has increased from figures as low as 40-50% in the early 1990s in most parts of the country to as high as 80-90% by 2001 in several districts (Kilian, 2003). The Net Mark survey carried out in 2001 indicated that 92.0% of the respondents in the five districts knew that mosquitoes cause malaria, while 21.0% knew that mosquitoes are the only cause of malaria. Study by Okello (2001) IN Uganda also indicated that 77.6% of the respondents in the three districts used knew that mosquitoes cause malaria. Makanga (1997) also found out similar result in Kampala where 84.0% of the respondents interviewed knew that mosquitoes transmitted malaria. In Uganda, knowledge about signs and symptoms of malaria is relatively high with most respondents

indicating awareness of key symptoms including raise in temperature/hot body followed by other symptoms like vomiting, loss of appetite and restlessness (Kilian, 1998; Kilian, 2003). In Fort portal (urban Kabarole), 59.1% of households were considered to have good knowledge of the symptoms of malaria as compared with 43.1% in the rural area of Kabalore (Kilian 1998). Similarly, the study in Ethiopia where participants were asked to report the main symptoms of malaria, the result shows that 82.9% mentioned fever, 72.4% shivering, 56.7% headache and 56.1% chills (Tamiru, 2009). A later study by Kilian (2003) shows improvements in knowledge about the symptoms of malaria in the same area.

In another study conducted by Tamiru (2009) in Ethiopia, 98.6% of the respondents recognized malaria as one of the major health problems in the area, majority (85.4%) knew that malaria is a communicable disease, while 92.0% described malaria as a disease caused by mosquitoes bite. However, misconceptions on the causes of malaria shows the level of understanding where 14.6% believed that malaria is caused by hunger, 10.6% from physical contact with malaria patient and 10.3% eating maize stalk and 9.5% and 9.3% respectively mentioned working in the sun and getting cold as causes of malaria (Tamiru, 2009). Also a study carried out in Zaria city in Nigeria shows that majority of the women 69.0% attributed malaria to mosquito bites and 27.0% noted “bad water” as its cause (Renne et al., 2007).

While general knowledge of malaria symptoms is relatively high, reviewed research indicates that symptoms of severe malaria are not well known among community members in most Africa countries, including Nigeria (Njama and Dorsey, 2003; Ariyo, 1997; Riisa, 2000; Fapohunda and Beth, 2004). The less common symptoms which require close observation and medical interpretation like jaundice, anaemia and splenomegally, were also not well known. Convulsions as a sign of severe malaria were not widely mentioned by the respondents in most studies reviewed (Riisa, 2000).

A study done by Njama and Dorsey (2003) in Kampala city also indicated that caretakers had a good understanding of how to recognize malaria, with 89.0% reporting hot body.

However, in the same study, the understanding and recognition of severe malaria was very low among the caretakers, with only 20.0% mentioning convulsions as a sign of severe malaria, 25.0% lethargy/weakness, and 26.0% anorexia (Njama and Dorsey, 2003). Twebaze (1998) noted similar observations based on a study in Rakai district that mothers (as caretakers) appeared not to easily recognize anaemia unless told by health workers. In the same study, it is indicated that although altered consciousness and convulsions were recognized signs (by some caretakers) that the child was unwell, they were often thought to be traditional diseases that could only be best managed by traditional means (Twebaze, 1998).

Knowledge of malaria prevention as reported in the study in Ethiopia shows that nearly three-fourth of the respondents (74.3%) reported sleeping under ITNs could be practiced to prevent malaria, 49.5% and 32.6% of respondents respectively attributed clean surroundings and indoor residual spraying as other effective means of malaria prevention (Tamiru, 2009). Similarly, Uganda FMoH baseline survey showed that respondents had several opinions about ways to preventing malaria, but a few of the rural respondents had no idea how to prevent malaria. Same Uganda report showed that 48.3% of the respondents in an urban area observed that the use of nets was the best way to prevent malaria but in rural areas, the use of nets was only cited by 24.6% of respondents. Generally, keeping the house and surroundings clean was cited as the best method, 12.7% of rural respondents observed that drinking clean water was the best method of prevention in their area while 11.2% of respondents in urban areas cited the use of insecticide spray as the best method (Uganda FMoH Report, 2004).

Attitude towards malaria

Community members' attitude towards malaria as a disease is important in understanding their health seeking behavior and use of preventive methods. Some of the studies reviewed have indicated that communities now regard malaria as a dangerous disease that can kill and affects more children under-five years than the adults (Tobin and Alex-Hart, 2015; Ordinioha, 2012). Studies reviewed also indicated that most community members strongly felt that malaria can be prevented. Such positive attitudes are essential opportunities for behavior change campaigns. In a study done in Mpigi district in Uganda

by Riisa (2000), 87.5% of the community knew that malaria can be prevented while others thought otherwise. Likewise, in a study conducted in Moyo district by Leku (2000), it is indicated that 72.0% of the community members thought that malaria can be prevented.

The CMS survey by Okello (2001) in three districts of Uganda noted that majority (98.0%) of the respondents believed that malaria was dangerous and could cause death. The survey noted a strong perception among community members that children under - five were more vulnerable to malaria than older children or adults. A study done by Riisa (2000) in Mpigi indicated that 95.4% of respondents looked at malaria as a severe problem that could kill.

2.3 Perception about the use of long lasting insecticide nets

According to Obol, Atim and Moi (2014), 97.0% of the respondents perceive ITN as being effective at preventing mosquitoes bites which transmit malaria in Uganda. Likewise, Kimbi, Nkesa, Ndamukong-Nyanga, Sumbele, Atashili and Atanga (2014) also shows that 92.0% of respondents had the right perception of malaria while 88.0% knew at least one correct sign/symptom of malaria in Cameroon. Lubwama (2010) also reported high community perceptions on severity and susceptibility to malaria, but with low risk perception. Likewise, the respondents also have high perception about the benefits of mosquito nets especially against mosquito bites.

2.4 Factors influencing the occurrence of malaria.

There are many factors influencing the occurrence of malaria. According to Rogier (2003), some these include immune status, genetic factors, socio-cultural factors and nutritional status.

Genetic factors

The main genetic factors known to influence susceptibility to malaria include haemoglobin (Hb), genotype, red cell enzyme abnormalities- G6PD deficiency, red cell antigens- Duffy antigen prevalence among others. Duffy blood group and sickle cell anaemia offers insight into host-parasite relationship. The worldwide distribution of S

haemoglobin, α -thalassaemia and β -thalassaemia is consistent with selection by malaria (Pouniotis et al., 2004). Furthermore, the clinical advantage of sickle trait and the thalassaemia has been demonstrated (Pouniotis et al., 2004).There is strong evidence that subjects with the Hb genotype AS or AC being protected against *P. falciparum* malaria. Over the last 50 years, considerable evidence has been provided to show that these traits do confer protection from malaria (Rihet al., 2004) and studies have strongly supported the hypothesis that α-thalassaemia is also protective (Cockburn et al., 2004). Epidemiological evidence for a protective role for glucose-6-phosphatc dehydrogenase (G-6-PD) deficiency is less strong. However, study of G-6-PD deficiency and malaria carried out showed protection of both heterozygotes females and homozygous-deficient males in both East and West Africa (Ruwende et al., 1998).

The mechanism of protection of AS red cells against *P. falciparum* probably relates to sequestration and low oxygen tension; but other mechanisms may also play a role. *P. falciparum* in red cells containing AS haemoglobin grow poorly at low oxygen tension (3.0% 0_2) and growing the cells in high potassium media reversed this, suggesting that the growth defect resulted from potassium loss from the red cells (Rihet al, 2004). In additions, a lower pH under condition of low oxygen tension may lead to sickling of infected AS red cells. Another postulation is that the immune response may be enhanced in AS red cells (Rihet et al., 2004).

Immune status

Carter and Mendis (2002) described immune status as a function of age and geographical location. For instance, malaria is prevalent in children under-five years old than in older children and adults living in the tropics. In the view of Carter and Mendis (2002), the stable nature of malaria results in herd immunity and it is over time that children develop their own immunity.

Malaria parasite rate increases with age from 0-10 percent in the first three months of life. By the time children are between 10 and 14 years of age, the average monthly parasite prevalence were still relatively high at 60.0%,but is much less than the 80 and 90 percent experienced by children in younger age group (Bloland et al., 1999). In association with

rising parasitaemia levels, immunity is gradually acquired (Snow and Marsh, 2002) and by school age, the anti-malarial levels are high enough to confer sufficient antitoxic properties to neutralize parasite products and interfere with host acute response to malaria infection. This, according to Bloland et al (1999), leads to an acquired ability to tolerate parasites without fever. In effect, the school-aged child is heavily parasitized, but healthy and so has asymptomatic malaria parasitaemia.

Nutritional factors

Malaria and malnutrition occur together in many developing countries and a link between these two conditions has been postulated in several studies (Deen et al., 2002). Malaria has considerable potential for adversely influencing host nutrition; it can restrict food intake through anorexia and vomiting; a febrile attack of malaria induces a negative nitrogen balance. As observed by Brabin et al (2004), it has been found to correlates with low birth weight Microcytic anaemia in the tropics is often associated with chronic malaria. Malaria is reported to be a contributing factor to stunting of growth, and expression of chronic malnutrition in young children (Blair et al., 2002). Also, aggravation malnutrition and infectious diseases is often observed (Filteau and Tomkins, 1994).

Socio-cultural factors

A number of social factors affect the risk of infection. Colonization and development projects such as construction and building in area endemic for malaria and which increase vector-breeding sites typically result in an increase in disease. Population movement can also assist spread of the disease when an infected individual moves to another area where the vector is present. Migrants are often poor and unable to take appropriate action to minimize the risk of being bitten by mosquitoes, and may be unaware of the relationship between vector and disease.

Occupation may also influence malaria transmission. In a number of malaria endemic areas, infection occurs as a result of workers staying overnight in forests where they are exposed to the vector, or working in fields at times when they are likely to be bitten. They may then re-introduce malaria to their communities.

The vector (mosquito) factor

Over 40 species of Anopheles mosquito have been identified in Nigeria, but the major vectors of human malaria are *Anopheles gambiae*, *Anopheles arabiensis*, *Anopheles. Funestus* and *Anopheles melas*. *Anopheles arabensis* most dominated the savannah areas and cities while *A. gambiae* are highly dense in the forest areas. *A. funestus* have an even distribution and the salt water forms of *A. melas* are essentially coastal species. *A. gambiae* is the most efficient vector of human malaria in the world.

Only female Anopheles mosquitoes can transmit malaria because of their blood feeding habits. The life expectancy of the mosquito depends on environmental conditions. Relative humidity has been found to determine mosquito life expectancy longevity and the completion of sporogony (parasite development in an infected mosquito). Seasonal variations in relative humidity that shorten the life expectancy of a very potent vector species may cause malaria transmission to cease, even though the temperature is favourable for sporogony.

Mosquito density is also a major determinant of malaria transmission. Mosquito density depends largely on the longevity of the adult mosquitoes and on the availability of suitable breeding places. Breeding sites vary for different mosquitoes, and variations which may occur with respect to water flow, exposure to the sun, water temperature and aquatic vegetation can affect the multiplication of the vector. Environmental temperature also regulates the speed of mosquito breeding; the lower the temperature the longer it takes.

Rainfall can influence malaria transmission in several ways. Surface water collection can create breeding places for some, not all Anopheles mosquitoes. Evaporation of surface waters can keep humidity high and thus prolong the lifespan of the mosquito. However, heavy rainfall may flush the breeding places of mosquitoes and terminate larvae survival. The biological effect of rainfall varies depending on whether the Anopheles in question prefers to breed at least temporarily in pools, streams or wells. Most mosquito bites occur

at night when most people in rural agricultural communities are in or near their houses. Poorly constructed houses have higher mosquito densities and a higher risk of the inhabitants getting malaria than better-constructed house. Other factors of importance for exposure to mosquito bites include the (i) location of the house relative to vector breeding sites (ii) suitability of vegetation near the house to provide shelter for mosquitoes (iii) presence nearby of alternative hosts such as wi1d1ife or cattle and (iv) use of personal or household protection methods such as insecticide spraying, repellents and bed nets. Some of these factors not only affect exposure to mosquito bites but are also indicators of socio-economic status, which in itself has been proposed as an important factor associated with malaria.

2.5 Malaria control and prevention effort /Activities

Efforts targeted at malaria control

The WHO Ministerial Conference held in October, 1992, at Amsterdam, evolved a Global Strategy for Malaria Control. The strategy broadly suggests de-emphasis on vector control and renewed emphasis on treatment. Early diagnosis and treatment; prevention of deaths, promotion of personal protection measures like use of ITNs, epidemic forecasting, early detection and control, monitoring, evaluation and operative research and integration of activity in Primary Health Centers are the salient aspects of this strategy (Steketee, 2009). The control of malaria involves control of the vector and its environment. Man, the host is a moving target and takes the disease with him far and wide. Mosquitoes are moving, highly adaptable and have shown resistance to insecticides. It is therefore important to target non-flying eggs and larvae. The parasite also is highly adaptable, hides in humans and mosquitoes have also developed resistance to drugs. Therefore, effective malaria control, according to Salawu (2012) is to target man first, control mosquitoes next and keep trying to tackle the parasite with development of effective preventive measures within the environment.

Control of malaria is a complex chain of measures that often complement one another. For example, by taking personal protective measures, three things can be achieved - prevention of malaria in the given individual, thus reduced parasite load and reduction in

spread, and by denying blood meal to the mosquito the egg laying is also hampered. In the recent years, more emphasis is being laid on early diagnosis and treatment, on personal protection especially with insecticide treated bed nets and on biological vector control. By these means, it is intended to minimize use of potentially harmful chemical insecticides (Salawu, 2012).

Man is the most important link in the malaria control chain. He can be made to understand the problem and he can help in breaking the chain at multiple points. Therefore great emphasis should be laid on educating the people about malaria and its control, so that common people can effectively contribute in controlling this disease (Salawu, 2012).

Personal protection against mosquito bites: Man should be encouraged to protect himself against malaria. Personal protection measures include protection against mosquito bites by sleeping under Long Lasting Insecticidal Treated Nets.

Protection against mosquito bites: People living in endemic areas as well as travelers to such areas should be educated and encouraged to use protective measures against mosquito bites. These include closing the doors and windows in the evenings to prevent entry of mosquitoes into human dwellings, using mosquito repellant lotions, creams, mats or coils and regular use of bed nets. Using bed nets is one of the safest methods of preventing and controlling malaria.

Now, Insecticide Treated Bed nets are available and they have been found in various studies that made use of these ITNs to 19.0% reduction in child mortality and 40-60% reduction in malaria infection. As mentioned above, protection against mosquito bites, especially the use of mosquito nets has a spiraling effect on malaria control. By this measure, blood meal is denied for the female mosquito and this prevents development of eggs and hence a reduction in mosquito population and transmission.

Malaria control in Nigeria

The problem of malaria has been endemic in Africa and rather than improving situation appears to be worsening, at least in some of the countries in the continent. Previous

malaria strategies, plan and interventions in Nigeria as elucidated by the Federal Ministry of Health (2001) is presented in the Table 2.1.

