UNIVERSITY FOR DEVELOPMENT STUDIES

SUSTAINING THE USE OF THE INSECTICIDE TREATED BED NETS IN THE UPPER EAST REGION OF GHANA: FACTORS MILITATING AGAINST CONTINUOUS USAGE.

KENNEDY DIEMA KONLAN

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BY

KENNEDY DIEMA KONLAN (BSC. NURSING)

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A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF ALLIED HEALTH SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY DEGREE IN COMMUNITY HEALTH AND DEVELOPMENT.

NOVEMBER, 2015

AUTHOR'S DECLARATION

Student

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere

Candidates signature……. Date…….

Name ……..

Supervisor

I hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis by the University for Development Studies

Supervisor's Signature: …….. Date ……

Name ……

ABSTRACT

The control of the spread of endemic malaria is incumbent on the prevention of many mortalities and morbidities that are associated with the disease in the Upper East Region of Ghana. The insecticide treated bed nets are the most reliable and cost effective tools to use in the prevention of malaria. This study explored the usage patterns and decision making processes, level of knowledge on the risk of the non-use of the Insecticide Treated Net (ITN), barriers to sustained usage and the factors that facilitate sustained use of the ITN. This was a mixed method study that used the multi stage sampling technique. The study used data from three key informant interviews conducted on District Malaria Control Officers and a structured survey from three study Districts in the Upper East Region. The study identified nature of the weather, season of the year, temperature, relative humidity, education, access to the ITN, number of persons living in the household and the belief and understanding of the household head to influence patterns of behaviour. On risk awareness; formal education is related to the level of consistent use of the ITN. Major barriers to consistent use of the ITN include over complacency, the influence of male dominance, improper use of the ITN and technical factors like poor retreatment schedule and lack of understanding in hanging the net. To have a sustained usage of the ITN in the region, the need to have a community retreatment centre for re-impregnation of the net is inescapable and the use of behaviour change communication methods to influence behaviour towards sustainable use of the ITN is critical. This study recommends that: Mosquito bed net users must roll up the net when not in use, and carefully at night, tucking in the net partially and fully when in bed, obey washing instructions and follow strict re-impregnation schedule. Also they are to inspect ITN for holes, check for mosquitoes trapped inside the net and sleep away from the edge of the bed so as to ensure the net is durable and provide profit for a long time to beneficiaries.

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DEDICATION

This thesis is dedicated to my wife Mrs. Konlan Sylvia; and also to my daughter Konlan Kersiah Wumpuknin.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Sub-Sahara Africa (SSA) is a malaria endemic region. How endemic a region is varies from one region or country to the other. This variation is as a result of the diverse socio-political and ecological zones that are found in Africa and also in each country (Ali et al, 2013). Malaria is a common cause of morbidity and Mortality in Africa especially among infants and children. The impact of the disease and its associated effects on the socio economic development of a country and that of an individual cannot be over accentuated. The Ghana health service in her 2011 annual report noted the devastating impact of the disease. The service stated that 'Malaria is not only the burden of the health sector but it also permeates every aspect of our social as well as economic life' (Ghana Health Service,page 28, 2011). The growing trend of the disease despite the efforts made by related Agencies (DFID, UNICEF NMCP GHS, etc.) and Governments have made many countries to sign international treaties to cooperate and to show commitment to fight the disease.

The Ghana Government has stepped up its efforts to tackle malaria, with a renewed interest in the past decade. An integrated approach has been adopted by Ghana in the fight against malaria. This integrated approach include the free distribution of insecticide treated bed nets to pregnant women and children under five years and an intensive indoor residual spraying (IRS) exercise that are piloted in some Districts. Also an intensive campaign on prompt adequate treatment of malaria and prophylaxis treatment of the disease is a routine exercise for the vulnerable populations (pregnant women) in the communities. Ghana and other West African countries are signatories

to the Roll Back Malaria Summit (widely known as the Abuja Summit) to achieve universal coverage of insecticide treated bed nets (ITNs) for children younger than five years of age (Amzat, 2011).

Malaria is hyper endemic in Ghana and is the leading cause of morbidity and mortality, in both infants and children under five years, accounting for 22% of under-five deaths and 9% of maternal deaths in 2007 (Presidents Malaria Initiative, 2009). The Ministry of Health (MOH) in Ghana estimates that 3 to 3.5 million cases of suspected malaria are reported each year in public health facilities, representing 30 - 40% of all outpatient attendance. Of this figure over 900,000 are children under the age of five (MOH, 2007). Malaria is also responsible for an estimated average annual reduction of 1.3% Gross Domestic Production (GDP) in economic growth (president malaria initiative, 2009). Reducing the malaria disease burden is therefore a priority for the government of Ghana, the Ministry of Health, the Ghana Health Service, and the National Malaria Control Programme (NMCP) but most importantly, the general population whose life is severely affected by this disease.

As scientific and empirical data indicate the causes, effective treatment and preventive interventions: the total control and treatment, eradication and elimination of malaria is multi-dimensional and multi factorial. The challenge is deeply rooted in the beliefs, values and perceptions of the people. This could be portrayed when Ali et al, 2013 summarized it that; Local discourses about malaria are found to be entrenched in indigenous illness representation in various communities - an indication that malaria has been an age-long disease (Ali et al, 2013). They further stated that, within the context of the study, perceived threat and severity of children to malaria was overwhelmingly acknowledged by the majority of the caregivers interviewed. As

majority of Africans may have various views of the nature of the disease; its devastating impact cannot be unclear to all. A significant number of the caregivers interviewed by Ali et al, (2013) in Nigeria were of the opinion that malaria is a serious health problem and a major threat to children (Ali et al, 2013).

On world malaria day 2008, the United Nations (UN) secretary general called for efforts to ensure universal coverage with malaria prevention and treatment programmes by the end of 2010. The goal established by world health assembly member states and the roll back malaria partnership is to reduce the numbers of malaria cases and deaths by 50% or more by the end of 2010 and by 75% or more by 2015. However, very debatably, Ghana is not on course to meet this target. The global malaria action plan managed by WHOs global malaria programme defines the steps required to accelerate achievements of the partnerships 2010 and 2015 targets for malaria control and elimination include; diagnosis of malaria cases and treatment with effective medicines, distribution of insecticide treated nets, indoor residual spraying to reduce or eliminate malaria transmission. These are central to the strategic plan for malaria control in Ghana (2008 - 2015).

The ITN have proven to be one of the most reliable and cost effective tools for the control of endemic malaria in Africa and free distribution of the net is on-going in many countries of the sub region. However, the fact that people do have the nets does not readily guarantee that they will eventually benefit from its specific use. A study in Burkina Faso; disclosed that although ITNs were given free to the population and education on their proper use was addressed, especially to women during the net distribution, not everyone slept under an ITN every night. Although most people have the capacity to protect themselves, not everyone does so, on a nightly basis (Toe, et al., 2009). What therefore are the political, economic and socio-cultural factors in the

community and within the household that influence the perception of the vulnerable in the use of the insecticide treated bed nets? Could this be attributable to problems that are associated with the bed nets themselves? What are the net design factors, room shape and design, and the number of occupants of a room that influence the use of the ITN in the communities? In the same study, Lea et al, (2009) identified that difficulties in the use of the bed nets were more related to space management than to the form of the houses (rectangular or circular) (Lea, et al., 2009). Could this finding of Lea and his colleagues in a different cultural background than the Upper East Region be the reason for lack of sustained usage of the ITN? In furtherance to the Lea et al. (2009), the inhabitants in the study area found the design of the ITN positive and pleasant. Initially they wanted to acquire ITNs, but later the motivation for their use decreased and their usefulness was questioned (Lea, et al., 2009). What Lea and his colleagues (2009) could not identify was: what were the queries of the use of the ITN by the local people leading to decrease motivation for its usage? This study tried to address these and other related gaps.