Table 2.1 highlights some previous malaria strategies, plan and interventions in Nigeria

1955-1968:	Pre-eradication pilot studies, Kankiya district-project findings indicated that malaria eradication was not feasible
1955-1969:	Division of malaria and vector control was established within the then Medical Department now FMoH. The division is the leading malaria control implementing organ in Nigeria.
1955-1972:	National Malaria Control Committee set up, with membership drawn from the Federal, State Ministries of Health, Universities and other relevant sectors. The committee produced five-year plan of action (1975-1980) whose objective was reduce malaria burden by 25% all over Nigeria within the period. It became latent for years but has now been reconstituted for effective implementation of Roll Back. Malaria (RBM) initiated in 1998. Strategies to achieve this objective included training of key personnel, pilot projects in different states, and training of public health superintendents in Schools of Health Technology.
1955-1973:	Malaria control became a joint venture between federal, states and local governments, while the committee was reconstituted to ensure multi-sectoral approach to malaria control. A five-year plan was drawn to reduce malaria morbidity and mortality by 50% within the five-year period. Activities to achieve this included distribution of antimalarial drugs both as chemoprophylaxis for vulnerable age groups and treatment of fever in primary school children.
1987-1990	National Malaria Therapy Surveillance Network was established in the four PHC zones to monitor sensitivity of *P. falciparum* to selected antimalarial drugs (1987- 1990).
2009-2013	A Road Map for Malaria Control in Nigeria to reduce deaths due to malaria progressively by 50% by 2010, by another 30% by 2015 and by another 20% by 2025.

Malaria therapy surveillance studies were conducted in twenty states and the Federal Capital Territory, Abuja. Also, health facilities were selected from the four PHC zones as malarial sentinel surveillance centers (FMoH 2009). Age specific morbidity and mortality baseline data on malaria were collected from these sentinel centers for about two years; but the programme was abandoned prematurely because of insurmountable logistic problems (FMoH 2009).With the health system reforms, which followed the adoption of a National Health Policy for the country in 1988, malaria control fell within the concept and ideology of Primary Health Care (PHC).

The latest of the strategies for malaria control in which Nigeria is an active participant is the Roll Back Malaria Initiative (RBM) programme. Unlike previous anti-malaria efforts and the eradication era, the people in the forefront of malaria control in Africa now are African experts themselves and RBM is all embracing-inter-sectoral, inter-agency, multidisciplinary and multinational pooled resources for maximum advantage, thus eliminating waste and costly overlap (FMoH, 2009). The RBM, a global initiative strategy, consists of the WHO four basic technical elements of the global strategy for malaria and the incorporation of the malaria control strategy into PHC. As a result of these strategies, the goals of RBM programme are to reduce deaths due to malaria progressively by 50% by 2010, by another 30% by 2015 and by another 20% by 2025 (FMoH 2009).

The Nigerian Government in its determination to accelerate and intensify efforts on malaria control developed a five years strategic plan (2009-2013) titled “A Road Map for Malaria Control in Nigeria”. The malaria control plan builds on the National Malaria Strategic Plan (NMSP) for Malaria Control that was developed by the National Malaria Control Programme in partnership with the RBM Partners, States Ministries of Health and their LGAs and other Stakeholders to enable national scale-up of key preventive and curative interventions. The national malaria control strategic plan addresses national health and development priorities, including the Roll Back Malaria (RBM) goals and the Millennium Development Goals (MDGs). The malaria control strategy contained herein

includes demonstrable performance results, including malaria-specific morbidity and overall "all-cause mortality".

The strategic plan provides a monitoring and evaluation framework, ensuring that Scales Up for Impact (SUFI), an evidence-based and cost-effective package of interventions, is appropriately evaluated and documented. Finally, the strategic plan includes a "business plan" component to enable efficient collaboration among all the partners in the public sector, the private and commercial sector and civil society.

The Federal Government of Nigeria vision is to have a malaria free country. The government and the entire people of Nigeria believe that every Nigerian has the right to access highly effective malaria preventive services and curative care delivered as close to the households as possible. To have the burden of malaria by the year 2010 and thus ensure that the disease no longer constitute a public health problem (National Malaria Control Programme, 2010), strategic intervention programme to handle malaria in Nigeria is the Roll Back Malaria Programme (RBM). RBM in Nigeria anchors on the global strategies for malaria control which are multi-pronged and of proven efficacy. These include:

- Prompt and Effective Case Management
- Intermittent Preventive Treatment of malaria in pregnancy and
- Integrated Vector Management including Use of Insecticide Treated Nets (ITNs)
- Indoor Residual Spraying (IRS) and Environmental Management.

Other cross-cutting interventions include Advocacy, Communication and Social Mobilization, Effective Programme Management, Monitoring and Evaluation, Partnership and Collaborations. Since the inception of the Roll Back Malaria Initiative, malaria control in Nigeria has undergone an evolution that has resulted in the attainment of several milestones which have served to set the stage for the next phase in the implementation process, thus, bringing up a rapid scaling up of interventions. Among these milestones include development and adoption of national policies and guidelines, development of training manuals; sensitization and training of health workers and stakeholders on all interventions (National Malaria Control Programme, 2010). Vector control remains the most generally effective measure to prevent malaria transmission and

therefore is one of the four basic technical elements of the Global Malaria Control Strategy. The principal objective of vector control is the reduction of malaria morbidity and mortality by reducing the levels of transmission. Vector control methods vary considerably in their applicability, cost and sustainability of their results. The choice of vector control will depend on the magnitude of the malaria burden; the feasibility of timely and correct application of the required interventions; the possibility of sustaining the resulting modified epidemiological situation. A decision-making process is needed for the management of vector populations.

Utilization of Insecticide Treated Nets (ITNs)

The Carter Center's Malaria Control Program stems from more than two decades of Carter Center efforts at the grassroots in Ethiopia and Nigeria to improve health infrastructure and fight neglected diseases such as Guinea worm, trachoma, and river blindness. Long-lasting insecticidal bed nets, like the one presented to Mrs. Hlmenlike by former First Lady Rosalynn Carter in January 2007, have been distributed throughout Ethiop and Nigeria.

A mosquito net is classified as insecticide-treated if it has been treated with insecticide within the previous 12 months. Long lasting insecticidal treated nets, a recent technological innovations, are nets that have been permanently treated with insecticide that last for the useful life of a mosquito net, defined as at least 20 washes and at least three years under field conditions (UNICEF, 2007).

The WHO now recommends that the national malaria control programmes and their partners purchase on long lasting insecticide treated nets (WHO, 2006) for intervention programmes. Insecticide-treated bed nets (ITNs), if properly used according to instructions, are known to be highly effective in reducing malaria morbidity and mortality.

The Roll Back Malaria Initiative has identified the under-fives children and pregnant mothers as one of those people who are at high risk of malaria, and one of the strategies to fight malaria in these groups is increasing mosquito awareness on net use. This implies that there must be selective targeting at the household level such that the children are

protected. The use of ITNs to protect children from malaria parasite transmission is one of the main strategies recommended by the Roll Back Malaria (RBM) partnership. A major objective of the (RBM) campaign is to have 80% of pregnant women and children aged under-five sleep under ITNs by 2010 (WHO, 2005). Child health outcomes remain one of the most important barometers for measuring the overall social and economic well-being of a country (Nketiah-Amponsah, 2010). An effective strategy to combat the widespread malaria morbidity among children aged under-five, their mothers and pregnant mothers is the utilization of preventive healthcare via Insecticide Treated Bed nets (ITNs) (Nketiah-Amponsah, 2010).

The Federal Republic of Nigeria hosted the African Summit on Roll Back Malaria (RBM) on April 25, 2000 in Abuja. The Presidents, Heads of State and Governments of nearly all African States, led by the President of Nigeria, Chief Olusegun Obasanjo, endorsed the RBM Initiative for Africa. They also declared that 60% of children under-five years and pregnant women in Africa should sleep under insecticide treated mosquito nets (ITNs) by the year 2005. As a follow-up to this declaration, this policy has been developed to give effective Federal Government directions to States, Local Government Areas (LGAs), private and public sectors and other stakeholders on how to move forward with the implementation (National Malaria Control Programme {NMCP}, 2005). The major recommendations from these meetings were that the public sector should provide an enabling environment for local production and wide distribution as well as lowering of prices by removal of taxes and tariffs on insecticides entails and nets. This entails demand creation for use of ITNs through appropriate campaigns, active generic advertising and awareness creation.

As recommended at the African Summit on RBM, The private sector should take the lead in the production, procurement, promotion, distribution and sales of mosquito nets and insecticides in Nigeria. In addition, mechanisms for the distribution of subsidized nets and insecticides should be developed and targeted at the vulnerable groups and those unable to pay the full price of these products (National Malaria Control Programme, 2005). The Insecticide Treated Nets Massive Promotion and Awareness Campaign

(IMPAC) for encouraging patronage of public health facilities using ITNs as incentives/rewards for best practices i.e. Ante-natal clinic attendance for first pregnancies, first deliveries at health facilities and completion of immunization schedule for a child should be established and sustained.

In the year 2000, the African summit on RBM considered the removal of taxes and tariffs on ITNs as one of the important arsenals for fighting malaria. The Federal Government of Nigeria, in accordance with the Abuja Declaration, has continued to adjust the taxes and tariffs on mosquito nets to encourage local production. Presently, the taxes and tariffs are at 40%. This adjustment, according to Nigerian government will scale-up local production which will result in decrease in the price of nets. However, zero rating on the taxes and tariffs on insecticides for use in treating mosquito nets in Nigeria were declared in 2001 (NMCP, 2005). However, as of year 2007, more than half (24 of the 39 Abuja signatories) continue to impose taxes and tariffs on this life-saving tool. Taxes and tariffs considerably increase the price of ITN, reduce affordability and discourage the commercial sector from importing ITNs (Alilio et al., 2007). The government of Ghana through its Ministry of Health has been at the forefront of malaria control and this could be seen in the tax waiver on the importation of nets since 2000. This is to help render the price of ITNs affordable across income groups. A study by Simons et al (2002) has shown that a reform of the tariff and tax policies on insecticides could significantly increase bed net use.

Despite the overwhelming scientific evidence in support of the public health impact likely to result from widespread use of ITNs, the political commitment and the increasing financial resources to support delivery and increase coverage among vulnerable young children remained poor in 2003. Even though the Federal Government of Nigeria does not intend to subsidize the price of ITNs on the open market, however, the Federal, State and Local Governments as well as Development Partners should make special arrangements for the most vulnerable groups (pregnant women and children under-five years of age) who may be unable to afford them. In order to take care of the above concern and still ensure a real and sustainable market for ITNs where everyone benefits,

including the private sector, the following are possible mechanisms: i) increasing ITNs Massive Promotion and Awareness Campaign (IMPAC), ii) increasing Vouchers/Coupons and iii) increasing donations.

According to IMPAC programme, ITNs can be used as an incentive/reward for complying with healthy behaviours such as full immunization of children and ante-natal care attendance, especially for first pregnancies. Children who comply with the six mandatory vaccines and pregnant women who have taken 2 doses of Tetanus Toxoid should receive free ITNs (FMoH, 2009). This strategy will increase coverage for ITNs distribution and will also has a two pronged advantage. The scheme is linked to IMPAC described above allows both actions (promotion of ITN use and patronage of public health facility use) to feed upon one another and benefit each other simultaneously. Voucher system is a form of subsidy whereby ITNs are made available to beneficiaries at a reduced cost. Other sources that enhance availability and use of ITNs include mandatory use by all public and private health facilities for in-patient wards, boarding schools and its distribution as a social benefit to company staff. Community-based and private sect distribution of ITNs/LLITNs and re-treatment and Re-treatment of mosquito nets were also carried-out.

Studies examining ITN's efficacy suggest a significant reduction in malaria episodes. If used universally, ITNs could prevent approximately 7.0% of the global under-five mortality (Jones, et al. 2003). The UNICEF corroborates that under-five mortality rates could be reduced by about 25.0-30.0% if all young children in malaria endemic areas were protected by treated bed nets at night. In addition, a large clinical trial in Kenya affirms the effectiveness of bed nets in curbing malaria infection. The results show a significant reduction in clinical malaria and moderate-severe anaemia by 60.0% in children under-five years (Alaii et al., 2003). In a study by Abdella, Deribew and Kassahun (2009), using clinical trials confirmed that inconsistent use of mosquito nets coupled with other social and technical factors influence the efficacy of mosquito nets. In particular, the authors found that mosquito net possession and appropriate utilization of mosquito net were not associated with clinical malaria. However, given pragmatic

deficiencies like poor ITN distribution and re-treatment services, ITNs were not significantly associated with clinical malaria in children aged under-five.

Custodio, Descalz0 and Villamor (2009) investigated the nutritional and socio-economic factors associated with *plasmodium falciparum* infection in children from Equatorial Guinea. Among the findings were that only 55.0% of the children who had suffered malaria were treated outside their homes. In particular, age, longer distance to health facilities, utilization of bed net and maternal anti-malaria medication among others were associated with parasitemia. In Nigeria, Oresanya, Hoshen and Sofola (2008) examined the predictors for treated net ownership and utilization among children aged under-five. Many socio-economic variables including education, distance to health facility, wealth, income and region residence proved significant in predicting bed net utilization. On the contrary, Coesch et al. (2008) reported a strong inverse relationship between socio-economic factors such as presence of running water, flush toilet in residence and highest income score on one hand and on the other hand, bed net use. The authors attribute the inverse relationship to the 'insect nuisance hypotheses' in which bed net might be used to avoid excessive noise created by the insects but not necessarily for preventing mosquito bites. Hence, richer households are less prone to the insect and nuisance relative to poor households who often do not have nets in their windows as a first step of prevention.

Other studies have shown that poor households may have lower or simply insufficient willingness to pay for bed nets (Uzochukwu and Onwujekwe, 2004). Even households that are willing to pay may not be able to do so if they lack the cash at hand and do not have access to credit. In Kenya, Noor, Omumbo, Amin, Zurovac, and Snow (2006) reported that homestead, travel time to nearest market centres and mother's education were significantly associated with use of retail sector nets by children aged less than five years. However, the authors did not account for the effect of confounding variables such as religious denomination on usage. The literature also show ample evidence that gender, occupation, place of residence, relationship with household head and other socio-demographic factors significantly contribute to sleeping under a mosquito net (Wiseman, Scott and Mcelroy, 2007; Ng'ang', Jayasinghe and Kimani, 2009).

Other findings emanating from the literature indicate that individuals who understand the connection between mosquitoes and malaria may also attribute the disease to perception and attitudinal factors, making it difficult to convince them to adopt bed nets as a control measure (Hill, Kendall, Arthur, Kirkwood and Adjei, 2003; Adongo et al, 2005). For instance, warm weather perceived absence of mosquito bites are cited as some of the reasons for low bed nets use (Browne, Maude and Binka, 2001; Owusu-Agyei, Awini, Anto, et al. 2007). The authors concluded that there was a significant increase in the utilization of ITN among children aged under-five and pregnant women between the period 2000 and 2003. However, the authors did not empirically examine the socio-economic factors influencing the utilization of ITNs.

2.6 Prevalence, practice and factors relating to use of ITN

Use of insecticide-treated nets (ITNs) continues to offer potential strategy for malaria prevention in endemic areas. However their effectiveness, sustainability and massive scale up remain a factor of socio-economic and cultural variables of the local community which are indispensable during design and implementation stages (Ng'anga et al., 2009). However, more African households (31.0%) own at least one insecticide-treated net (ITN), and more children under 5 years of age used an ITN in 2008 (24.0%) compared to previous years (Ng'anga et al., 2009). These averages are affected by low ITN ownership in several large African countries for which resources for scale-up are only now being made available. Household ITN ownership reached more than 50.0% in 13 of the 35 highest burden African countries (WHO, 2009). In Kenya, ITN coverage among children increased from 3.0% in 2000/1 (unpublished data) to 7.0% in 2004/5 (Noor et al., 2006). According to Mugisha and Arinaitwe (2003) in Uganda, children use mosquito nets primarily because they happen to share a bed with their parents. A child who shares a bed with the mother is 21 times more likely to use a mosquito net than his/her counterpart. Increasing mosquito net coverage such that 60% (the target for the RBM) of households have at least one mosquito net will not necessarily protect the under-fives. Either the coverage will have to be expanded or appropriate targeting strategies designed. Studies have shown that in most communities, net use is lowest among the poorest (Armstrong-Schellenberg, Victor, Mushi, de Savigny, Schellenberg, Mshinda and Bryce, .2003).

Mosquito nuisance and perceived threat of malaria were the main determinants of bed net use. Knowledge of malaria and the means to prevent it were not sufficient to guarantee compliance with LLITNS use. Factors such as climate, work and evening social activities impacts on the use of bed nets, particularly in men (Atkinson, Bobogare, Fitzgerald, Boaz, Appleyard, Toaliu and Vallely, 2009). In 2005, a nationwide survey estimated that 6.5% of households in Ethiopia owned an insecticide-treated net (ITN), 17.0% of households had sprayed with insecticide, and 4.0% of children under-five years of age with fever were taking anti-malarial (Jima et al., 2007). According to the NDHS 2008, 17 percent of households in Nigeria own a mosquito net (treated or untreated), and 8 percent of households own more than one mosquito net. Sixteen percent of households own at least one ever-treated mosquito net, and 7 percent own more than one ever treated mosquito net. The percentage of households that own at least one ITN is 8, while 3 percent own more than one ITN. The average number of TINs per household is less than one.

By residence, more rural households (19 percent) than urban households (14 percent) own at least one mosquito net. A similar trend is seen for ownership of ever-treated mosquito nets. In contrast, urban households are more likely than rural households to own at least one ITN. There is variation in the ownership of mosquito nets by zone. The percentage of households that own any mosquito net in the Northern zones ranges from 16 percent to 28 percent, while in the Southern zones, net ownership ranges from percent 11 to 17 percent. However, ownership of ITNs is higher among households in the Southern zones (NDHS, 2008). Similarly, according to the NDHS 2008, only 12 percent of children under the age of five slept under a mosquito net on the night before the survey. The same proportion slept under an ever-treated net; however, only 6 percent of the children slept under an ITN. It is interesting to note that only half of children in household that own an ITN slept under an ITN on the night before the survey. The use of any net, an ever-treated net, and an ITN decreases with increasing age of the child. The percentage of children who slept under an ITN on the night before the survey increases with wealth quintile (NDHS, 2008).

In addition, the utilization of ITN among women of reproductive age including pregnant women shows that less than one in ten women slept under a mosquito net on the night before the survey and only 4 percent slept under an ITN. Use of all three types of nets is slightly higher in rural areas than urban areas. Use of any net or an ever-treated net generally decreases with increasing level of education and wealth quintile, while use of an ITN generally increases with level of education and wealth quintile. Forty-one percent of women in households with at least one ITN slept under an ITN on the night before the survey. The proportion of women in households with an ITN who slept under an ITN decreases with increasing level of education and wealth quintile (NDHS, 2008). Also at the national level, 12 percent of pregnant women slept under any net, and the same proportion slept under an ever-treated net. Five percent of pregnant women slept under an ITN. The percentage of pregnant women living in households that own at least one ITN who slept under an ITN is 44 percent. Pregnant women in rural areas are more likely to have slept under any type of net than their urban counterparts (13 percent compared with 9 percent) (NDHS, 2008).

Factors which influence poor bed net use

Policy makers and researchers concur that relatively inexpensive and welfare-improving technologies such as utilization of ITNs are very effective at protecting particularly pregnant women and children from malaria. Nevertheless, the purchase and use of bed nets remain low in many malaria-prone areas (Webster et al., 2005). Use of ITNs offers a potential strategy for reducing man-vector contact as well as reducing disease mortality and morbidity rates. They have been proven to offer significant personal protection against malaria infections in areas with drug resistance and insufficient health infrastructure (Takken, 2002).

However, despite this demonstrated efficacy, the choice, use and acceptance of ITNs continue to face major socio-economic and cultural challenges in most malaria endemic areas (Winch, Makemba, Kamazima, Lwihula, Lubega, Minjas and Shiff, 1994; Adongo et al., 2005). Given that different community's variety of beliefs about the cause and transmission of malaria, these factors are critical and cannot be assumed (Alaii et al.,

2003). Affordability was reported as a major barrier to access but non-financial barriers were also shown to be important determinants. On the demand side, key barriers to access bed nets, included mismatch between the types of ITNs supplied through interventions and community preferences, perceptions and beliefs on illness causes, physical location of suppliers and distrust in free delivery and in the distribution agencies (Alaii et al., 2003).

Key barriers on the supply side included distance from manufacturers, limited acceptability of ITNs provided through interventions, crowding out of the commercial sector and the price. Infrastructure, information and communication played a central role in promoting or hindering access (Chuma, Okungu, Ntwiga and Molyneux, 2010). According to Chitsulo (2000), cost has been implicated as one of the major reasons for non-ownership of nets. The populations most at risk are often among the poorest because they may not always afford the cost of purchasing ITNs. According to KDHS (2003), the situation of net ownership in Kenya was reported to be worse for households in the lowest wealth quintile; only 11 percent have least one net and worse still, only 2.5 percent have at least one ITN (Central Bureau Statistics [Kenya, 2004). Cost is not the only factor that hinders ownership and use of nets; other important factors that hinder ownership and/or use of nets include size of houses, type and availability of sleeping facility and sleeping arrangements especially in refugee camps and other needy communities. Research has found that sleeping space determines whether it would be possible to hang a net, because when the house is too small, it may not be feasible to use a net (Rowley, 1997).

The study by Nketiah-Amponsah (2010) in Ghana finds that low-income households, age of the child, area of residence, distance to the nearest health facility and distance to food market inter alia significantly predict mother's adoption and utilization of ITNs among children aged-under five. It is also worth-noting that women who had experienced childhood mortality in the last five years preceding the survey were 37 percentage points more likely to have their surviving children sleep under ITN. In addition, mothers who

profess the Catholic faith were 2.4 times more likely to have their children sleep under ITN compared to their counterparts who are traditionalist (Nketiah-Amponsah, 2010).

The demand for preventive healthcare is influenced by a host of socio-economic factors which are likely to influence the demand for any commodity such as income and market prices alongside current attributes, health status and the frequency of illness among others. Noor et al (2009) employed recent national household survey data for 18 malaria endemic countries to study the utilization of ITNs by age and sex and concluded that in malaria endemic Africa, school-aged children are the least protected with ITNs but represent the reservoir of infections. In Mozambique, Chase, Sacoor and Nhalungo (2009) showed in their study after controlling for other covariates, that there is no discernible empirical evidence that poor households are less likely to own bed nets. Conversely, the results indicate that education and market knowledge are associated with high willingness to pay for bed nets while use of alternative preventive measures such as Indoor Residual Spraying (IRS) are found to decrease demand for bed net use. In Congo, Pettifor, Taylor, Nuke, et al (2008) found women with secondary education or better education were 2.8 times more likely to have used a bed net compared to women with less education. An exploratory study was conducted in Mukono district, Uganda, to assess perceptions and use of ITNs. Results show that malaria is perceived as a serious illness among pregnant women and children, and there is high awareness on benefits of ITNs.

However, ITNs are used by few people, mainly because of their high cost and the perception that the chemicals used to treat them have dangerous effects on pregnancy and the fetus (Mbonye, Neema and Magnussen, 2005). Other factors that influence the use of ITNs include low utilization of antenatal care, husband's lack of interest in malaria prevention and the perception that adolescent girls and primigravidae are at a low risk of getting malaria. Although the efficacy of insecticide-treated net (ITNs) in malaria prevention is well documented, the low coverage of ITNs in malaria endemic countries necessitates investigation on factors that limit access to this intervention. The policy implications of these findings include demystifying the negative perceptions on the

chemicals used to treat nets and subsidizing the cost of ITNs in order to increase access to them. These findings provide important lessons for malaria control programmes that aim at increasing access to ITNs by pregnant women in developing countries ((Mbonye, Neema and Magnussen, 2005).

ITNs were perceived as very important for protection against mosquitoes and malaria particularly during the rainy season, but there were problems with their use during the dry season. Young children usually slept with their mother under the ITN and self-reported compliance was 66.0% and 98.0% during dry and rainy season respectively (confirmed by direct observation) (Frey, Traore, De Allegri, Kouyate and Muller, 2006). Important reasons for low compliance during the dry season were high temperatures inside houses and problems related to changing sleeping places during the night (Frey et al., 2006). In a research in Tanzania about women seeking malaria chemoprevention and other antenatal services, the time associated with traveling long distances to ANC clinics and ITN retailers and with waiting for services at clinic-level was a major factor of discouragement in the health seeking behavior of pregnant women (Mubyazi, Bloch, Magnussen, Olsen, Byskov, Hansen and Bygbjerg, 2010). Tanzania National Voucher Scheme on the coverage and equitable distribution of insecticide treated nets, used to prevent malaria, to pregnant women and their infants shows steady increases in net coverage indicators over three year study period (2005 to 2007) with an household ownership increase of at least one net (untreated or insecticide treated) from 44.0% to 65.0% ($P<0.001$), and ownership of at least one insecticide treated net doubled from 18.0% to 36.0% in the same period (Hanson, Marchant, Nathan, Mponda, Jones, Bruce, Mshinda, Schellenberg, 2009). The major challenges observed include: the re-introduction of taxes on mosquito nets and related products, procurement and tendering procedures in the implementation of the GFATM, and organizational arrangements and free delivery of mosquito nets through a Presidential initiative (Njau, Savigny, Gilson, Mwageni and Mosha, 2009).

Behavioural change communication (BCC) relating to ITN

Currently in Nigeria, the behavioural change communication strategy for raising the level of awareness and creating demand for ITN/LLITNs and other malaria prevention and control technologies is low. Also, there is a low level of advocacy for the implementation of the RBM scheme at the State and LGA levels. The key components of the BCC strategy for malaria control will include i) the design and development of a behavioural change communication (BCC) strategy. This is a logical step for addressing this problem. Development of key messages on transmission of malaria, use of insecticide treated nets, diagnosis of malaria, home treatment of malaria, recognition of danger signs and referral will be developed. These messages should be disseminated through the most effective means of communication in relation to the target audience. Options include posters, pamphlets, mass media (electronic/print), special announcement in places of worship. ii) monitoring and evaluation of BCC efforts will help to evaluate effectiveness of BCC messages to get feedback from the community on the impact of BCC. The strategy will spell out effective ways of using interpersonal communication, community mobilization, mass media and other social change strategies to facilitate the adoption of the principles and practices related to the RBM initiative.

2.7 Malaria policy in Nigeria

The National policy focuses on Malaria Diagnosis and Treatment describes the goal of Nigeria Government with respect to the diagnosis and treatment of malaria and the strategy by which the goal is to be achieved.

Policy strategy

Roll Back Malaria is a global initiative that has set specific deadlines for the attainment of explicitly defined milestones. One of these is the reduction of malaria everywhere by 50.0% by the year 2010.This strategy seeks to establish a social movement in which the local communities, public and private sectors, all tiers of government and non-governmental development agencies e.t.c. come together in a partnership and network to implement malaria control interventions. The RBM intervention strategy has four key elements.

i. Patients with malaria should have access to appropriate and adequate treatment within 24 hours of the onset of symptoms

ii. Pregnant women particularly in their 1st and 2ndpregnancies should have access to effective anti-malarial prophylaxis and treatment.

iii. Insecticide treated nets and other materials should be available and accessible to persons at risk of malaria particularly pregnant women and children under 5 years of age.

iv. Epidemics of malaria should be recognized and steps initiated for their containment within one week of their onset.

2.7.1 Policy for the implementation of insecticide treated mosquito nets in Nigeria

This policy has been developed to give effective Federal Government directions to States, Local Government Areas (LGAs), private and public sectors and other stakeholders on how to achieve the universal coverage of LLITNs.

Goals and Objectives of the Policy

The goal of this policy is to provide clear directions of the Federal Government of Nigeria on implementation of ITNs/LLITNs policy towards achieving reduction of malaria morbidity and mortality in the country.

The objectives of this policy are to:

- Create an enabling environment for the smooth implementation and scaling up use of ITNs/LLITNs in accordance with global trend for achieving universal access and the National access and the National Malaria Control Strategic plan.
- Support demand creation and encourage adoption of positive net culture.
- Encourage private sector participation in implementation of ITNs/LLITNs.
- Develop appropriate mechanisms for monitoring and evaluation of ITNs/LLITNs implementation.

2.7.2 Integrated Vector Management (IVM) and malaria control Policy in Nigeria

The concept of IVM is built on selected vector control strategies which were defined by the WHO Expert Committee on Malaria. The strategy was targeted at the use of different vector control methods alone or in combination to prevent or reduce vector populations and human-vector contact cost effectively while addressing sustainability issues (WHO, 1997). The strategies that have been adopted in IVM include:

1. The use of Insecticide Treated Nets/Long Lasting Insecticidal Nets (ITNs/LLITNs)
2. Environmental Management
3. Use of Indoor Residual Spraying

Among the strategies of IVM, only the use of ITNs/LLITNs has been scaled up in the country. Although, individuals practice various forms of environmental management measures in the form of sanitation, this needs to be strengthened.

2.8 Conceptual Framework

The PRECEDE-PROCEED frame work or model was adopted to guide the design of the study. The PRECEDE is essentially a planning model commonly used in health education (Green and Kreuter, 1999). It guides planners through a process that starts with desired outcomes and works backwards to identify a mix of strategies for achieving objectives (United States Department of Health and Human Services {USDHHS, 2005}). Because the model views health behavior as influenced by both individual and environmental forces, it distinct parts include an "educational diagnosis" (PRECEDE) and an "ecological diagnosis" (PROCEED) (USDHHS, 2005). The PRECEDE (*Predisposing, Renforcing, and Enabling Constructs in Educational Diagnosis and Evaluation*) outlines a diagnostic planning process to assist in the development of targeted and focused public health program (Green and Kreuter, 1999).