There is a growing need to use mixed methods i.e. quantitative and qualitative techniques in research to allow for the open expression and in-depth understanding of the characteristics within the communities that influence the patterns of behaviour and decision making processes, the level of risk awareness of the non-use of the insecticide treated bed net, barriers to sustained use of the insecticide bed net and factors that promotes sustainable use of the insecticide treated bed net. This study specifically provided for this.

1.2 Problem Statement

The ITN is the most reliable tool to use in the prevention of malaria. Knowledge has shown that the vector that transmit malaria, the female *anopheles mosquito,* is generally nocturnal and mostly indoors. The transmission of the disease is habitually during bedtime - the optimum time to use the ITN. The prerequisite to prevent this vector from imminent contact with people especially during bed time is incumbent on the prevention. This urgency to control malaria made the roll back malaria campaigners to adopt free distribution of the insecticide treated bed net (to the vulnerable populations) as a tool in the prevention of malaria.

Due to the benefits associated with the use of the insecticide treated bed net, the World Health Organization and Global Malaria Programme recommended; full coverage of all people at risk of malaria through rapid scale up by free or highly subsidized distribution through public health services delivered by campaigns and routine service with distribution to be accompanied by information on hang-up use and maintenance (WHO Global Malaria Programme, 2007). Earlier study proved that having a net does not readily guarantee that people will readily benefit from its specific use. The use and other wise of the ITN are strongly rooted in our beliefs, values perceptions, political and socio economic reputations.

In Ghana and the Upper East Region in particular, various interventions are used to get the local communities to own and use the insecticide treated bed net. These interventions include the subsidizing of the prize of the ITN in open markets through the community bed net vendor, free distribution in ante natal and post natal clinics and during vigorous malaria crusade sessions. As efforts are made towards the distribution of the insecticide treated bed net to pregnant women and children less

than five years, very little significance is still seen in the control of the disease in the region. Malaria is still noted as the number one cause of all OPD attendances in Ghana and the Upper East Region (Ghana Health Service, 2011). These are indications that there are no sustained usage of the insecticide treated bed net in Ghana and the Upper East Region to be particular. As Governments and Non-Governmental Organizations in the sub region (and especially Ghana) commit more interest and resources towards the acquisition and distribution of the insecticide treated bed nets, a study by Alberto et al, (2011) in Nigeria indicated that; The mean number of individuals per household who slept in houses that had at least one net or ITN was 3.5 (SD 3.6) and 2.6 (SD 2.9) respectively. And the proportion of nets that were ITNs was estimated to be around 83% (95% CI: 82-85) (Alberto et al, 2011). What therefore are the factors that act as barriers to the sustained usage of the insecticide treated bed net?

Another study in Nigeria noted that, although malaria was found to be an important disease, ITNs were believed to be only partially beneficial because of the perception that malaria had multiple causes and further to this, fear was expressed that the chemicals used to treat ITNs were associated with the use of family planning (Chukwuocha, et al., 2010).

Until people sleep under the insecticide treated bed net, the eradication of malaria still remains a mirage. What therefore are the factors that influence the individual choice of use of the insecticide treated bed net. Do factors that relate to perceptions, beliefs and value systems influence the choice of use of the insecticide treated bed net in Ghana and particularly the Uppers East Region? What are the factors that can influence the sustained use of the insecticide treated bed net in the Upper East Region

of Ghana. Housing, room space, net design issue, loss of potency of the net, lack of information on re-impregnation of the ITN, poor access to ITN and socio-political factors within the household may be a challenge to the use of the insecticide treated bed net. To ensure a sustained usage of the ITN within the household, a durable household net is central. What are the factors adopted by the communities to ensure that their insecticide treated bed net remains durable and potent? In all this study thematic areas, little research has been conducted to determine how these factors poses challenges or encourages the use of the insecticide nets within households in the Upper East Region. This study therefore respond to many research gaps identified as the factors to ensure the sustainable use of the insecticide treated bed net in the upper east region.

1.2.1 Justification of the Study

The government of Ghana has used various interventions to control endemic malaria in the Upper East Region. These include, distribution of insecticide treated bed nets, indoor residual spraying and prompt and adequate treatment of malaria with a renewed interest in malaria campaign programmes. Despite these worthy interventions malaria still remains the number one reason for total OPD attendances in the Region (Ghana Health Service, 2011). If the insecticide treated bed net is used efficiently and effectively, malaria could be controlled. In Nigeria although most people knew ways of preventing malaria, a study findings documented that this knowledge is not used in daily practice (Chukwuocha et al., 2010). Could this also be the case in Ghana and particularly the Upper East Region; that despite people having knowledge in the control of malaria, they do not use such knowledge in daily practice due to their political, cultural and socio economic values? What are these indices that act as barriers to sustained use of the insecticide treated bed nets? The Health Belief

Model (HBM) strongly advocate that the amount of knowledge a person or people have directly influence the way of practice of health behavioural outcomes. The use of the ITN is directly related to the amount of knowledge available to an individual but these findings in the Nigeria proved otherwise. With this finding, what is the level of knowledge of the people of the Upper East Region with regard to the use of the ITN and the factors that promote sustained usage of the ITN in this region? The importance of the insecticide treated bed net in the prevention of malaria cannot be overestimated. A four country 2008 evaluation conducted by WHO and Global Fund noted that following large-scale LLIN distributions in 2006, inpatient cases of malaria fell by 13% in Ghana and 60% in Ethiopia and child deaths in Ghana were reduced by 34%. In Ethiopia massive campaigns of free LLIN distribution had been undertaken to achieve maximum coverage (WHO 2008).

What are the perceptions and beliefs of the indigenes of the Upper East Region that impede on the successful use of the insecticide treated bed net in the prevention of the spread of endemic malaria.

1.3 Research Questions

The following are the research questions for this study;

1. What are the patterns of behaviour, decision-making processes within households in respect of the use of the insecticide treated bed nets (ITNs)?
2. What is the general level of risk awareness of the non-use of insecticide treated bed net?
3. What are the barriers to sustained use of the insecticide treated bed nets?
4. What are the factors that can facilitate Sustained use of the ITN?

1.4 Research Objectives

This section summaries the research goal and objectives that determine the processes to ensure sustainable use of the insecticide treated bed net in the Upper East Region.

1.4.1 Principal objective

The principal objective of this study was to explore factors that contribute to sustained usage of ITNs in the Upper East Region: household decisions about usage, usage patterns, and the levels of consistent and correct usage of ITN

1.4.2 Specific Objectives

The specific objectives of this study are:

1. To investigate the patterns of behaviour: decision- making processes within households in the use of the insecticide treated bed nets.
2. To assess general levels of risk awareness of the non-use of the insecticide treated bed nets.
3. To assess the barriers to sustained use of the insecticide treated bed net.
4. To assess the factors that can facilitate sustained use of the insecticide treated bed net.