The PRECEDE consists of five steps or phases. Phase one involves determining the quality life or social problems and needs of a given population. Phase two consists of identifying the health determinants of these problems and needs. Phase three involves analyzing the behavioural and environmental determinants of the health problems. In phase four, the factors that predispose to, reinforce, and enable the behaviours and

lifestyles are identified. Phase five involves ascertaining which health promotion, health education and/or policy-related interventions would be best suited to encouraging the desired changes in the behaviours or environments and in the factors that support those behaviours and environments (Green and Kreuter, 1999).

The PRECEDE framework was used in probing and finding health promotion solution to practice and the utilization of insecticide treated net (ITN) among mothers of under-five chi1dren in Bundu-Ama community of Port Harcourt Local Government Area. The personal preference that a group of mothers or individual mother of under-five years children makes with respect to ITN use are predisposing factors. They include knowledge of causes of malaria utilization and its prevention, attitude about malaria prevention with respect to ITN use and their beliefs i.e. cultural issues concerning ITN use. They also include perceived needs, abilities and their perception about malaria.

Environmental conditions such as availability, accessibility and affordability of ITN are the enabling factors. Each of these variables either encourages facilitates or discourages ITN use. New skills could be needed to tie the ITN even in a smaller room and therefore essential to carry out a behavioural or environmental change.

Positive and negative consequences of ITN use, including social support, peer influences, advice and feedback of health-care providers and physical consequences of ITN use (protection from mosquito's noise nuisance and malaria) supports or discourages ITN use. These are the reinforcing elements. They determine whether the individual receives positive feedback for the behaviour and is socially supported after behaviour.

The PROCEED section consists of addressing the implementation of the intervention and the assessment of the outcome of the implementation which is outcome evaluation.

In applying this theory, the predisposing factors which have potential to` facilitating the use of effective strategies to prevent malaria among individuals will be noted. These include Knowledge of cause and prevention attitude towards malaria and belief about

ITN. This helped in developing questions in the instruments for data collection that helped probed into these factors (See Appendix I)

Enabling Factors such as freedom of choice**,** affordability of preventive methods**,** Self-efficacy**,** Socio-economic status etc were also factored into the study with the help of the framework.

Reinforcing Factors such as promotion of ITN use by health workers, village health workers and media were considered in guiding the framing of the instrument. Likewise, possession of ITN by neighbors, husband's willingness to use ITN, attitude and behaviours of significant others were also factored into use in the instrument for the study.

Environmental factors which have potential facilitating the use of ITNs among mothers of under-five were noted in the framing of the questionnaire.

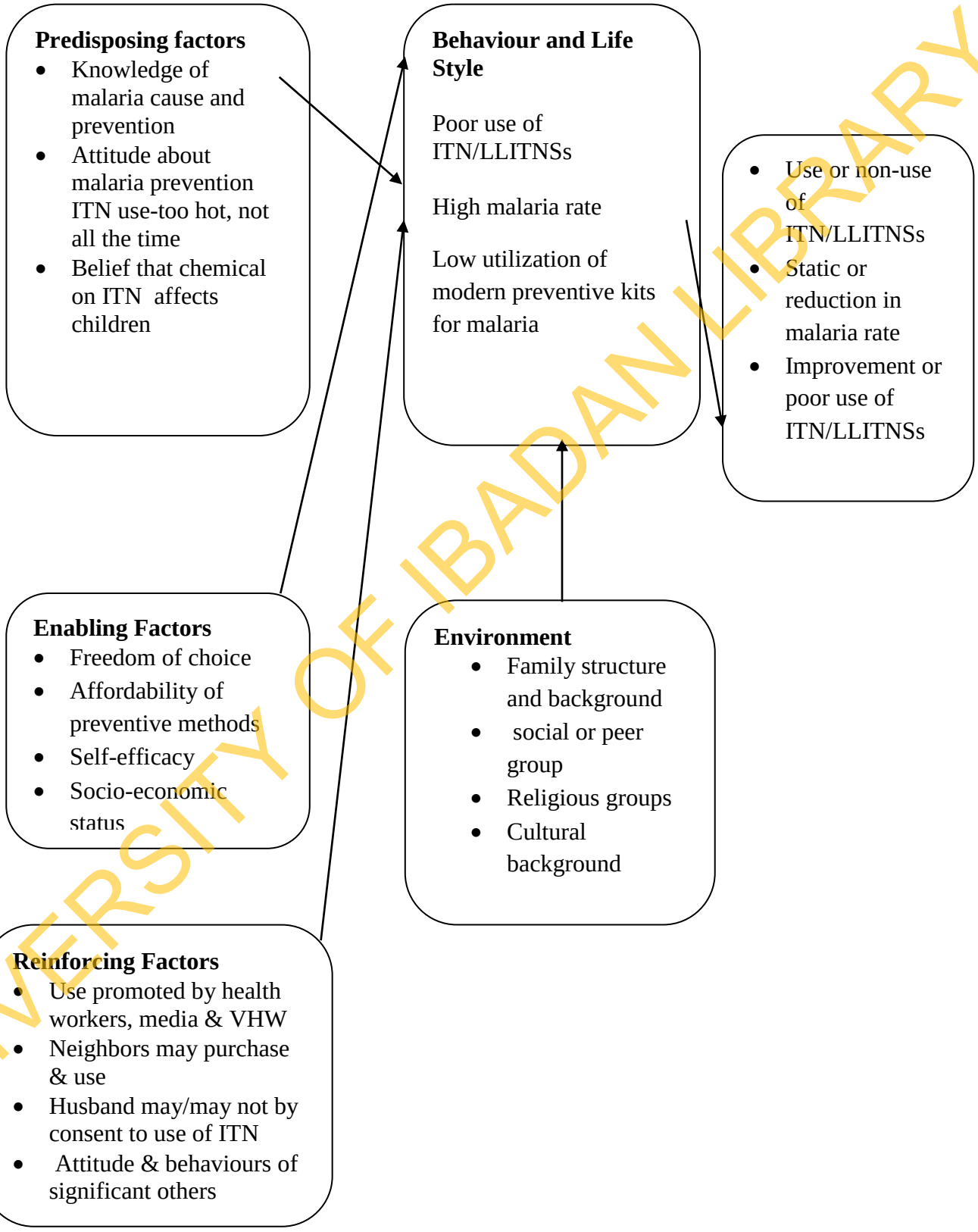

Figure 2.2 The PRECEDE Model

CHAPTER THREE

METHODOLOGY

3.1 Study Design

This chapter deals with the research design, description of study area, independent and dependent variables, sample size, study population, sampling technique, procedure for data collection and data analysis procedure. The study was a cross-sectional survey which involved the use of quantitative method in Bundu-Ama, community in Port Harcourt Local government, in Rivers State, to seek information about the knowledge, perception, attitude and practice of LLITNs among mothers of under-five children.

3.2 Description of Study Area

Bundu-Ama is a community located in Port Harcourt Local Government Area (LGA). It lies along Bonny River in the Niger Delta Region in Rivers State (See Figure 3.1). It is the fifth largest community and third largest economically industrious LGA after Trans-Amadi and Diobu areas, with an estimated population of 200,000 people (National Population Census, 2006). It is the community hosting a multinational cement company (Ibeto Cement). Likewise, it has Boatyard where boats are constructed and major marine activities are carried-out. Also, Oando Administrative office and several other commercial activities are sited in this community. It has two model primary health care centers: Primary Health Care Centre, Bundu-Ama and Primary Health care centre, Pott-Johson; three primary schools, two secondary (Community secondary school, Bundu (public) and Stella Maris Grammar school, Bundu-Ama (private)).

The Community can be accessed by both water and land transportations. The vegetation of the Community, characterized by mangrove forest and saltwater swamps, encourages the breeding of malaria parasites, reasons emanating from heavy rainfall which often

dominate much of the seasons in the area (Atsegbua, 2009).The inhabitants of the community are mainly fishermen, traders, civil servants and artisans.

As reported by RSMoH (2009), the disease burden in the community is mostly due to preventable disease such as malaria, upper respiratory tract infection, diarrhoea etc. This accounts for high morbidity and mortality (premature) death in the community. Likewise, the adverse effects of malaria attacks on health and productivity as well as school absenteeism and man-hour-loss at work places are another burden facing the community (Parker 2009). Poor usages of LLITNs among mothers of under-five have been found to contribute to the malaria burden in the area. When there is high tide from the mighty Bonny River coming in from the Atlantic high seas, the water from the adjourning water ways come into the homes, thus, leaving behind water lodged Area which also contribute to mosquito breeding sites aside the rivers and the dams in the area.

Threatened with demolition by the former River State Governor Amaechi (NDW,2010), Bundu-Ama is one of more than forty water front's settlement in Port Harcourt, most densely populated area and are homes to more than 200,000 people (Amnesty, 2014).

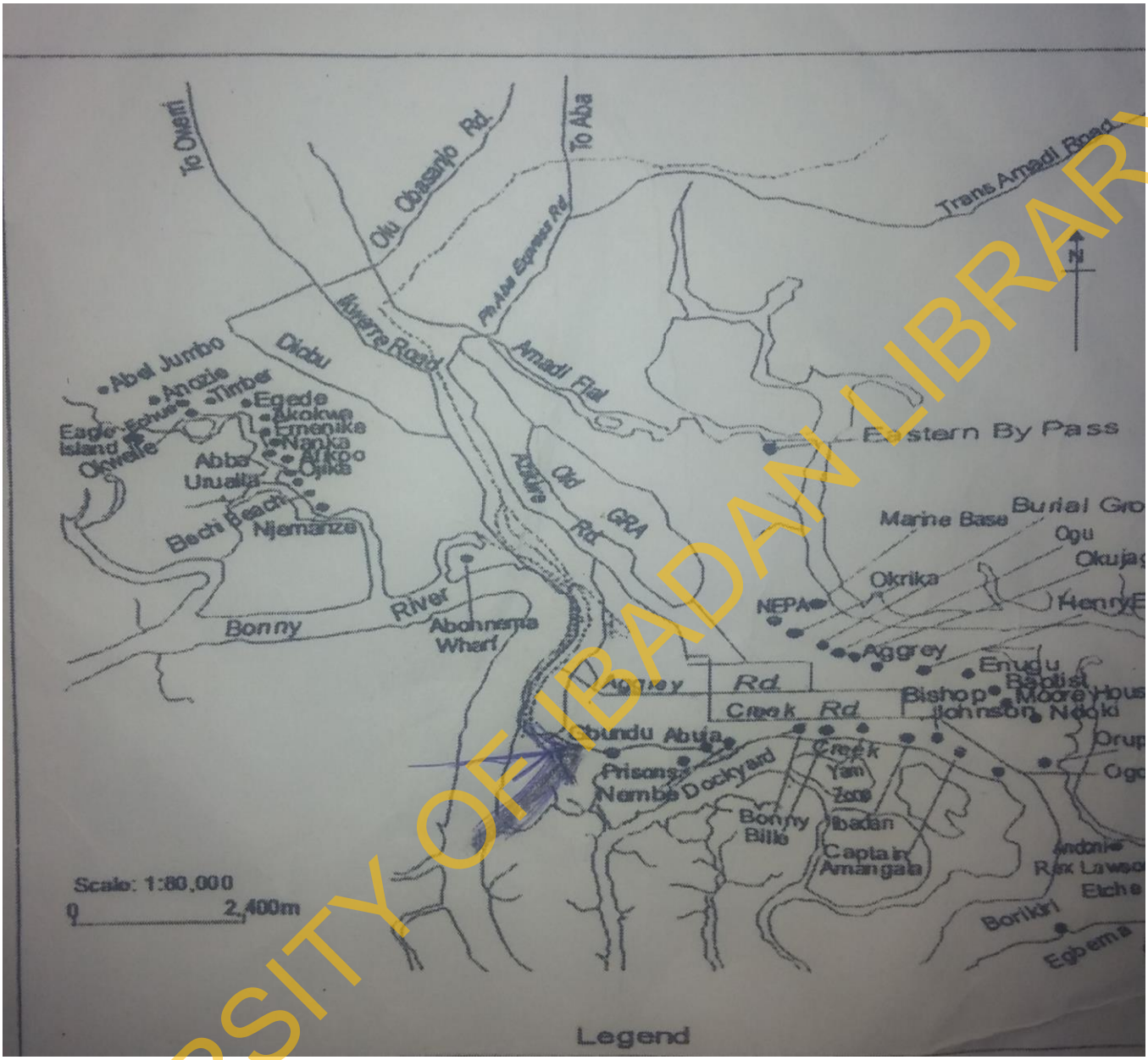

Figure 3.1 The sketch map of the study area (Bundu-Ama).

3.3 Study population

The study population consisted of mothers of under-five children residing in Bundu-Ama community**.** The target population consisted of women who are married and were within the age-group of 20 and above. Three hundred and seventy married women and mothers of under-five who were present in this community during the periods of 7th to 30thSeptember 2015 were recruited into the study.

3.4 Independent and dependent variable

The variables of interest for this research are knowledge, perception, attitude and practices towards malaria prevention among mothers of under-five children at Bundu-Ama, community. The independent variables in the study include the socio demographic data which include the age, marital status, parity, ethnic group and economic status. The dependent variable on the other includes Knowledge, perception, attitude and practices of LLITNSs.

3.5 Determination of sample size

The study sample for this research was calculated using the Leslie Kish sample size formula of 1965 for cross-sectional study which is:

$N= Z^2pq /D^2$

N = sample size collected or minimum sample size

D= degree of accuracy set at 0.05 (precision set at 5.0%)

Z= standard normal deviation set at 1.96 normal interval at 5.0 % (95.0% confident interval**)**

p= the proportion of the target population estimated to have a particular phenomenon of interest in the study.

The World Malaria Report by the WHO in 200 revealed that more African households (31.0%) own at least one insecticide-treated net (ITN), and more children under the ages of five used an ITN in 2008 (24.0%), compared to previous years. These averages are affected by low ownership in several large African countries for which resources for scale-up are only now being made available. Household ITN ownership reached more than 50.0% in 13 of the 35 highest burden African countries. From this finding, more

than 31.0% of Africans on the average own at least one insecticide-treated net (ITN). Thus, mean value is 31.0%.The sample size for this study was therefore calculated using this mean value. Therefore,

N = Z^2pq/d^2

In this formula:

N = sample size

d = degree of accuracy, 5.0%

z = confidence level. 1.96

p = reasonable estimate of key proportions (31.0% or 0.31) (WHO, 2009)

q = 100 – 31 = 69% or 0.60

$$N = \frac{(1.692 \times 1.692) \times 0.31 \times 0.69}{0.05^2} = 329$$

Since participation in the study was voluntary, the sample size was increased by 10.0% and this rounded up to 370 in order to make up for any possible improper completion of the questionnaires and or cases of attrition.

3.6 Inclusion and Exclusion Criteria

Inclusion criteria

The study involved the following categories of eligible persons:

1. Persons who have under-five children as reported by the mothers of the children themselves.
2. Persons who were willing to participate.
3. Individual who gave informed consent to be involved in the study.

Exclusion criteria

The study excluded the following categories of people:

1. Persons who do not children under the ages of five as reported by the parents themselves.
2. Mothers who were not willing to participate.