1.5 Significance of the Study

The popular adage is that prevention is better than cure. Preventing the spread of malaria in Sub Saharan Africa is imperious to reducing many mortalities and morbidities. The contribution of insecticide treated bed nets in the Sub Region is domineering to the total reduction of the mortality and morbidity that are associated with this deadly canker. Insecticide treated bed nets (ITNs) are important tools for malaria control. However, there is little knowledge on how perceptions of ITNs

usage, patterns of behaviour, decision making processes affect the use of the ITN; barriers to sustained usage, the general level of risk awareness of the non-use of the insecticide treated bed net, factors that promote sustainable usage. This study specifically seeks to address these research gaps.

Governments and non-governmental organizations over the years have tried to ensure that most households are supplied with ITN especially storming from the Role Back Malaria Campaign in Abuja. The views of the community and their understanding of the effect of the disease are very important in the total eradication of malaria in Sub Saharan Africa. Awareness of the benefits of the risk factors that are associated with the non-use of the insecticide treated bed net help in the forces that influence the use of the nets.

Bed nets are predesigned and shaped either into rectangles and circles or cylinders depending on the desire of the manufacturer. African homes are found in various shapes and may not necessary be very friendly to the hanging and use of the insecticide treated bed net in the rooms. Other challenges may be room space, general household space; ventilation, type of roofing and house structure, season of the year, weather characteristics, temperature, relative humidity, cost, loss of potency of the net and other factors that are related to design may influence the use of the ITN within the households. What therefore are the structural and technical challenges that are encountered in the use of the insecticide treated bed net in the home? This study specifically documents these factors as they are related to measures to sustain the usage of the ITN in the upper east region so as to influence and impact on policy direction in the control of malaria in Ghana.

This study will serve as a surge in creating the awareness of the general public, stakeholders of health, the authorities in charge of health and related Non-Governmental Organisations (NGO) and agencies as well as related authorities of the need to sustain the use of the insecticide treated bed net in Ghana and particularly the Upper East Region. With this specific need to encourage and sustain its usage, malaria can be eradicated.

1.6 Scope of Study

This study was basically a across sectional descriptive study of the patterns of behaviour and decision making process, level of risk awareness of the non-use of the ITN, factors that influence the sustainable use or the barriers to the sustained use of the insecticide treated bed nets in the Upper East Region of Ghana. The study made use of data from three Districts of the Upper East Region: with one District from the eastern, central and western parts of the region. The study assessed the decisions made within the household about the use of the insecticide treated bed net in the prevention of malaria and those barriers that influence or militate against the successful sustainable use of the insecticide treated bed net within the household. The study was carved within the health belief model of behaviour change and hence determined the level of risk awareness within the households with the inconsistent or non-use of the insecticide treated bed nets.

The study however does not assess the efficacy of the insecticide treated bed net in the prevention of malaria in the Upper East Region following time and resource constraints. The study also does not assess the efficacy of public campaign adopted in the distribution and use of the insecticide treated bed net in the region.

1.7 Theoretical Concepts

This study is theoretically framed within the Health Belief Model of behaviour change. The need to borrow some insights from social psychological models, particularly the Health Belief Model (HBM) to behaviour change and sustained behaviour, to understand and predict health care seeking behaviour and health behaviour change has been suggested by many researchers. Using this theory of behaviour change may not be an exception from the ordinary. The HBM allows us to assess the patterns of behaviour, decision making processes, perceptions, beliefs and values, level of risk awareness of the non-use of the ITN of the indigenes of the Upper East Region on the use of the insecticide treated bed nets.

This particular need to use the health belief model follows increased emphasis on interdisciplinary approach to the understanding of health behaviour change and the need to incorporate socio cultural beliefs and factors in the contemporary health delivery system especially regarding long term behaviour change characteristics like the sustained use of the insecticide treated bed net in the Upper East Region of Ghana.

The health belief model as from social psychological models has six thematic stages inter twined as the bench marks to sustained behaviour change. These indicators of the Health Belief Model and how it is applied to the concept of the research include;

- Perceived susceptibility to a particular health problem; in this case malaria and the use of the insecticide treated bed nets – does the non-use of the insecticide treated bed net influence the person risk of contracted malaria, whether the children's risk of malaria and the inability to sleep under an insecticide treated

bed net influence a person's susceptibility. What is the chance of contracting the disease for not sleeping under an insecticide treated net

- Perceived seriousness of the health condition - how severe is malaria? What are the social, economic and health consequences of malaria? How is the individual family affected when a member is infected with malaria? What is the consequence of malaria on family productivity?
- Belief in effectiveness of the new behaviour – whether treated bed nets are effective in the prevention of malaria transmission. Whether treated bed net control the vector that transmit malaria (mosquitos). Does sleeping under insecticide treated bed net prevent malaria? Is the use of the treated bed net cost effective means of prevention malaria?
- Cues to action - witnessing the death or illness of a relative due to malaria. Or witnessing other people not developing malaria for having slept under an insecticide treated bed net. Prevention of child mortality and morbidity for sleeping under the insecticide treated net. a person prompted by another person to sleep under the ITN.
- Perceived benefits of preventive action - if using treated bed nets can prevent malaria infection among the populace. Can use of the insecticide treated bed net prevent child and maternal mortality
- Barriers to taking action – impediments to using bed nets. How these barriers do affect the decisions we make about health. What are the technical factors that prevent use of the ITN?

This health belief model allow for a successful use of the model to assess a person's choices and decisions regarding the use of the insecticide treated bed nets. As proposed in HBM perceived susceptibility to a particular health problem, perceived

seriousness of the health condition and cues to action are important factors in health behaviour change (Ali, et al., 2013).

1.7.1 The Cycle of the Health Belief Module

The applications of the health believe module can be theoretically framed within the context of a cycle. A person's behaviour will go through a series of steps before it eventually reaches its final change process and the need for a change is again developed. The change to use insecticide treated bed nets usually imperative. In every situation, change for the better is usually required. This can be required as

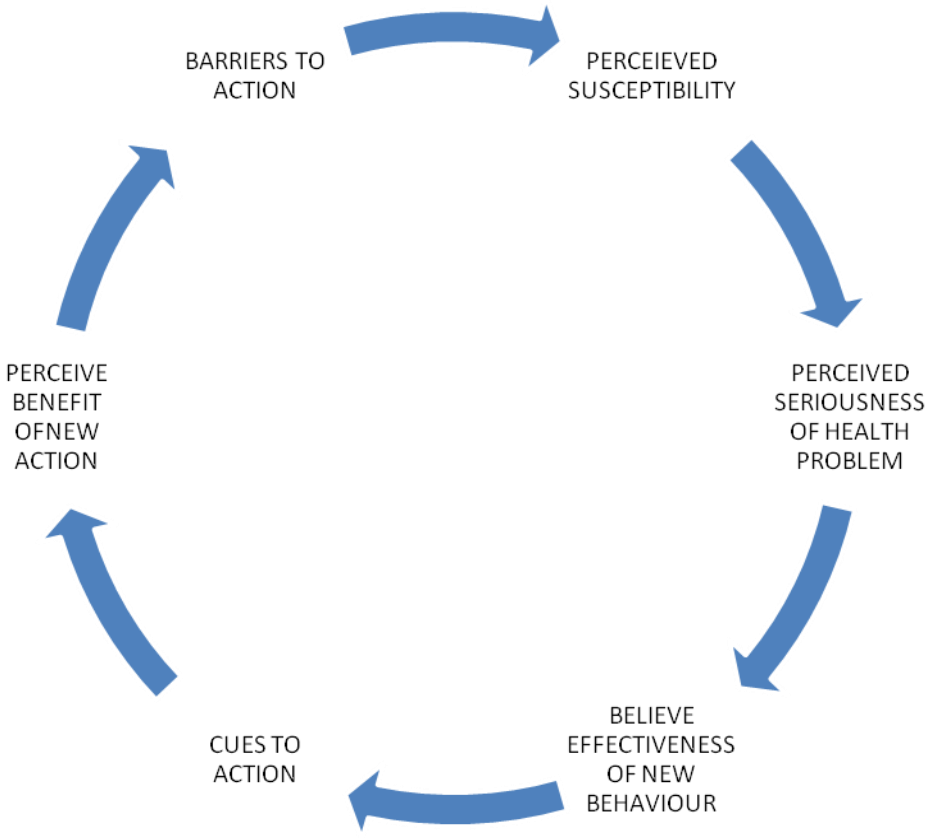


Figure 1 The Cycle Of The Health Belief Model

Source: Candidates Construct, 2015

1.8 Structure of Thesis

This thesis is mainly organized in to six chapters aside other rudimentary sections. Each chapter of the study encompassed:

Chapter one is the introduction section of the thesis and include Background to the Study, Problem Statement and Justification, Research Questions, Objectives of the Study, Relevance of the Study, Scope of the Study and Conceptual Framework.

Chapter two; relevant literatures was reviewed as impetus for in-depth discussion of finding in subsequent chapters. It also established locus for the study.

Chapter three comprises the methodology of the study and gives an in-depth explanation of the study designed, sample size and sample characteristics as well as the sampling technique adopted for the study. Also included in this chapter are the research variables and a description of the data collection tools and the research instruments used for the data collection. Quality control measures and ethical concerns formed the conclusion portion of this particular chapter.

Chapter four formed the basis for presentation of research findings and results. Data analysed is presented in chapter four as tables, charts, figures or in simple narratives.

In chapter five, data presented in chapter four is discussed. This will help fine tune ideas, give meaning and synchronized synthesis of the ideas identified in a manner that policy and decision making will be influenced to improve the livelihood of the people of the Upper East Region. Discussion also gives a locus to the study findings in the body of knowledge.

Chapter Six (6) comprises titled Conclusion and Recommendation and included Novel Contributions and Main Findings of this Thesis, Methodological Limitations, and Future Directions to other researchers

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review gives the impetus for in-depth discussion of findings by looking at what is already in the body of knowledge. This review takes cognisance of the objectives of the study as thematic areas and a guide to detailed review of literature that is imperative to understanding the intricacies involve in understudying the use of the insecticide treated bed net (ITN) in the prevention of malaria in malaria endemic region of sub Saharan Africa. The review specifically looks at the use of the insecticide treated bed net in the prevention of malaria, patterns of behaviour in the house hold, barriers to sustained use of the insecticide treated bed net, factors that promote sustainable use of the ITN and the general level of risk awareness in the non-use of the ITN within the household.

2.2 Malaria and the Insecticide Treated bed Net

The impact of malaria on mortality and morbidity in sub Saharan Africa is devastating. Conscious efforts are made by governments and related agencies to stop the escalation and if possible total eradication of malaria. The 2013 annual report of the Ghana health service reported malaria as the leading reason for all Out Patient Department (OPD) attendances and among the first ten (10) top causes of all facility mortalities in all the ten regions of Ghana. The vector that spread malaria is endemic in Africa south of the Sahara. The female anopheles mosquito is imperative in the transmission of this noxious disease. This vector generally bites and is active indoors and nocturnal.

The need to control malaria has heightened interest of the World Health Organisation (WHO) to channel resources towards vector control and prevention of malaria in general. Various mechanisms have been instituted as the precursor to the control of malaria even though the World Health Organisation reported in 2012 that; the control of malaria currently relies on a handful of insecticide classes and on pyrethroids in particular. Vector control is a central, critical component of all malaria control strategies. It relies primarily on two interventions: long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS). Use of both has increased significantly during the past ten (10) years as part of a drive towards universal coverage of all populations at risk, saving hundreds of thousands of lives (World Health Organization, 2012). The national malaria control programme in ghana further recommend that every two people in an endemic region should own atleast one bed net for usage. (WHO, 2012)

Governments have therefore according to this identification by the World Health Organisation and other researchers, channelled significant resources towards malaria control and prevention by the use of the insecticide treated bed net especially in malaria endemic regions. The World Health Organisation reported in the 2012 that; Current coverage with LLINs and IRS in the WHO African Region is estimated to avert approximately 220 000 deaths among children under 5 years of age every year (World Health Organization, 2012). This is an indication that the mosquito bed net use and the Indoor Residual Spraying (IRS) exercised taking place in beneficial countries are yielding tremendous results without having any other intervention as a substitute yet (World Health Organization, 2012). With these two interventions strictly adhered to the later, there is hope in the African continent to control malaria in the shortest possible future.

While the World Health Organisation seems to applause all this interventions put in place as the most efficient interventions strategies for the control of malaria worldwide, a study by Andrew et al (2012) in the Kenya still suggested malaria as a worry. They summarised their views by saying: In most villages, malaria was the largest health concern, among both men and women, in rural and peri-urban areas, and most respondents were aware of the benefits of sleeping under a net. However, a wide range of alternative uses for the nets was also reported, emphasizing the serious economic calculations families make (Andrew et al, 2011). While this report looks distressing, in the Kinshasa, Ndjinga and Minakawa, 2010 had a different view; they reported that the number of bed nets reported was enough to cover all the villagers, apparently a result of the recent National Malaria Control Programme (NMCP) campaign. Nevertheless, fewer than half of the nets were used, and half of the villagers did not sleep under the nets (Ndjinga and Minakawa, 2010) - another eminent threat to the national malaria control programme and malaria control processes.

It is important that ITN programmes carried out in areas of high transmission have a well-designed mortality monitoring component alongside implementation (Cohcrane Collaboration, 2009). This will be able to pre-empt governments and related agencies in the malaria control strategies to be able to monitor progress towards the use of the ITN as one of the intervention protocols. It will also serve as a guide to the total impact produced by the use of the ITN. Neville, et al., (1996) reported that; the introduction of a single, malaria-specific intervention significantly reduced all-cause mortality by 63% in The Gambia. In Kilifi, all-cause mortality was reduced by 33%; however, even those who underestimate the effect of malaria as a failure to ensure complete net protection constituted (14%) and the failure of children to sleep under

nets consistently each night (23%). This means that the maximum expected reduction (by the consistent use of the ITN) in malaria specific events is around 66% (Neville, et al., April 1996)

Recently, a number of evaluations of small-scale and large scale programmes have documented good impact on different health parameters. Most notably, the evaluation of a large social marketing programme in Tanzania showed a 27% improvement in survival in ITN users compared to non-users (Schellenberg, 2001) cited in (Cohcrane Collaboration, 2009) and a substantial (63%) impact on anaemia in children (Abdulla, 2001) cited in (Cohcrane Collaboration, 2009). In the Gambia, Neville, et al., April 1996 during a comparative study of the means of reducing the malaria burden demonstrated that the introduction of a programme of Insecticide Treated Bed Net distribution and use (ITBN) can reduce paediatric malaria admissions by 41 %. (Neville, et al., 1996)

With the upper east region receiving all this interventions (the distribution of ITN and IRS) from governments and related agencies in the prevention of malaria, yet malaria is endemic all year long: this was shown in the study by Baired et al 2002; the prevalence of parasitemia at enrolment was 69% and 52% in the dry and wet season cohorts, (Baird, et al., 2002). Intense transmission of *P. falciparum* occurred from May to February in the Kassena-Nankana District of northern Ghana. The incidence density of infection decreased moderately during the dry season that commenced in October. Transmission abruptly dropped to very low levels only during the last two to three months of the dry season (Baird, et al., 2002). This revelation does not show a specific pattern in the use of the insecticide treated bed net in the prevention of

malaria. This also portrays the pattern of behaviour of the disease as it is related to the rainy season when mosquito reproduction and growth is at its peak.