3. Individual who did not give consent.

3.7 Instruments for data collection

This study made use of quantitative method for data collection. This was done by using a semi-structured questionnaire. The semi-structured interviewer administered questionnaire was divided into six sections labeled sections A, B, C, D, E and F. Section A consists of questions for documenting the socio-demographic characteristics of the respondents while section B documented knowledge of signs and symptoms of malaria. Section C contains questions for documenting practice towards sleeping under ITNs by mothers of under-five children and section D indicated questions on factors that influence the use of ITNs/LLITNs. Section E contains questions on perception of mothers towards malaria prevention and section F contains questions on attitude of mothers towards malaria prevention (See Appendix I).

3.8 Validity and reliability

Validity

According to Davitz and Davits (1997), validity is the extent to which an instrument actually measures what is expected to measure, while reliability is the degree to which an instrument yields constant responses. To ensure these, the researcher did an extensive literature search on previous studies on malaria. Literature based information was used to design the instrument for data collection. The instrument was presented to expert in the fields of medical sociologists, psychologists, medical statisticians and health education specialist to check for face and content validity.

Reliability

Thirty seven questionnaires were pretested among mothers of under-five at Azuabie community, in Port Harcourt Local Government Area in Rivers State. The copies of the questionnaire were edited, coded and entered into a computer for analysis. Cronbach Alpha is a model of internal consistency, based on the average. This was done to ascertain the psychometric properties of the instrument. The obtained Cronbach alpha coefficient score was 0.69, implying that the instrument was reliable. Thus, Cronbach Alpha coefficient was used to confirm the reliability of the instrument.

The instrument was revised after the pre-test as some questions were removed and some added. These amendments helped ascertained the effectiveness of the instrument in collecting appropriate data relevant to the research objectives. Reliability coefficient of the questionnaire was determined using the Cronbach's Alpha technique.

3.9 Training of field assistants.

Four field assistants were recruited, trained and paid as agreed by both the researcher and the field assistants. The training focused on the objectives and importance of the study. The instruments for data collection were discussed in details during the three day training period so as to ensure familiarity of the instruments. During this period, the field assistants were made to demonstrate the process as explained by the researcher.

The field assistants trained were involved in the administration of the instrument during pretest. This gave them the opportunity to learn how to collect the required data while the researcher watched the exercise and made necessary corrections.

These research assistants were given four hours training for three days and they were later accessed through the display of a well-coordinated demonstration and return-demonstration skills. They were accessed and made to complete and sign confidentiality forms before the commencement of the study.

3.10 Sampling and Data collection procedures

The EPI sampling technique was used to facilitate the sampling and interview of the respondents. First, the investigator moved to the center of Bundu-Ama community and spinned a bottle. The spinned bottled was allowed to turn round and round unhindered and allowed to come to rest.

Next interview started from the part of the community to which the mouth of the bottle was pointing. Every third house in the direction was selected and visited and one eligible respondent was selected by balloting for interview if more than one eligible respondent was met in a house. In a house where there was one mother, such a mother was purposively selected for interview if she consented to participate in the study.

After reaching the end of the community, the investigator and the research assistants moved back to the centre of the community and started recruitment and interview in another direction. This way a total of 370 eligible mothers of under-five who consented to be involved in the study were interviewed.

The administrations of questionnaire were carried out by the researcher with the help of the trained research assistants. Data collection for the main study took place within the period of 7th to 30th September 2015. The questionnaires were interviewers administered.

3.11 Ethical consideration

The proposal for the conduct of this study was submitted to the Oyo State Ethics review committee for approval. This was done in order to ensure that the study conducted was in accordance with ethical principles covering studies involving living subjects. Informed consent was obtained from the study participants before administering the questionnaire and each participant was assured she could withdraw consent freely at any time. Confidentiality of participants responses were maintained during and after the collection of data. Only registration number was assigned to each questionnaire and no identifiers such as names, address or phone numbers were required on the questionnaire.

3.12 Data processing and analysis

The copies of the questionnaire were serially numbered for control and recall purpose.

The quality of information collected was checked by the researcher in the field. This entails reviewing the pattern of responses of each participant as recorded in the questionnaire. Problems discovered during data collection were resolved immediately in the field.

The administered questionnaires were edited and coded by the investigator with the use of coding guide. The data in each questionnaire was entered into a computer for analysis.

The data was analyzed using Statistical package for the Social Sciences software version 15 (SPSS Inc., Chicago, IL, USA). After making use of the questionnaires, they were stored in a place that would be safe from destruction by water or fire and where

unauthorized persons would not have access to them. They will be destroyed after the defense of the project.

Responses to knowledge questions on the causes, symptoms, modes of transmission and methods of preventing malaria were categorized using a 22-point scale. The knowledge scores of the respondents were computed based on only three categories of responses: *Yes*, *No* and *Not sure*. Respondents' knowledge scores were categorized as Poor, Fair and Good as operationally defined. Score of 0- 12 points was categorized as having "Poor knowledge", those having 13-15 points was categorized as "Fair Knowledge", while scores ranging from 16-22 were categorized as "Good Knowledge".

Likewise, respondents' attitudes were evaluated as Poor, Fair and Good as operationally defined. Responses attitudinal questions on the causes, symptoms, modes of transmission and methods of preventing malaria were categorized using a 7-point scale. The attitudinal scores of the respondents were computed based on only three categories of responses: *Agree*, *Disagree* and *Undecided.* As a way of categorizing the responses, any respondent that score between 0- 3 points was categorized as having "Poor Attitude", those having

4-5 points were categorized as "Fair attitude", while scores ranging from 6-7 was categorized as "Good attitude".

The quantitative data were analyzed using descriptive statistics and Chi-square. Chi-square test was used to test for significant associations between variables. A p-value of less than 0.05 was considered as statistically significant.

3.13 Limitations of study

A limitation that was encountered during this study was that some respondents hesitated to present information relating to their bed net use. The researcher addressed the challenges by creating a very relaxed atmosphere for the interview to take place. Rapport was established with the respondents before interview stated.

Another limitation in the study was that some of the respondents were expecting incentives from the researcher. This was not provided but were assured, that the results of

the study would be useful in future to design programmes aimed at controlling malaria in the study area.

CHAPTER FOUR

RESULTS

4.1 Respondents' socio-demographic characteristics

The results of respondents' socio-demographic characteristics are presented in this section. The key socio-demographic variables measured were respondents' age, ethnic group, occupation, marital status, education and religion. The age profiles of the respondents are highlighted in Figure 1. The respondents' mean age was 31.3±6.4, it was revealed that majorities (56.2%) of the respondents were between the age group 26-35 years, ethnicity group revealed that majorities (36.2%) of the respondents were Ijaw (See Figure 4.2) and 48.6% were traders (See Figure 4. 3). Table 4.1 shows that majority of the respondents (78.4%) were married and respondents' highest level of education included secondary education (53.2%) and tertiary education (25.9%) respectively. Christianity (94.1%) topped the list of the religions practiced by the respondents.

N= 370

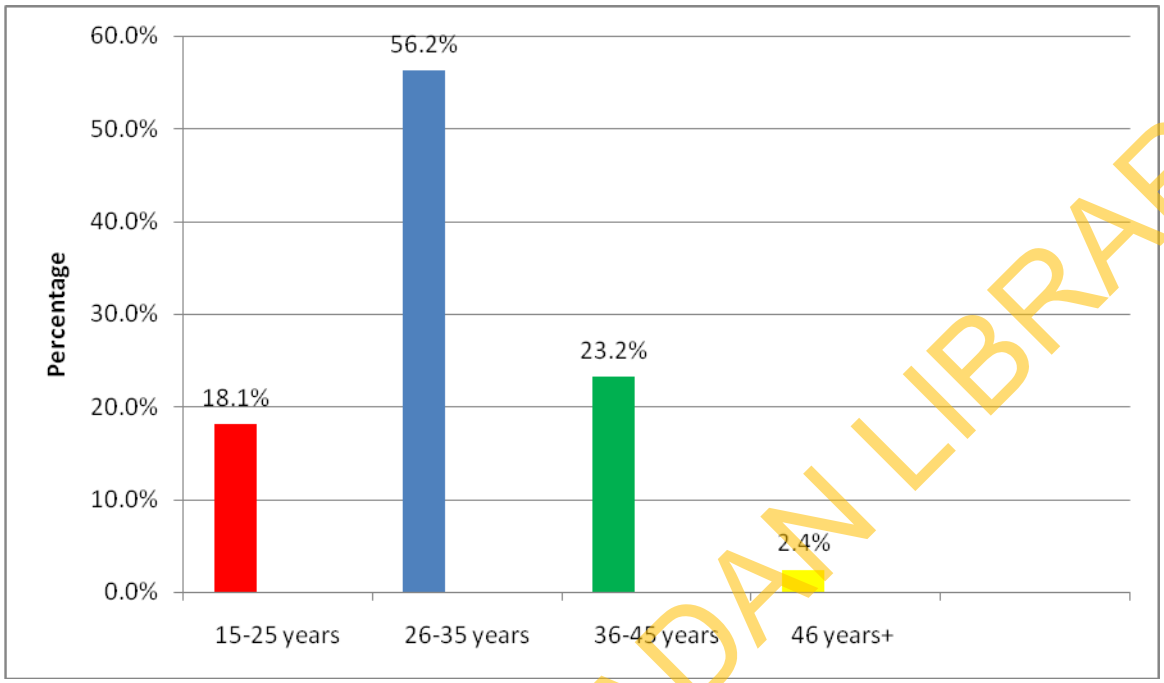

Figure 4.1: Distribution of respondents by age group

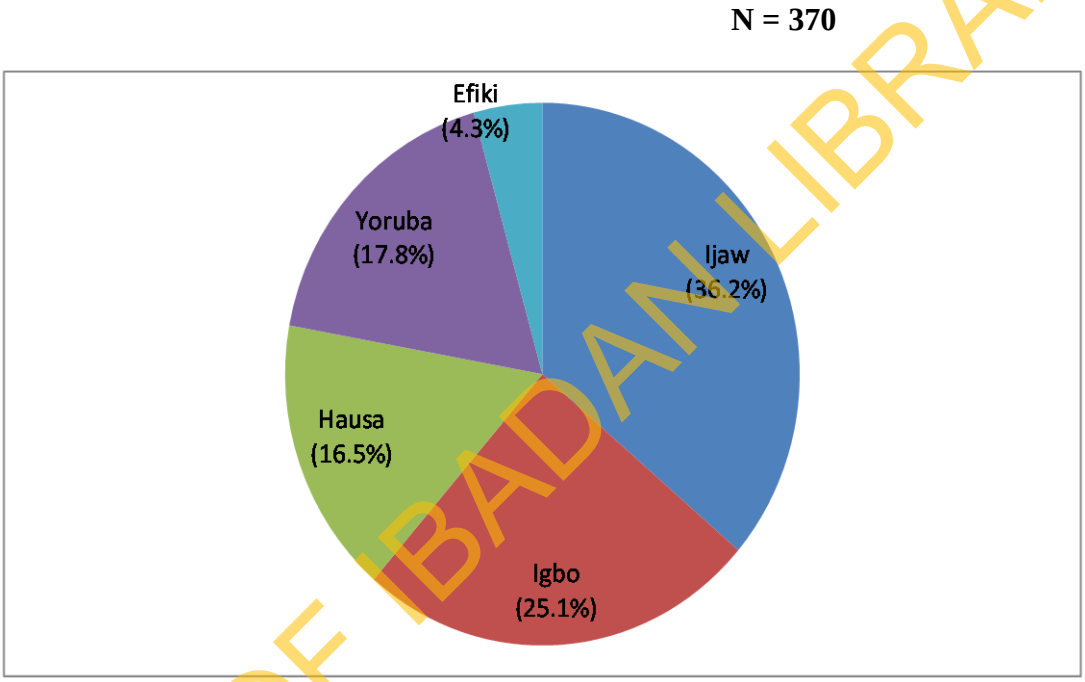

Figure 4.2: The respondents' ethnic group.

N =370

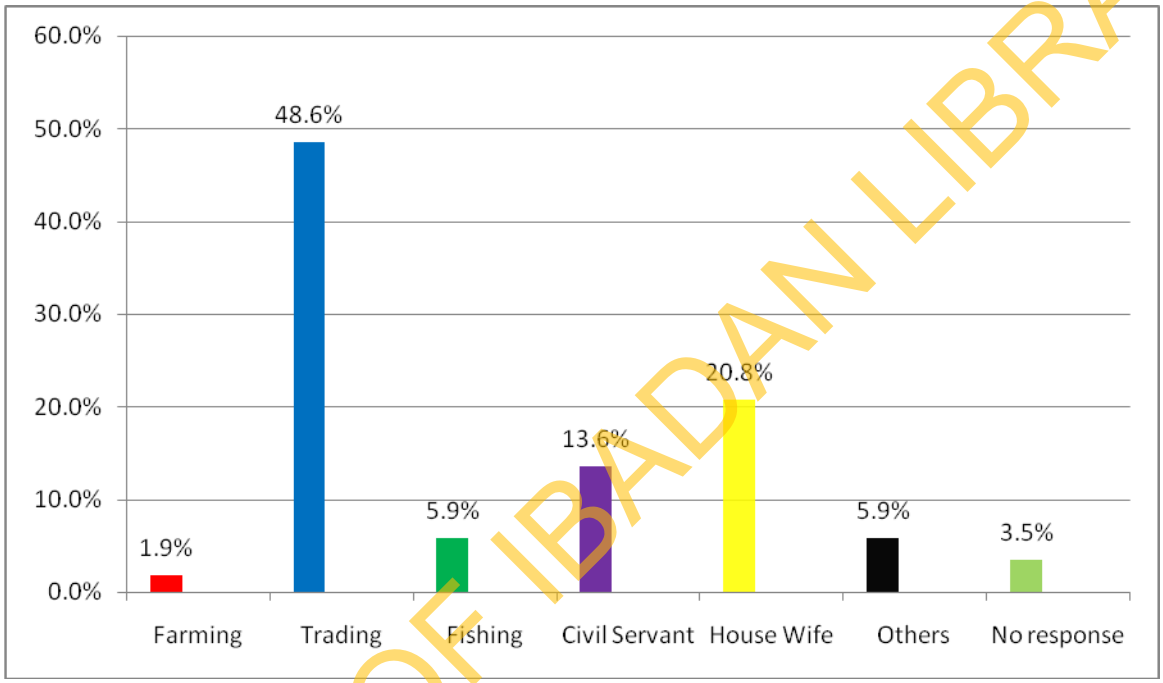

Figure 4.3: The respondents' occupation.

Table 4.1Respondents' Marital status, level of education and religion

N=370

Respondents' Characteristics	**No**	**%**
Marital Status		
Single	58	15.7
Married	290	78.4
Divorced	9	2.4
Widowed	13	3.5
Education		
No formal Education	34	9.2
Primary	36	9.7
Secondary	197	53.2
Tertiary	96	25.9
No response	7	1.9
Religion		
Christianity	348	94.1
Islam	17	4.6
Traditional	5	1.4

4.2. Respondents' Household and Environmental Characteristics

Table 4.2 contains results relating to the respondents' household and the characteristics of their environment. Most (90.3%) respondents were from monogamous homes and many (41.4%) of the respondents' youngest children were aged 12-24 months; those aged 0-11 months accounted for 23.8%. The mean age of their youngest child was 25.0±18.0. Several (39.7%) of the respondents had five or more living children, 17.6% had four while 16.5% had three children. Majority (62.7%) lived in block houses while 27.0% lived in thatched houses. More than half (58.4%) of the respondents lived in swampy areas.

4.3 Respondents' knowledge and experiences of malaria

Respondents' knowledge and experiences relating to malaria are highlighted in Table 4.3. Most (92.7%) had ever heard of malaria and 100% of respondents who had ever heard of malaria indicated they had a child who had ever suffered from malaria. More than a third (36.4%) of the respondents had their children who suffer from malaria once while 26.8% had experienced it twice within three months preceding the study. The other details are contained in the table under reference.

Table 4.2: Respondents' Household and Environmental Characteristics

N=370

Respondents' Household Characteristics	**N**	**%**
Type of Family		
Monogamous	334	90.3
Polygynous	20	5.4
No response (Not married)	16	4.3
Age of youngest child in months**		
0-11	88	23.8
12-24	153	41.4
25-36	42	11.4
37-48	64	17.3
49-60	23	6.2
Number of living children in household***		
0	2	0.5
1	37	10.0
2	58	15.7
3	61	16.5
4	65	17.6
≥ 5	147	39.7
Type of House		
Thatch (Batcher)	100	27.0
Mud	33	8.9
Block	232	62.7
No response	5	1.4
Living Environment		
Swampy area	216	58.4
Dry land	144	38.9
Bushy area	10	2.7

**** Mean 25.0±18.0, Min=0, Max=60**

*****Mean 4.0±2.2, Min=0, Max=15**

Table 4.3: Respondents knowledge and experiences of malaria

Knowledge of Malaria	**N**	**%**
Ever heard of Malaria (N=370)		
Yes	343	92.7
No	27	7.3
Whether any child has ever suffered from malaria (N=343)	343	100
Yes	0	0
No		
Number of time child had malaria within 3 months preceding study* (N=343)		
Once	125	36.4
Twice	92	26.8
Three times	37	10.8
Four times	13	3.8
Always	23	6.7
No response	53	15.5

***Mean 2.0±1.2, Min 1, Max 5**

4.4 Respondents' knowledge relating to causes, symptoms, modes of transmission and methods of preventing malaria

Respondents' knowledge on causes of malaria was presented in Table 4.4. Majority (97.1%), of the respondents stated that malaria is caused by mosquito bites stagnant water (94.8%) and dirty surrounding (95.3%); other listed causes included contaminated foods and drinks (85.4%), as well as exposure to swampy areas and cold weather (69.1%).

Table 4.5 shows respondents' knowledge of the symptoms for recognizing someone with malaria. Majority (96.2%) stated shivering as a symptom while 91.5% mentioned headache. The other listed symptoms include fever (47.8%), excessive crying (87.2%) and diarrhea (28.0%) (See table 4.5 for details).

Table 4.6 highlights respondents' knowledge of the modes of transmission of malaria. Most (95.6%) respondents stated as true that the bite of an infected mosquito, consumption of contaminated foods (84.8%) and drinking unsafe water (87.8%) are routes of transmission of malaria. Some wrongly stated that direct exposure to rain (34.4%), bad odour (23.6%) and close contact with infected malaria patients (14.9%) could lead to malaria (See table 4.6 for details).

Table 4.7 highlights the method of prevention of malaria at home by respondents. Many (43.7%) of the respondents spray insecticides to prevent malaria. 41.7% sleep under the net while 9.6% use a mosquito coil.

Table 4.4: Respondents' knowledge of the causes of malaria

N=343

Main Causes of Malaria	Yes (%)	No (%)	Not sure (%)
Mosquito bites	333 (97.1)**	5 (1.5)	5 (1.5)
Stagnant water	325 (94.8)	1 (0.3)	17 (5.0)
Dirty surrounding	327 (95.3)	7 (2.0)	9 (2.6)
Wet and cold condition	118 (34.4)	133 (38.8)	92 (26.8)
Contaminated food and drink	293 (85.4)	28 (8.2)	22 (6.4)
Exposure to swampy areas and cold weather	237 (69.1)	44 (12.8)	62 (18.1)
Evil spirits	57 (16.6)	116 (33.8)	170 (49.6)

***Multiple responses included**

***Partially correct.**

Table 4.5: Respondents' knowledge of the symptoms of malaria

N=343

Knowledge of the Symptoms of Malaria	**Yes (%)**	**No (%)**	**Not sure (%)**
Shivering (cold) and feeling like staying in the sun	330 (96.2)+	7 (2.0)	6 (1.7)
Headache	314 (91.5)+	19 (5.5)	10 (2.9)
Hotness of the body (fever)	299 (87.2)+	9 (2.6)	35 (10.2)
Loss of appetite	273 (79.6)	40 (11.7)	30 (8.7)
Body or joint pain	226 (65.9)	94 (27.4)	23 (6.7)
Excessive crying	164 (47.8)	130 (37.9)	49 (14.3)
Vomiting	220 (64.1)	77 (22.4)	46 (13.4)
Diarrhea	96 (28.0)	142 (41.4)	105 (30.6)

***Multiple responses presented**

+Correct responses.

Table 4.6: Respondents' knowledge of the modes of transmission of malaria

N=343

Mode of transmission	**Yes (%)**	**No (%)**	**Not sure (%)**
Bite of an infected mosquito	328 (95.7)+	8 (2.3)	7 (2.0)
Eating Contaminated food	291 (84.8)	27 (7.9)+	25 (7.3)
Close contact with malaria patient	51 (14.9)	223 (65.0)+	69 (20.1)
Unsafe Drinking Water	301 (87.8)	30 (8.7)+	12 (3.5)
Bad odour	81 (23.6)	195 (56.9)+	67 (19.5)
Being in the rain	118 (34.4)	116 (33.8)+	109 (31.8)
Presence of wastes	294 (85.7)	25 (7.3)+	24 (7.0)

***Multiple responses presented**

+Correct responses

Table 4.7: Respondents' knowledge of the methods of preventing malaria

N= 343

Statements	**No**	**%**
What could be done to prevent malaria		
Sleep under net	143	41.7
Spraying of insecticide	150	43.7
Eliminating mosquito breeding sites	2	0.6
Cleaning environment	14	4.1
Others-Use of mosquito coil	33	9.6

***All the responses are correct.**

4.5 Respondents mean knowledge scores on malaria

This section presents the categorization of respondents' knowledge scores as well as comparisons of their mean knowledge scores with some pertinent variables. Table 4.8 shows distribution and evaluation of respondents' knowledge scores. Respondents' knowledge was evaluated as poor, fair and good. About a third (32.4%) had good knowledge on malaria while 51.1% were fairly knowledgeable about it.

There was significant difference in respondents' mean knowledge scores on malaria by age group as shown in Table 4.9. Respondents within the age group 46-56 years were more knowledgeable, with a score of 15±1.7, followed by within 36-45years age bracket (14±2.7). The mean score among respondents age26-35 years was 14±3.3whileage group 15-25 years had a mean score of11±6.2.

There was no significant difference in respondents' mean knowledge scores on malaria by level of education as shown in Table 4.10. Respondents with tertiary education were more knowledgeable, with a score of 14.24±2.9; they were closely followed by those with secondary education (13.91±4.1) and no formal education (13.72±2.7).

Table 4.11 highlight the comparison of respondents' mean knowledge scores on malaria by marital status. The mean score of respondents who were divorced was higher 14.56 ±2.53, followed by those who were married with a mean score of 13.96±3.67.There was a significant difference between respondents' knowledge scores by marital status.

The comparison of respondents' mean knowledge scores on malaria by ethnicity is presented in table 4.12. Knowledge of respondents from the Yoruba ethnic group was 14.41±3.44. This is higher compared with 13.59±4.02 obtained by those from Ijaw, Hausa (13.56±4.16) and Igbo (13.50±4.38). However, this observed difference in mean knowledge scores was not statistically significant.

The comparison of respondents' mean knowledge scores by family type is shown in table 4.13. The mean knowledge scores of respondents in monogamous families was 13.85±3.8 while the score among those in polygynous families was 14.4±3.8. The difference was not statistically significant.

Table 4.8: Distribution of respondents' knowledge scores on malaria

N= 370

Categorization of scores (in points)*	No	%	Evaluation
0-12	61	16.5	Poor
13-15	189	51.1	Fair
16-22	120	32.4	Good

***Categorization based on scale adopted**

Table 4.9: Comparison of respondents' mean knowledge scores on malaria by age group

Age group	Number	Mean	S.D.	F-Statistics	Df	p-value
15-25	67	11.16	6.2	12.477	3	0.000*
26-35	208	14.24	3.3			
36-45	86	14.41	2.7			
45 and above	9	15.33	1.7			

Significant at $p<0.05$

Table 4.10: Comparison of respondents' mean knowledge scores on malaria by level of education

Level of Education	Number	Mean	S.D.	F-Statistics	Df	p-value
No formal education	36	13.72	2.68	0.350	3	0.789
Primary	197	13.57	4.31			
Secondary	96	13.91	4.07			
University (Tertiary)	34	14.24	2.97			

Difference not significant at p>0.05

Table 4.11: Comparison of respondents' LLITNs knowledge score on malaria by marital status

Marital Status	Number	Mean	S.D.	F-Statistics	Df	p-value
Single	58	12.39	5.82	2.680	3	0.047
Married	290	13.96	3.67			
Divorced	9	14.56	2.53			
Widowed	13	14.23	2.53			

Difference not significant at p>0.05

Table 4.12: Comparison of respondents' mean knowledge score on malaria by ethnicity

Ethnicity	Number	Mean	S.D.	F-Statistics	Df	p-value
Ijaw	110	13.59	4.02	1.993	4	0.0951
Igbo	66	13.50	4.38			
Hausa	61	13.56	4.16			
Yoruba	117	14.41	3.44			
Efik	16	11.69	5.51			

Difference not significant at $p>0.05$

Table 4.13: Comparison of respondents' mean knowledge score on malaria by family type

Family type	Number	Mean	S.D.	df	t-value	p-value
Monogamy	334	13.85	3.88	1	0.6137	0.3692
Polygamy	20	14.40	3.78			

Difference not significant at p>0.05

4.6 Respondents' knowledge and sources of information on mosquito nets

Respondents' knowledge and sources of information relating to mosquito nets are shown in Table 4.14. Majority (95.7%) had heard of mosquito nets; Clinics (34.5%) and Radio (22.9%) were the most commonly reported sources of information on mosquito nets. Friends (21.8%) and Outreaches (20.9%) were other sources of information on mosquito nets mentioned by the respondents.

4.7 Respondents' possession and source of possession of LLITNs

The results relating to respondents' possession and source of acquisition of LLITNs are highlighted in Table 4.15. Many (65.3%) affirmed that they had LLITNs and the respondents who had LLITNs, the table also shows that more than a third (36.8%) had one LLITNs each, 45.9% respondents had two LLITNs each while 13.4% had three LLITNs. The commonest sources of LLITNs mentioned by respondents were from the free distributions (46.8%), clinics (26.1%) and markets (14.2%).

Respondents' practices relating to LLITNs are shown in Table 4.16. Most (98.3%) disclosed they slept under LLITNs, 14.3% of the respondents had just started using LLITNs, 23.8% had used it for less than three months prior to the study and slightly over half (51.1%) had used it for a year. On frequency of sleeping under the net, about half (50.7%) reportedly used it daily while 41.4% disclosed that they used LLITNs occasionally. Majority (72.7%) of the respondents stated that they encountered problems while using LLITNs. The most reported problem was heat (58.8%); the other was suffocation (6.7%). There was a high non-response of 30.9%.

Table 4.14: Respondents' knowledge and sources of information about mosquito nets

Respondents' knowledge and sources of information on mosquito nets	No	%
Ever heard of mosquito nets (N=370)		
Yes	354	95.7
No	13	3.5
No response	3	0.8
Sources of info about mosquito nets (N=354)		
Radio	81	22.9
Friends	77	21.8
Outreaches/Campaigns	74	20.9
Clinics	122	34.5

Table 4.15: Respondents' possession and source of LLITNs

Statements on possession of LLITNs	No	%
Do you have LLITNs (N=354)		
Yes	231	65.3
No	123	34.7
If yes, how many LLITNs do you have in your household (N=231)*		
1	85	36.8
2	106	45.9
3	31	13.4
4	8	3.5
6	1	0.4
Source of acquisition		
Free distribution	102	46.8
Market	31	14.2
Clinic	57	26.1
Drug shop	12	5.5
NGO	1	0.5
No response	13	6.0

***Mean 1.85, SD=0.83, Min 1, Max 6**

Table 4.16 Respondents' practice and use of LLITNs

Statements on Practice	No	%
Mother sleep under (231)		
Yes	227	98.3
No	4	1.7
Duration of using LLITNs (231)		
Just started	33	14.3
<3 months	55	23.8
6months	20	8.7
1 year	118	51.1
Others (>1 year)	5	2.8
Frequency of sleeping under LLITNs (227)		
Daily	115	50.7
Weekly	11	4.8
Occasionally	94	41.4
No response	7	3.1
Whether encountered any problems sleeping under the net? (N=227)	165	72.7
Yes	60	26.4
No	2	0.9
No response		
Problems encountered while using net (N=165)		
Heat	97	58.8
Suffocation	11	6.7
Not interested	4	2.4
Not comfortable	2	1.2
No response	51	30.9

4.8 Perception about LLITNs and malaria

Table 4.17a presents the respondents' perception relating to LLITNS and malaria. Several respondents (45.0%) were of the view that LLITNs prevent mosquito noise, 67.9% perceived LLITNs could prevent mosquito bites, 50.5% perceive LLITNs use is necessary only when mosquitoes are plenty. Some respondents (21.1%) stated that it was not convenient to tie the net in their room.

Respondents' other perceive relating to malaria and LLITNs are presented in table 4.17b. Majority (59.6%) perceived that it is difficult to use LLITNs during dry seasons. The perception of 43.1% respondents was that mosquito-repelling chemical used in treating LLITNs is dangerous to children's health. Only 1.5% of the respondents were of the opinion that their culture prohibits the use of mosquito nets.