While many remedies are sort for the malaria burden, the ITN still remain the surest means of the control of endemic malaria in sub-Saharan Africa. Also in Gambia Neville, et al., April 1996 reported that, given the rapidly emerging anti-malaria drug resistance in sub-Saharan Africa, malaria mortality can be expected to increase beyond its already unacceptable level. Although recent studies have given encouragement to the drive to develop malaria vaccines, these will not form part of comprehensive malaria control efforts for many years. Meanwhile insecticide treated bed net (ITBN) provide our best hope for the reduction of severe and complicated paediatric malaria and significant improvements in child survival on the African continent (Neville, et al., 1996).

2.3 The patterns of Behaviour in the use of the ITN: decision- Making Processes

In Africa where poverty is pervasive, Andrew et al (2011) reported that Non-Governmental Organisations are involved in subsidized or free distribution of the insecticide treated bed net. The effort is to achieve universal coverage of the bed net (Andrew et al, 2011). While this may just be a long term goal, efforts are made, according to the WHO tenants to prioritise the most vulnerable in the communities. The prioritized vulnerable populations in the communities include children under five and pregnant women. Following this specific need, governments and NGOs engage in the distribution of the insecticide treated bed net do so either in the post natal clinic or at the antenatal clinic so as to reach the vulnerable populations. To what extend do this vulnerable populations actually use the insecticide treated bed net during bedtime? Andrew et al 2011 posed this to their respondents and reported that; it

appears that this topic was too sensitive to get detailed and direct answers. Most of the men answered that they, as "chief of the family" made the decisions; women largely echoed this. A much smaller number suggested that decisions were co-operative, or that the mothers/grandmothers made decisions. The very strict gender roles in Timorese society and the private nature of marriages / relationships, combined with the study facilitators' outsider status, made it very challenging to fully explore these issues (Andrew et al, 2011). The most striking result that emerged was uncertainty about which family members could or could not sleep under the nets. One result of this confusion in Timor- Leste was the separation of couples at night, with potentially large implications for long-term user acceptability. The other result is the exclusion of many men and older children from the protection provided by nets already in households (Andrew et al, 2011). The study by Ndjinga and Minakawa (2010) in Kinshasa also found a lower prevalence of net use among children less than 5 years of age and among adults, and a greater prevalence of use among school children 5 to 15 years old. Mothers and infants are primary targets for net distribution, and their use of nets should be high (Ndjinga and Minakawa 2010).

This finding looks much different from what was reported in the Burkina Faso; neighbour to the Upper East Region of Ghana. Some studies show that vulnerable groups (young children and women of reproductive age) sleep under nets more than other adults, indicating that when the method of prevention is already available within the household, priority is given to the more vulnerable. Others in the household did not show any particular interest in the method of prevention (Toe, et al., 2009).

In instances when the net is available to all members of the population, the study by Andrew et al (2011) reported that; that the nets were only for use by pregnant women

and young children. Fathers in Covalima and Manatuto said they could not sleep under the nets, and that doing so would be harmful to the baby. Several groups were then asked for clarification, and reported that they had been told by doctors or health providers that the nets were only for these two groups, stating emphatically "... that is based on the information that we got from the Ministry of Health - that the mosquito net is only prioritized to pregnant mother and children under five years old." (Andrew et al, 2011). Further on Ndjinga and Minakawa (2010) reported in the Kinshasa that in recent years, primary and secondary schools have focused on education in disease prevention and sanitation, including bed net use in the district where their surveyed villages were located. These systematic education programs were responsible for high prevalence of nets use among children 5 and 15 years of age in these villages (Ndjinga and Minakawa, 2010).

The majority of those who use nets have a family tradition of doing so. Moreover, married women with an increasing number of co-wives, with whom they share a room, are likely to use nets both for protection against mosquito bites and for privacy. Older people are more likely to use nets than are younger (Aikins et al 1994). In Pulford et al (2011) review of literature, The next most widely reported reason for not using a mosquito net in a household aside discomfort in the survey-based studies was perceived low mosquito density; although this only accounted for 12.3% of all responses in the pooled data set (compared to 47.5% for discomfort) suggesting it was widely reported, but often at a relatively low frequency. Heat and perceived mosquito density were also consistently identified in the small number of studies presenting qualitative data (Pulford et al, 2011)

2.4 General Levels of risk Awareness of the Non-use of the ITNs

The level of knowledge of people influence their choice and general risk taking behaviour. People in a community need to have an in-depth knowledge of the presence, transmission and remedy modalities to malaria before action is taken to a successful prevention and control. Malaria in West Africa is endemic in all seasons but worse in the rainy season due to the presence of stagnant waters for the breeding of mosquitoes and people sleeping indoors are more likely to be exposed to the vector that cause malaria. In Kenya; it was almost universally accepted that malaria was serious during the rainy season in all the studied regions, but many also thought it was year-round. A few participants mentioned the dry season as being the worst, as well; but there were no specific geographic trends in responses (Andrew et al, 2011). While the level of knowledge of the populaces gives hope to interventions strategies, Gyapong et al (1996) reported low knowledge on malaria by inhabitants of the Kasena Nankana District of the Upper East Region "Information from the general discussions and previous studies in the area revealed that knowledge about the cause and transmission of malaria in most parts of the Kassena Nankana district is very low." (Gyapong et al 1996)

As this knowledge will look much helpful in interventions strategies, Lea et al (2009) reported some discrepancy; a decrease of motivation was noted during the first year of bed net use, despite the intense campaign that initially led to a high user acceptance and use in the first months. The study in the Burkina Faso was actually conducted in the malaria peak season where it is expected that with higher knowledge following strong public campaign, people will sleep under the ITNs.

In variance to these observations, Chukwuocha et al (2010) in Nigeria reported that; participants knew that malaria mostly affects pregnant women and children and that

ITNs are beneficial in reducing the burden of malaria. However, there is low use of ITNs and other malaria preventive interventions in this area. This was partly attributed to the high cost of ITNs and negative perceptions on the chemicals used to treat them, especially among non-users, and to poor utilization of health services, particularly antenatal care and delivery care, leading to missed opportunities (Chukwuocha, et al., 2010).

The level of risk awareness by a group of people in a particular locality differs as people ascribe many causes to malaria. Evidence from qualitative data in the upper east region of Ghana suggests that people attribute the cause of "*pua"* (referring to malaria) to three different sources. Some respondents attribute the cause of "*pua"* to God, believing that it is inherited genetically from one's parents. Inherited pua frequently induces more vomit in childhood than other forms and finally develops into hernia or hydrocoele in adulthood (Adongo et al, 2005) and this directly adversely affect their health behaviour pattern in the prevention of malaria by using the ITN

With this, a further study in the Burkina Faso revealed that malaria is not identified as a normal disease (of everyday occurrence) and various aetiological factors are generally ascribed to it (Toe, et al., 2009). Having said that, Toe et al (2009) in Burkina Faso further reported that since "malaria" is not a unique reality for this population, it is logical that they deduce that this disease complex is not acquired solely from mosquitoes. Accordingly, they do not consider ITNs a total defence (Toe, et al., 2009). A further confirmation of knowledge directly related to person actions towards behaviour change and healthy lifestyles. This is not actually an abrasion of the health believe model of behaviour change as it strongly support this views.

Another important factor worthy of review is the fact that people may use the insecticide treated bed net but not necessarily because they want to prevent themselves from malaria infection. Even though the people in the Kassena Nankana district did not associate mosquitoes with malaria, they were very concerned about the nuisance effect of insects in general, and mosquitoes in particular, especially during their sleep (Gyapong et al, 1996). However the study by Adongo et al (2005) held a contrary view as they reported that; People connect it (malaria) to female anopheles, usually described as the 'big' mosquito as responsible for causing malaria. Some respondents accurately replied that mosquitoes give malaria by drawing blood from a person sick with malaria and then transferring it to an uninfected person (Adongo et al, 2005). Having said, All the same there, is great confusion about malaria and the role mosquitoes play in its causation as demonstrated by four female FGD participant. They believed all mosquitos give malaria irrespective biting or not biting an infected person. (Adongo et al, 2005). With this variant knowledge expressed during various studies in the region, what extend of knowledge of the people influence positive attitudes towards the use of the insecticide treated bed net?

Due to the WHO policy of prioritization of the use of the insecticide treated bed net to only the vulnerable population, not all members of the household may have the benefit of use of the insecticide treated net. In Kenya Andrew et al (2011) reported that; when asked which family members do not generally sleep under nets, one group was consistently mentioned: young boys who sleep at their friends and neighbour's houses, on porches or verandas. This appeared to be common practice in many areas, occurring on a fairly regular basis (1-2 nights each week). This could lead to significant and regular exposure to vectors in a vulnerable group. Others respondents mentioned a range of household members including husband, some of their children,

and younger siblings, but no simple patterns emerged (Andrew et al, 2011). But the most important revelation in this was the fact that we all know that not all members receive the benefit of protection from malaria by using the insecticide treated net.

Also Gyapong et al (1996) in the upper east region reported that "If the use of insecticide treated nets is to be beneficial to non-immune children, the nets have to be provided for the entire family because children tend to sleep with the mother, grandmother or an older sibling. This could have cost implications which would be beyond the means of a subsistence farming community. Alternatively, nets could be provided for women and children only initially, but in a male dominated society, one could not guarantee that they would remain with them" (Gyapong et al, 1996)

In **B**urkina Faso Toe et al (2009) reported that; Although ITNs were given free to the population and education on their proper use was addressed, especially to women during the net distribution, not everyone slept under an ITN every night. Although most people have the capacity to protect themselves, not everyone does so only on a nightly basis. It is emphasized that this survey was conducted during the second half of the rainy season, at the peak of malaria transmission and, therefore, net usage should have been at its maximum (Toe, et al., 2009).

2.5 The Barriers to Sustained use of ITN.

A study conducted around Lake Victoria in Kenya of the misuse of the insecticide treated bed net found very worrying and detrimental results. The misuse of bed nets for drying fish and fishing is considerable in the study area. Many villagers are not yet fully convinced of the effectiveness of LLINs for malaria prevention. Misuses of bed nets may hamper the efforts of NGOs and governmental health organizations for malaria prevention (Noboru et al, 2008).

The knowledge of a people affects their way of behaviour and subsequently the use of the insecticide treated bed net. In 1996 a study in the Kansena-Nankana District of the Upper East Region reported that many people in the area associated malaria with eating sweets, standing in the sun and as 'something' one was born with. Relatively few people, most of whom had some formal education, thought malaria was caused by mosquito bites (Gyapong et al, 1996).

In all areas the majority of respondents were concerned about the irritation mosquitoes caused, particularly in disturbing sleep. Some people attempted to physically drive mosquitoes out of the house using pieces of cloth, towels or fans made from raffia or palm leaves, before going to bed. This method is not, however, effective due to poor visibility at night and gaps in doors and windows through which mosquitoes continue to enter. Others burn mosquito coils and dried orange peel to drive mosquitoes out of houses at night. Various types of aerosol anti-insect sprays are widely used (Aikins et al, 1994).

The study by Toe et al (2011) describes a functional and temporal organization of house space, where its management differed between daytime and night-time. In daytime, the house inhabitants were outdoors, the commonly used objects were also outside and houses were relatively empty. Sleeping mats were stored away. At night, the space within was much solicited by all the inhabitants of the household. The mats were spread close to different objects, including the fire place (Toe, et al., 2009). The inner space of a house, including the sleeping area, assumed many functions. Many objects were stored and many activities carried out in the same area. The insertion of bed nets in such a space was not easy for the inhabitant because, once set up, the bed nets are fixed, limiting the sleeping arrangements and any other use of a significant

part of the house. Further, it was difficult for them to erect the nets and take them down daily (Toe, et al., 2009)

In Pulford et al (2011) review of related literature, the pooled survey data indicated that social factors, such as sleeping elsewhere, or not sleeping at all, frequently result in mosquito net non-use. Technical factors related to mosquito net use (i.e. not being able to hang a mosquito net or finding it inconvenient to hang) and the temporary unavailability of a mosquito net (primarily due to someone else using it) was also reported in the survey and qualitative studies. Social obstacles to mosquito net use may be addressed by complementary mosquito control strategies. (Pulford et al, 2011)

One may also vehemently ague that cost may be a substantial barrier to the universal attainment of the insecticide treated bed net. How that may be, a study again within the Kenyan community proved that when the community was given bed nets for free by a particular NGO members, the community still slept without the net as they were found to use the said nets for fishing. This compelled the authors to state: The interviews clearly indicate that misuse of the nets started in the period when the Kenya Ministry of Health and NGOs began distributing LLINs. Although data were unavailable, it seems that LLINs were not popular in this area before they began distributing the nets (Noboru et al, 2008). The said NGO in the study by Noboro et al (2008) showed that The single NGO distributed 1040 LLINs in six villages (the number of bed nets distributed in one village was not available), of which 170 (16.3%) were being used for drying fish. Among the villages, the percentages of bed net used for drying fish ranged from 5.9 to 43.3%. Of 239 LLINs found on the beaches, 71.1% were from that particular NGO (Noboru et al, 2008).

Inconsistency in the use of the insecticide treated bed net may be self-limiting in the prevention of the spread of malaria in endemic regions. In communities that this inconsistency is identified, people are still likely to report to the hospitals with malaria. As people do not see immediate control of malaria for sleeping in the insecticide treated bed net they may stop using it. In Kenya, while most users had very positive experiences with nets, a smaller number expressed frustration that malaria was still a problem even with regular net use (Andrew et al, 2011). One likely contributor to this is the fact that essentially all febrile illness is assumed to be malaria, leading to pervasive confusion about other infectious agents (Andrew et al, 2011). A greater need is therefore recommended to ensure efficient delivery of champagne massages and a clear distinction of malaria from other febrile diseases.