Table 4.17a: Respondents' perception about LLITNs

N= 327

Perception about LLITNS	No	%
To prevent mosquito noise		
Yes	147	45.0
No	61	18.7
I don't use it	99	30.3
No opinion	20	6.1
To prevent mosquito bites		
Yes	222	67.9
No	3	0.9
I don't use it	100	30.6
No opinion	2	0.6
Mosquito bites can cause malaria		
Yes	219	67.
No	6	1.8
I don't use it	101	30.9
No opinion	1	0.3
Is only necessary when mosquitoes are plenty		
Yes	165	50.5
No	43	13.1
I don't use it	95	29.1
No opinion	24	7.3
It is not convenient to tie in my room		
Yes	69	21.1
No	122	37.3
I don't use it	89	27.2
No opinion	47	14.4

Table 4.17b: Respondents' perception about LLITNs

N= 327

Perception about LLITNs	No	%
Is good to use during raining season		
Yes	171	52.3
No	22	6.7
I don't use it	85	26.0
No opinion	49	15.0
It is difficult to use during the dry season because of heat		
Yes	195	59.6
No	17	5.2
I don't use it	71	21.7
No opinion	44	13.5
Chemical in LLITNs is not good for children		
Yes	141	43.1
No	45	13.8
I don't use it	46	14.1
No opinion	95	29.1
I don't use LLITNs because it is too expensive		
Yes	32	9.8
No	175	53.5
I don't use it	64	19.6
No opinion	56	17.1
Our culture does not permit us to sleep under the LLITNs		
Yes	5	1.5
No	201	61.5
I don't use it	25	7.6
No opinion	96	29.4

4.9 Factors hindering the use of LLITNs

Tables 4.18a, 4.18b and 4.18c illustrate the factors hindering the use of LLITNs. The resource-related hindrances to the use of mosquitoes net by respondents are shown in table 4.19a. Cost was a hindrance to 16.5% respondents. Lack of availability and lack of information on selling outlets were hindrances to 25.1% and 29.4% respectively. Many respondents (34.3%) had problem relating to the handling of nets. Little space and poor sleeping condition/position were challenges which adversely affects the use of nets among 39.8% and 43.7% respectively.

Table 4.18b presents respondents' personal and social factors which hinders use of nets among them. Many (40.4%) stated that a hindrance to net use was the belief or perception that mosquitoes can still bite through the net. Dislike of nets by house hold members and lack of concern for the availability of mosquitoes were hindrances listed by 42.5% and 33.3% respectively. The other hindrances are contained in the table.

The other factors which serve as hindrances to the use of LLITNs are highlighted in table 4.18c. The difficulty in tucking the net each night is a challenge to 34.6% of the respondents. The adverse effects on sexual relations and difficulty in getting out of the net each night were stated by 30.0% and 27.5%respectively (See table for details).

Table 4.18a: Resource-related factors which serve as hindrances to the use of LLITNs among respondents

N=327

Resource related factors	No	%
Cost of the net		
Yes	54	16.5
No	237	72.5
Not sure	36	11.0
Unavailability of the net around my area		
Yes	82	25.1
No	216	66.1
Not sure	29	8.9
Lack of information about outlets selling nets		
Yes	96	29.4
No	198	60.6
Not sure	33	10.1
Difficulty in handling the net		
Yes	112	34.3
No	157	48.0
Not sure	58	17.7
Little space in the house		
Yes	130	39.8
No	141	43.1
Not sure	56	17.1
Poor sleep condition/ position		
Yes	143	43.7
No	106	32.4
Not sure	78	23.9

Table 4.18b: Personal and social factors which serve as hindrances to the use of LLITNs **N=327**

Personal, social and physical factors	No	%
Mosquitoes still can bite through the net		
Yes	132	40.4
No	112	34.3
Not sure	83	25.4
Dislike for the net among some household members		
Yes	139	42.5
No	99	30.3
Not sure	89	27.2
Lack of concern or not being so cared by mosquitoes		
Yes	109	33.3
No	118	36.1
Not sure	100	30.6
Sleeping under the net is uncomfortable		
Yes	226	69.1
No	30	9.2
Not sure	71	21.7
Causes heat while sleeping		
Yes	248	75.8
No	14	4.3
Not sure	65	19.9
Sleeping under the net can cause suffocation for children		
Yes	139	42.5
No	78	23.9
Not sure	110	33.6

Table 4.18c: Other factors which serve as hindrances to the use of LLITNs among respondents **N=327**

Other factors	No	%
Difficulty in sleeping comfortably in LLITNs		
Yes	135	41.3
No	100	30.6
Not sure	92	28.1
Hindrance to sexual relations		
Yes	98	30.0
No	98	30.0
Not sure	131	40.1
Difficulty in getting out of the net at night		
Yes	90	27.5
No	115	35.2
Not sure	121	37.0
No response	1	0.3
Difficulty in tucking the net each night		
Yes	113	34.6
No	92	28.1
Not sure	122	37.3
Size not adequate for use		
Yes	97	29.7
No	113	34.6
Not sure	117	35.8

4.10 Perceived ways and attitude of mother towards malaria prevention

Table 4.19 highlight respondents' perceived ways of malaria prevention. Most (98.9%) of the respondents were of the view that keeping the environment clean prevents one from malaria infection, while 94.1% where of the belief that using indoor residual spraying is good for malaria prevention. The opinion of 90.0% was that eliminating mosquito breeding sites prevents malaria infection. Most respondents stated that malaria can be prevented by eliminating breeding sites (See table for details).

Table 4.19: **Respondents' perceived ways of preventing malaria**

N=327

Respondents' perceived ways of malaria prevention	**No**	**%**
Keeping the environment clean prevents one from malaria infection	366	98.9
Using indoor residual spraying is good for malaria prevention	348	94.1
Eliminating mosquito breeding site	261`	90.0
Use of mosquito repellants	322	87.0
Avoidance of conditions that make one cold	261	90.5
Use of ITN can prevent malaria	239	64.6
Avoiding working in the sun	161	43.5
Praying and faith healing helps in preventing malaria infection	159	43.0
Breathing as a way of protecting malaria infection	116	31.4
Using herbs and cow dung automatically prevent malaria infection	73	19.7
Keeping the environment clean prevents one from malaria infection	366	98.9
Using indoor residual spraying is good for malaria prevention	348	94.1
Eliminating mosquito breeding site	261	90.0
Use of mosquito repellants	322	87.0
Avoidance of conditions that make one cold	261	90.5
Use of ITN can prevent malaria	239	64.6
Avoidance working in the sun	161	43.5
Praying and faith healing helps in preventing malaria infection	159	43.0
Breathing as way of protecting malaria infection	116	31.4
Using herbs and cow dung automatically prevent malaria infection	73	19.7

4.11 Attitude towards malaria prevention

Respondents' attitude towards malaria prevention is presented in table 4.20a. Many (45.9%) agree that their regular use of ITN is preventive measure for malaria infection. Attitudinal statements relating to the prevention of prevention of malaria to which the respondents agreed with included the following: eliminating mosquitoes breeding sites will protect one from malaria (72.2%), and use of mosquitoes repellant will prevent one from being infected (63.2%). The other details are contained in the table.

Table 4.20 Respondents' attitude towards malaria prevention

	(%) N=370				
	S	**A**	**U**	**D**	**SD**
If I use ITN regularly I cannot be infected with malaria	85(23.0)	170(45.9)	54(14.6)	48(13.0)	13(3.5)
Eliminating mosquito breeding sites will protect me from malaria infection	68(18.4)	267(72.2)	29(7.8)	6(1.6)	0(0.0)
I avoid working in the sun so that I cannot be infected with malaria	56(15.1)	152(41.1)	60(16.2)	83(22.4)	19(18.6)
I always avoid getting cold, it prevents me from malaria infection	69(18.6)	181(48.9)	39(10.5)	54(14.6)	27(7.3)
If I use mosquito repellent, we will not be infected with malaria	71(19.2)	234(63.2)	48(13.0)	11(3.0)	6(1.6)

Key: **S** = Strongly agree
A =Agree
U= Undecided
D= Disagree
SD=Strongly disagree

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Socio-demographic profile

A preponderance of respondents were in the 25-29 years age bracket with a mean of 31.0 years. Majority of the respondents were from the Ijaw ethnic group followed by Igbo. This was as a result of the fact that the community is a predominantly Ijaw-speaking community (NDHS, 2014). Ninety-four percent of the respondents were Christians; this was probably due to the fact that the study location has a fairly high proportion of Christians. It was clear however, that religious background and faith of the respondents did not affect the use or knowledge of insecticide-treated nets. Majority of the respondents were married, over half had secondary education and many of them were traders. These and other socio-demographic characteristics should be taken into consideration when designing educational intervention aimed at controlling malaria in the study area.

5.2 Knowledge of causes, transmission and symptoms of malaria

It was not strange to find out that the study population had heard of malaria. This cannot be unconnected with the fact that malaria is one of the major endemic diseases in the study area (Parker, 2009).

It was shown in this study that majority (92.7%) of the respondents' children had suffered malaria at some point or the other. This also attests to the endemic nature of the disease, this is in agreement with the World Malaria Report by the WHO in 2011, that every year, malaria is reported to cause more than 250-660 million infections and more than a million deaths, mostly among African children (World Malaria Report, 2011).

One of the interesting findings in this study is the high proportion of the respondents who stated that mosquito bite is the cause of malaria. This is in accordance with the common view that female anopheles mosquitoes are implicated in the transmission of malaria especially in Nigeria (Kakkilaya, 2011; CDC, 2012). The mosquitoes only serve as

vectors for the transmission of malaria (CDC, 2012). The actual causative agent is plasmodium which consists of several species, although mosquito is implicated, it is not the causes of the disease (Kalillaya, 2006; CDC, 2012). It has been revealed in this study that majority of the respondents had some basic knowledge of the major symptoms of malaria. Previous studies have revealed the symptoms listed by the respondents (UNICEF, 2007). The other symptoms often reported include chill, loss of appetite, general body ache, changes in the colour of eyes, and nausea and vomiting.

It should be noted that malaria parasites get into the body through several ways and these include transmission through contaminated needles or transfusion blood (PHAC, 2004; Kakkilaya, 2011; MedicineNet.com, 2014). Malaria can also be acquired through organ transplants and Intra Venous-IV drugs (MedicineNet.com). It is debated able whether the aforementioned other means of transmission are of public health importance. Community health education interventions are however, still needed to upgrade nursing mothers knowledge relating to these other possible means of transmission.

5.3 Knowledge on the use of nets

It has been revealed in this study that majority of the respondents had heard about mosquito treated net and their major source information was the radio. This was in accordance to earlier studies which states that radio was the major source of information among people on the health issues followed by health providers, relatives, drug dealers and health posters **(**Okware, 1996; Wanyama, 1997; Namusobya, 1998; Net Mark, 2001; Okello, 2001; Batega, 2003; Mangeni, 2003 and Twebaze 1998). It is to be noted also that aggressive marketing by drug producers/distributors on radio was a very common source of information on insecticide treated nets (Mangeni, 2003 and Twebaze 1998).

Majority (98.2%) of the respondents slept under LLITNs. This is slightly different from the report of the NDHS (NPC, 2008) which stated that only 17.0% of households in Nigeria owned a mosquito net (treated or untreated) and eight percent of households owned more than one mosquito net.

It was revealed that majority (73.2%) of the respondents' encountered problem sleeping under the net: a common problem reported was heat. This is in agreement with the study carried out by Frey et al. (2006) which reveals that users experienced heat particularly during the dry season when using LLITNs. As reported in a study conducted by Frey et al. (2006), young children who usually slept with their mothers under the ITN and compliance during the dry and rainy seasons were 34.0% and 79.0% respectively. Important reasons for low compliance during the dry season were high temperatures inside houses and problems related to changing sleeping places during the night.

Many of the respondents acquired their LLITNs through free distribution programme from state government. Mosquitoes' nets are routinely distributed to nursing mothers in Rivers State including the study area.

5.4 Factors hindering the use of LLITNs

This study revealed that only few of the respondents cited unaffordable cost of nets as a factor which hinders their use of LLITNs. Chitsulo et al., (2000) had noted in their study that cost was a major reason for non-ownership of nets. They observed that the poor may not always be able to afford the cost of purchasing one. Chuma et al (2010) also noted that the price or cost is one of the barriers to access to ITN.

Other factors hindering the use of net in this study included lack of inadequate skill for hanging the net, little space in the house, poor sleeping conditions and position. This agrees with the findings of the study carried out by Rowley (1997).Rowley (1997) had stated that other important factors that hinder ownership and (or) use of nets include size of houses, type and availability of sleeping facility, and sleeping arrangements. Some of the other factors hindering the use of net in this study included the perception that it could be uncomfortable and that it causes heat. Several studies such as those conducted by (Tobin and Alex-Hart, 2014; Nnodim, 2014), have implicated the generation of heat by ITN as a factor which make them uncomfortable to use by some people.

5.5 Perception and Attitude of mothers to malaria prevention

This study expressed perceptions which are favorable to the use of LLITNs. The LLITNs was perceived to be effective for the prevention of malaria. The perception by a few of the respondents in this study that praying and faith healing helps in preventing malaria has no scientific basis. Absolute reliance on praying and faith healing alone can put mothers and their under-five children at risk of malaria.

The findings of the study shows that mothers' attitude to malaria prevention varies. Majority of the respondents had positive attitude to LLITNs; that using LLITNs regularly prevents malaria infection. A positive perception such as this was noted by Tamiru (2009) in a study he conducted in Ethiopia. In the Ethiopian study majority had positive attitude to LLITNs based on the fact that it is highly effective for preventing malaria. In addition to the use of LLITNs, most respondents in this study had positive attitude to the adoption of environmental control in the control of malaria.

5.6 Implications for Health Promotion and Education

The findings of this study have several implications for health promotion and education. The implications could be used for planning, implementation and evaluation of LLITNs education programmes targeted at mothers of under-five children within the study area.

Health education is any planned combination of learning experiences designed to predispose, enable and reinforce voluntary behavior conducive to health in individuals, groups or communities (Green and Kreuter, 1999). It can also be described as an intervention used to facilitate voluntary adaptation of positive attitude (Green, Kreuter, Deeds and Patridge, 1980). It is concerned with reinforcing and changing knowledge, perception, attitude and practices of people through effective communication of factual information and use of other strategies, with the aim of promoting optimum well-being. Health Education can therefore be used to bridge the gap between health information and appropriate attitude relating to mosquito bites and malaria infection.

Public enlightenment

Public enlightenment, one of the health education strategies, can be used to promote the utilization of LLITNs among mothers in the community. Findings from the study showed that mothers or household who own at least a net and do not sleep under the bed net, do not have adequate knowledge and positive perception relating to the relationship between mosquito bite and the occurrence of malaria. Health education programmes should be aimed at upgrading knowledge of these issues and tackles the misconceptions that could be associated with malaria and LLITNs.

Public enlightenment programs have potentials in dispelling the inherent conceptions of those who have negative attitude towards the use of nets. The use of well-tailored information, education and communication materials (jingles) through media to give out information regarding the safety, uniqueness, procedures and benefits of nets to people so as to reach out to a large number of the target population and thereby influence their knowledge, attitude and willingness, will go a long way in achieving the global, national and state level goals and objectives of combating malaria in the area.

Conducting Training in the community on the proper use of nets

Health promotion and education do not only provide factual health information, it also encompasses other components such as developing health skills, creating supportive environment, advocating favourable policies targeted towards helping the individual, community and the nation prevent health problems, promote healthy attitude and good perception and facilitate access to distribution and use of nets (Fertman andAlliensworth, 2010).