The shape of the insecticide treated bed net may also be a hindrance on the use of the net. Several women also noted that the lack of entry doors or flaps in the nets made it difficult for children to get in and out by themselves, and reported that much of the damage to nets was from children. Several groups also commented that they preferred the conical shaped commercial untreated nets, (having a single hang point) to the generally distributed square ones, which require multiple attachment points (Andrew et al, 2011)

Also others may seem to portray very personal factors as a hindrance to the use of the insecticide treated bed net. Andrew et al 2011 again reported that; the few dislikes mentioned were that the nets were too hot, too small, and difficult to enter and exit. One issue was that the net forced couples to sleep in different rooms; this would likely have a serious impact on usage patterns (Andrew et al, 2011). Also in a related review of literature, Pulford et al (2011) reported that; Discomfort, primarily due to heat, was

the most widely identified reason why mosquito net owners chose not to use a mosquito net on one or more nights in the 17 survey- based studies included in their review (Pulford et al, 2011)

Some of the problems they associated with insect bites were headache, body weakness, skin itching, rashes and 'shortage of blood' (Gyapong, Gyapong, Amankwa, Asedem, & Sory, june 1996). In a related study in the Kasena -Nankana district of the upper east region, Adongo et al 2005 made this revelations; When asked whether the use of ITNs could help prevent convulsions in the qualitative interviews, respondents in the three settings held a strong view that ITNs could not prevent them because they are a spiritual illness that require a spiritual solution.

The fact that malaria is said to be endemic is Africa may also be a hindrance to the use of the ITN as people get use to the disease and see it as an everyday life pattern. A report in Nigeria summarised this view by stating that; although most people in the study area knew ways of preventing malaria, the findings documented that this knowledge is not used in daily practice. The reason for this seems to be that people, including pregnant women, are not really concerned. Several explanations can be given for this behaviour. It is known that in highly endemic areas, people get used to sickness and with time, they adopt to the disease (Chukwuocha, et al., 2010).

On whether the chemicals used in the ITN possess a major challenge to the insecticide treated bed net users, Gyapong et al 1996 within the same study are reported that very few people complained about side-effects of the chemical. These include minor skin irritations, especially during the first week of impregnation, when the smell of the chemical was strong. One woman complained about sneezing during the first night of use but she said she did not have any other problems after that (Gyapong et al 1996).

Qualitative data reported by Galvin et al, 2011 reveal other barriers including perceptions about the safety of insecticide impregnation and feelings of "being suffocated" while sleeping under the net. Issues of climate, outdoor sleeping and, for men in particular, work away and social activities, affect net use negatively (Galvin et al, 2011). The findings provide some evidence that the bed net is sometimes seen as inconvenient, space consuming, restrictive, and uncomfortable (Galvin et al, 2011). In Congo, outside of Kinshasa, Ndjinga and Minakawa (2010) reported that; the other reasons given were based on cultural myths, and failure to use bed nets is often associated with misconceptions and cultural taboos. Discomfort due to the heat may also be a misconception; although the bed net may reduce airflow and increase temperature, the increase might not be noticeable, and if it is noticeable, one's health should not be compromised due to discomfort (Ndjinga and Minakawa 2010)

2.6 The Factors that Facilitate Sustained use of the ITNs.

The sustained use of the insecticide treated bed net in Africa south of the Sahara is the aspiration of roll back malaria campaigners and related agencies. The problems of sustained use of bed nets are much more complex than can be addressed by malaria prevention campaigns alone (Galvin et al, 2011).

The benefit of the insecticide treated bed net in the prevention of mortality especially in under five children is tremendous; a study reported that An approximate extrapolation to the current population of children under five years of age at risk for malaria in sub-Saharan Africa (14% of approximately 480 million population at risk, or 67 million children) indicates that approximately 370,000 child deaths could be avoided if every child could be protected by an ITN (Cohcrane Collaboration, 2009). The ITNs remain the most viable tool in preventing the devastating effects that

malaria is likely to have on the general population. The benefit of the ITN is enormous especially as it is proven to prevent many needless deaths in Africa south of the Sahara (Cohcrane Collaboration, 2009).

Durability and continues availability is one of the key characteristics that influence the sustained use of the insecticide treated bed net in most African homes. Andrew et al (2011) reported that; In general, the softer feel of Dawa-Plus was perceived as not sturdy enough for extended use, and the stronger, stiffer mesh of the other two brands was seen as preferable, but detailed preferences were not possible with men or women based on their previous experiences (Andrew et al, 2011). Continues availability, supply and the non-destruction of available nets are significant to sustained use. To ensure that the net remain durable and lead to sustainable use, nine steps need to be adhered to. This steps include rolling up the net when not in use; rolling out the net carefully at night; tucking in the net partially; tucking the net in fully when in bed; washing instructions; a re-impregnation schedule; inspection for holes; checking for mosquitoes trapped inside; and sleeping away from the edge of the bed (Galvin et al, 2011).

When the ITN provides other benefits aside the single most important benefit of preventing the use for the spread of malaria; it also provides warmth and control the nuisance's effects of insects and its concomitants effects on sleep, work and productivity. In the Upper East Region, a study revealed that; the major benefit they associated with the nets was undisturbed sleep. One woman remarked, 'since **I** collected the net, I have never heard the cry of a mosquito, they don't make noise in my ears any more'; another respondent said, 'for the first time, I have had a sound sleep' (Gyapong et al, 1996). With this sort of testimonies becoming wide spread and

mitigating people suffering, the use of the insecticide treated bed net is like going to be sustained.

In furtherance to the motivation for using the ITN, Galvin et al in (2011) reported that The main motivations for using bed nets have been reported as reduction in nuisance of mosquito; perceived threat of malaria; positive views about preventative benefits; viewed as a desirable item if all household members can be covered by the net; added protection for other pests such as bed bugs; provision of decoration and aesthetic benefit to the home.

Another is the general impact of the insecticide treated bed net in the prevention of malaria as reported by Gyapong et al (1996) that; after the nets had been in use for 5 months; however, it became apparent that some users began to appreciate its impact on malaria. One women said 'my children don't get fever as often as they used to, I am sure it is because of your net' (Gyapong et al, 1996).

Other factors like the home environment may be used for basis of campaigns towards sustained use of the insecticide net as reported in the Niger Delta of Nigeria that; that people liked the nets because they beautified their homes, provided warmth, prevented dirt on beds, and aided sleep. In general the sample in this present study was knowledgeable about the cause of malaria and the potential of bed nets to prevent transmission (Galvin et al, 2011).

Another important factor was what Galvin et al (2011) quoted Toe et al in Burkina Faso as saying "They concluded that nets that suit living arrangements are needed, and that households with two rooms, rather than a single room, were likely to have more sustained net use" (Galvin et al, 2011). The shape of the room and place of use

of the net within the house also directly affects sustainable use of the insecticide treated net. A study of 900 households in 3 villages 26 showed that window nets were preferred to bed nets (cost was the major barrier). However nursing mothers did use nets for their babies (Galvin et al, 2011). Also in Kinshasa, Ndjinga and Minakawa (2010) reported that; the other important factors associated with bed net use were the numbers of beds and rooms in the house. As the number of rooms increased, the role of each room became clearer: it is common to use one room as a living room when a house has more than two rooms and the others as bedrooms. Residents who sleep on the floor in living rooms would have less attachment to nets compared with nets hung over beds in bedrooms, as the living room nets are most likely taken down every morning. Consequently, having more bedrooms increases both privacy and the space available for beds, which in turn increases the number of sites that are suitable for hanging nets, thereby increasing net use. (Ndjinga and Minakawa 2010)

Several factors that influence the use of ITNs and other malaria prevention interventions were identified in the study by Chukwuocha et al (2010). These include the high perception on the seriousness of malaria and its effect on pregnant women and children, the high perceived benefit of ITNs in protecting children and pregnant women against malaria and the high awareness of the prevention of malaria as a better and cheaper option compared with treatment .Inhibitory factors include fear of the chemical that is used to treat nets, high cost of ITNs and the high cost of assessing health services, uncaring husbands, unavailability of ITNs in communities and low quality of health services (Chukwuocha, et al, 2010).