Educational intervention such as training of the mothers in the community will effectively address the challenge of low knowledge and perception of prevention of malaria behaviours. This training should cover knowledge definitions, methods of prevention, mode proper use and tucking of mosquitoes nets, benefits of its use and health, social, economic and emotional implications of the consequences of not using

nets. This can be done by organizing trainings for the mothers according to their ministry, as this study will serve as needs assessment. Thereafter, a post-test will be conducted at the end of the training to assess their increase in knowledge. The training facilitators will be health promoters from the State Ministry of Health and experts from the department of Health Promotion and Education with recognised experts in the field of tropical diseases.

Advocacy

Advocacy for the involvement of government in adequate distribution of nets of various sizes, raising role model mothers and financing the services of various health workers, which include community health extension workers, community volunteers workers, traditional birth attendants, private medicine vendors, women's association and other volunteers will help reduce the endless health issues arising from malaria epidemic and the huge amount of money being spent on medical treatment and on hospital visits, else, these poor mothers may end up dying in weekly consultations, negative attitude towards the use of nets and poor perception of its efficacy and efficiency without regards to the little side effects or discomforts identified by the respondents. Enlisting the services of religious leaders in the campaign is also advocated because of the influence of religious leaders on their followers.

5.7 Conclusions

The research explored the knowledge, perceptions, attitude and practices relating to LLITNs among mothers of under-five children in Bundu-Ama community. Despite the fact that majority of the respondents had a good knowledge of malaria being transmitted by mosquito bites. Almost all the mothers in the study had heard of it LLITNs with clinic being the major source of information. The study revealed that there was no significant difference in respondents' means knowledge scores on malaria and their level of education.

The study also found out that several respondents were of the view that LLITNs prevent mosquito noise, many affirmed that they had LLITNs and most disclosed they slept under LLITNs three months prior to the study, yet the level of it proper practice is still low.

This might be due to their poor knowledge of its proper use provided by health workers who are not specialist in the field of tropical disease.

Respondents' awareness and sources of information relating to mosquito nets never reflected in their attitude towards LLITNs use. Perception and attitude of respondents towards LLITNs was relatively high. Most of the respondents were of the view that keeping the environment clean prevents, belief that using indoor residual spraying is good for malaria prevention and eliminating mosquito breeding sites were the opinions towards malaria prevention, yet, majority indicated they had a child who had ever suffered from malaria. The opinion might be due to inadequate and health promoting messages in the community.

Majority of the respondents stated various problems encountered while using their LLITNs. Among the factors identified as non compliance to proper use of LLITNs included cost, lack of availability and lack of information on selling outlets, problem relating to the handling of nets, little space and poor sleeping condition/position, difficulty in tucking the net each, adverse effects on sexual relations and difficulty in getting out of the net each nights.

5.8 Recommendations

The recommendations based on the findings of this study are as follows:

1. A behavioral change communication intervention is needed to promote positive attitudes and perception relating to the use of bed nets among mothers in the study area
2. The distribution of Long Lasting Insecticidal Nets among nursing mothers in the study area should be accompanied with community based net use education programme.
3. Mothers in the study area who have adopted the use of LLITNs should be recruited and trained as peer educators or role models to facilitate the acquisition and use of LLITNs.

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APPENDIX 1

QUESTIONAIRE

KNOWLEDGE, PERCEPTION, ATTITUDES AND PRACTICES RELATING TO LONG LASTING INSECTICIDAL NET AMONG MOTHERS OF UNDER-FIVE IN BUNDU-AMA, PORT HARCOURT LOCAL GOVERNMENT AREA, NIGERIA

Introduction

Dear respondent,

Good morning/afternoon, I am a Post Graduate Student of the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan.

We are conducting a study which focuses on '**knowledge, perception, attitudes and practices relating to long lasting insecticidal treated net (LLITNs) among mothers of under five in Bundu-Ama, Port Harcourt Local Government Area, Nigeria.**

1. Please, be informed that your participation in this study is voluntary and you are free to withdraw from it at any time without any consequence whatsoever.
2. Your identity, responses and opinions will be kept confidential and no name is required in filling the questionnaire.
3. As much as possible, kindly give honest responses to the questions that will be asked in this questionnaire.
4. This study will also yield information that will help government and other stakeholders in the management of malaria in the state to ensure the proper use of the insecticide treated Net to reduce the burden of malaria.

You have a right to withdraw at any given time if you choose to. We will greatly appreciate your help in responding and taking part in the study. Thank you.

Consent given? Yes ( ) No ( )

Section A: SOCIO-DEMOGRAPHIC DATA

1. How old are you now? (in years as at last birthday) ----------
2. What is your ethic group? (1) Ijaw ☐ (2)Ibo ☐ (3)Hausa ☐ (4)Yoruba ☐ (5)Others specify ----------
3. What is your religion? (1)Christianity ☐ 2)Islam ☐ (3)Traditional ☐ (4)Others specify ----------
4. What is your marital status? (1) Single ☐ (2) Married ☐ (3) Divorce ☐ (4) Widow ☐ (5) Other specify ----------
5. What is your highest level of educational qualification (1) Primary school ☐ (2)Secondary ☐ (3)Tertiary ☐ (4)Non formal education ☐ (5) Others specify ------

6.What is your Occupation? (1) Trading ☐ (2)Fishing ☐ (3) Farming ☐
(4) Full Housewife/Unemployed ☐ (5) CivilServant ☐
(6)Artisan ☐ (7) Others specify……..

7.What Type of family do you have? (1) Monogamous ☐ 2) Polygnous ☐

8.Age of youngest child as last birthday ----------

9.Total number of children in your household ----------

10.Type of housing? (1) Tar house ☐) Mud house ☐ 3)Block house ☐
(4)Others……..

11.Type of Environment? (1) Swampy areas ☐) Dry land(3) C☐ers specify-----

SECTION B KNOWLEDGE OF CAUSE, TRANSMISSION, SIGNS AND SYMPTOMS OF MALARIA

12. Have you ever had about malaria? (1) Yes ☐ (2) No ☐

13 Have any of your children suffered from malaria? (1) Yes ☐ (2)No ☐

14 If yes, how many times have they had malaria in the last 3 months? *Please specify*

15 The table below contains cause(s) of malaria (Tick√) all that apply

15.	What are the main cause(s) of malaria?	Tick(√)		
		Yes	No	Not Sure
1	Mosquito bite			
2	Stagnant water			
3	Dirty surrounding			
4	Wet and cold condition			
5	Exposure to swampy areas and cold weather			
6	Contaminated food and drinking water			
7	Evil spirit			

The table below contains a list of symptoms. For each of the spaces provided, please (√) "YES" if it is one of the symptoms of malaria, and "No" if it is not. If you are not sure, please tick (√) "Not Sure"

16.	**Symptoms of Malaria**	**Tick (√)**		
		Yes	No	Not Sure
1	Shivering (cold) and feeling like staying in the sun			
2	Headache			
3	Fever(Hotness of the body)			
4	Loss of appetite			
5	Body or joint pain			
6	Excessive crying			
7	Vomiting			
8	Diarrhoea			

The table below contains a list of mode of transmission. For each of the spaces provided, please (√) "YES" if it is one of the symptoms of malaria, and "No" if it is not. If you are not sure, please tick (√) "Not Sure"

17.	**Mode of transmission**	**Tick (√)**		
		Yes	No	Not Sure
1	Bite of infective mosquitoes			
2	Close contact with malaria patient			
3	Unsafe drinking water			
4	Bad odor			
5	Eating contaminated food			
6	Being in the rain			
7	Presence of wastes			

18. Which of the following do you do to prevent malaria in your home?

(1) Sleeps under the net ☐ (2) Spraying of insecticide ☐ (3) Eliminating mosquito breeding sites ☐ (4) Cleaning the environment ☐ (5) Others specify --------

Section C: PRACTICE TOWARDS SLEEPING UNDER LLITN

19. Have you ever heard about the use of mosquito net for preventing malaria? (1) Yes ☐ (2) No ☐

20. If Yes, ☐ source of information? (1) Radio ☐ (2) Friends ☐ (3)Outreach campaign ☐ 4. Clinic ☐

21. Do you have insecticide treated net? (1)Yes ☐ (2) No ☐

22. If Yes, How many ITN do you have in your household ----------

23. Do your children sleep under insecticide treated net? (1) Yes ☐ (2)No ☐

24 How long have you been using bed net/s in your household? (1). Just started ☐ (2).Less than 3 months ☐ (3). 6 months ago ☐ (4)1 year ago ☐

(5) Others specify…….

25. How often do they sleep under ITNS? (1). Daily ☐ (2).Weekly ☐ (3).Occasionally ☐ (4). Others specify----------

26. How many children below 5 years do you have (Age in months)……

27. How many of them sleeps under the net ……

28. Do they encounter any problem sleeping under net? (1). Yes ☐ (2). No ☐

29. If yes, what are the problems they encounter? ----------

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30. From what source did you acquire your net? 1. Free distribution from state ☐ government 2. Market ☐ 3.Clinic ☐4.Drug shop ☐5.NGO ☐6. Other sources specify ----------

31. Why don't you practice the use of mosquito treated bed nets to prevent malaria? 1. ITN don't prevent malaria ☐2. Not comfortable ☐3. ITN causes heat ☐4. Others reason specify ----------

The table below contains a list of statements about insecticide treated net (ITN).Go through each statement carefully and ticks (√) to indicate whether it is True or False. If you are not sure or you do not use ITN, tick (√) the appropriate column.

32.	Believes about ITN Use and Malaria	Tick (√) as many as applied to you			
		True	False	I don't use it	Not Sure
I	I use ITN because of mosquito noise				
2	I use ITN because mosquito bites				
3	I use ITN because mosquito bites causes malaria				
4	ITN is only necessary when mosquito are plenty				
5	ITN is not convenient to tie in my room				
6	ITN is good to use during raining season				
7	ITN is difficult to use during the dry season because of heat				
8	ITN chemical is not good for children.				
9	I don't use ITN because it is too expensive				
10	Our culture does not permit us to sleep under the ITN				

SECTION D. FACTORS THAT COURSE HINDRANCE TO MOTHERS OF UNDER-FIVE TO THE USE OF LLITNs. Indicate whether it has affected you by ticking (√) Yes or No.

33.	Factors Hindering the use of net (LLITN)	Tick(√) as many as applied to you		
		Yes	No	Not Sure
I	Cost of the Net			
2	Unavailability of the nets around our area			
3	Lack of information about outlets selling nets			
4	Difficulty in hanging the nets			
5	Little space in the house			
6	Poor sleeping conditions and positions			
7	Mosquitoes still can bite through the net			
8	Dislike for the net among some household members			
9	Household resistant to malaria or not bothered by mosquitoes			
10	Sleeping under net is uncomfortable			
11	Causes heat while sleeping			
12	Sleeping under the net can cause suffocation for children			
13	Inability to adapt to various sleeping habits			
14	Hindrance to sexual relations			
15	Difficulty in getting out of the net at night			
16	Difficulty in tucking the net each night			
17	The size of the net			

SECTION E: PERCEPTION OF MOTHERS TOWARDS MALARIA PREVENTION. The table below contains a list of statements that assesses your perception towards malaria prevention. Go through by ticking (√) Yes or No or Not sure if you are not sure.

34	STATEMENTS perceived ways for preventing malaria	Tick(√) as many as applied to you		
		Yes	No	Not Sure
1	Use of ITN can prevent malaria			
2	Keeping the environment clean prevents one from malaria infection			
3	Using Indoor Residual Spraying is good for malaria prevention			
4	Avoiding getting cold is important in malaria prevention			
5	Avoiding working in the sun can prevent malaria			
6	Eliminating mosquito breeding sites prevents malaria infection			
7	Using of mosquito repellants helps in preventing malaria			
8	Breastfeeding of the baby regularly can protect the baby against malaria infection			
9	Praying and faith healing helps in preventing malaria infection			
10	Using herbs and cow dung automatically prevents malaria infection			

SECTION F: ATTITUDE OF MOTHERS TOWARDS MALARIA PREVENTION

The table below contains a set of attitudinal statement; for each tick (√) whether you strongly agree (SA), Agree (A), Undecided (U), Disagree (D) or strongly disagree (SD).

35	**Attitudinal statements**	**SA**	**A**	**U**	**D**	**SD**
1	If I use ITN regularly I cannot be infected with malaria					
2	Eliminating mosquito breeding sites will protect me from malaria infection					

3	I avoid working in the sun so that I cannot be infected with malaria					
4	I always avoid getting cold, it prevents me from malaria infection					
5	If I use mosquito repellent, we will not infected with malaria					
6	I always pray and believe in God, so I cannot suffer malaria					
7	Using herbs and other traditional medicines automatically prevents my children from malaria infection.					
8	Malaria prevention not necessary because, it is cause by evil spirits.					

Thank you for your willing participation and patience in this interview

Appendix II

SCORING OF KNOWLEDGE SCALE

Q15	What are the main cause(s) of malaria	Maximum scoring
1	**Mosquito bite** 1.Yes* 2. No 3. Not sure	1 Point
2	**Stagnant water** 1.Yes 2. No* 3. Not sure	1 Point
3	**Dirty surrounding** 1.Yes 2. No* 3. Not sure	1 Point
4	**Wet and cold condition** 1.Yes 2. No* 3. Not sure	1 Point
5	**Exposure to swampy areas and cold weather** 1.Yes 2. No* 3. Not sure	1 Point
6	**Contaminated food and drinking water** 1.Yes 2. No* 3. Not sure	1 Point

7	**Evil spirit** 1.Yes 2. No* 3. Not sure	1 Point
	Total scores on the main cause(s) of malaria	**7 points**

*Right answers

Q16	**Symptoms of malaria**	**Maximum scoring**
1	**Shivering(cold) and feeling like staying in the sun** 1.Yes* 2. No 3. Not sure	1 Point
2	**Headache** 1.Yes* 2. No 3. Not sure	1 Point
3	**Fever(hotness of the body)** 1.Yes* 2. No 3. Not sure	1 Point
4	**Loss of appetite** 1.Yes* 2. No 3. Not sure	1 Point
5	**Body or joints pains** 1.Yes* 2. No 3. Not sure	1 Point
6	**Excessive crying** 1.Yes	1 Point

	2. No* 3. Not sure	
7	**Vomiting** 1.Yes* 2. No 3. Not sure	1 Point
8	**Diarrhoea** 1.Yes* 2. No 3. Not sure	1 Point
	Total score on symptoms of malaria	**8 points**

*Right answers

Q17	**Mode of transmission**	**Maximum scoring**
1	**Bite of infective mosquitoes** 1.Yes* 2. No 3. Not sure	1 Point
2	**Close contact with malaria patient** 1.Yes 2. No* 3. Not sure	1 Point
3	**Unsafe drinking water** 1.Yes 2. No* 3. Not sure	1 Point
4	**Bad odour** 1.Yes 2. No* 3. Not sure	1 Point

5	**Eating contaminated food** 1.Yes 2. No* 3. Not sure	1 Point
6	**Being in rain** 1.Yes 2. No* 3. Not sure	1 Point
7	**Presence of wastes** 1.Yes 2. No* 3. Not sure	1 Point
	Total score on mode of transmission	**7 points**

*Right answers