There is a growing need to ensure that all members of the community in the Africa context are protected from the ITN. To be able to achieve this very beneficial need,

Galvin et al, 2011 concluded that, in malaria endemic Africa, school age children are the least protected, and advocated school-based initiatives for delivery of ITNs, and further argued that up scaling malaria control to universal African coverage requires a better understanding of groups who are least protected. They also point to the significance of sharing sleeping structures; young children most often sleep with mothers or both parents, and older children sleep on separate beds or mats (Galvin et al, 2011).

Other important factors to ensure sustained use of the insecticide treated bed net in the African continent are parental education and understanding of the dynamics of the malarial disease. In Kinshasa, Ndjinga and Minakawa (2010) recommended in their conclusion of the study titled: The importance of education to increase the use of bed nets in villages outside of Kinshasa, Democratic Republic of the Congo recommended that; Development of an educational programme, particularly one directed toward parents, is necessary to reduce misconceptions and increase prevalence of bed net use among all age groups. (Ndjinga and Minakawa, 2010). They further assert, a mother's education level and adequate knowledge about malaria transmission are also associated with their use of bed nets in other countries. As a majority of children less than 5 years of age sleep with their parents in Africa, their protection from malaria depends on parents' perception of bed nets (Ndjinga and Minakawa 2010).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter provided information on the methodology used to obtain information for the study. The research methods adopted and the systems used to ensure the credibility of the data / information acquired is also discussed in this chapter. The specific sub-headings in this section are the study design, population under study, sample size and sample characteristics, sampling methods / techniques, research variables, data collection and study instrument, data analysis and quality control measures, and the research ethics adopted for the study.

3.1 study Design

This study is a Cross Sectional Descriptive Study. It employed mixed methods (quantitative and qualitative methods) and explored the usage patterns of behaviour and decision making processes, level of risk awareness of the non-use of the insecticide treated bed net, barriers to sustained usage and also identified the factors that facilitate sustainable use of the insecticide treated bed net by the target population and their ability to control the spread of endemic malaria depending on their knowledge on the use of the ITN. The mixed study design allowed for the eliciting of exhaustive understanding and expression of the views of the study participants as well as the use of figures and numbers to support expressed research findings. In this study therefore, there was a classical blend of the quantitative and qualitative methods to produce an in-depth understanding of the factors that promote sustained usage of the ITN in Ghana and particularly the Upper East Region.

The specific study design adopted was a Cross Sectional Descriptive Explorative Study Design which allowed for thriving into virgin areas and eliciting in-depth understanding of the factors that influence the use of the insecticide treated bed nets and the barriers to sustained usage of the insecticide bed net in the Upper East Region. A cross sectional study allowed for the collection of data from participants once and follow up for data collection was not required.

3.2 Upper East Region

The Upper East Region is located in northern Ghana and is the second smallest of ten (10) administrative regions in Ghana, occupying a total land surface of 8,842 square kilometres or 2.7 percent of the total land area of Ghana. The upper east regional capital is Bolgatanga. The region lies between longitude 0° and 1° west, and latitude 10° 30′N and 11°N. The region shares boundaries with Burkina Faso to the north, Togo to the east, Upper West Region to the west, and the Northern Region to the south. The Upper East region is divided into thirteen (13) administrative districts with the regional minister as the head and supported by the various departmental heads and directors. The centre of population of the Upper east Region is located in its capital of Bolgatanga (Ghana Statistical Service, 31ST MAY 2012). The population is primarily rural (79%) and scattered in dispersed settlements. With only 21 percent of the population living in urban areas, the region is the least urbanized in Ghana (Ghana statistical Service, 2012).

The urban areas are generally areas that are booming with economic activities because of the regions proximity to borders both to the east and north. Ghanaian citizen by birth, childhood or parenthood constitute 92.5 percent of the population of the Upper East region. The people of the upper east region are generally very welcoming and

apart from a few conflict prone areas like the Bawku municipal area, the region is relatively very peaceful.

Farming is the main occupation of the local inhabitants of the region mainly at the subsistence level. Formal education is spreading assiduously in the region. The climate and topography together with human activities in the area seriously encourage malaria transmission. In the upper east region, malaria is qualified as holoendemic, typical of the tropical rural regions of humid savannah in western Africa. The transmission season is long (over six months) and peaks in September, October/November: almost at the end of the rainy season with sporadic infections occurring throughout the year.

In the upper east region, malaria remains the most common reason for all Out Patient Department attendances in all health facilities. The region is highly heterogeneous with the population composed of different ethnics groups: Kusasis, Mamprusis, Talansis, Nambdams, Frafras (Gruni), Kasenas, Bimobas, Moshei's and Builsas etc. Houses in the Upper East Region are generally shaped in to compounds with several rooms. Most households in the upper east region have single common rooms which are rectangular or circular and built of mud, and thatched roofs and sometimes corrugated old zinc. The rooms of the houses have one door and some have no windows or have very small windows for ventilation. These rooms generally are organized in compounds, maybe several rooms per compound comprising several households. The sleeping arrangement is communal.

3.2.1 The Population

The Upper East Region is estimated to have a population of 1,046,545 people distributed in to thirteen (13) Administrative Districts with a 1.2 inter-censual population growth rate (Ghana Statistical Service, 31ST MAY 2012). The study population included all this inhabitants of the region. Malaria is endemic in every area of the Upper East Region. All the inhabitants of the region are generally at risk for malaria infection. The targets population are mainly households that have pregnant women/woman and / or children /child under five years (vulnerable populations). Included in the study as target population were also officers who have in-depth knowledge in malaria control programmes activities. Specific districts where the study took place included the Bawku Municipality, the Bolgatanga Municipality and the Kasena Nankana East Districts representing the eastern segment, central strap and the western segments of the region respectively. The population of the selected Districts are Bawku Municipality 217,791 people, Bolgatanga municipality 131,150 people and Kasena Nankana East Districts also made up of 109,944 people (Ghana Statistical Service, May 2012).

3.3 Sample Size Determination and Sampling Techniques

Sampling is the act of taking part of the target population for a study. This section specifically outlines the rigorous methods that were adopted to ensure that a credible sample that was representative of the study population was gotten.

3.3.1 Sampling Technique

Sampling is the selection of a subset of elements of a population to estimate characteristics of the whole population. This study was situated in a large

geographical area and is only through sampling (using multiple sampling methods) that the target population will be well represented. The multiple sampling methods were used. Multiple sampling methods refers to sampling plans where the sampling is carried out in many or multiple stages using smaller and smaller sampling units at each stage until the study sample is gotten.

The districts were first selected based on three clusters: The Upper East Region (the target population) was sliced / zoned in to three zones making up the eastern, central and the western zones. The eastern zone included the Bawku Municipality, Garu Tempani District, Binduri District, Pusiga District and Bawku west (Zebilla) District. The central section included Bolgatanga municipality, Bongo District, Talansi district and Nabdam District while the Western segment included the Kasena Nankana East District, Kasena Nankana West Districts, Builsa (Sandema) District and Builsa South (Fumbisi) districts.

In each zone, Districts were selected by simple random sampling. In each zone, district was handpicked from a collection of Districts listed in to a basket. In the eastern segment the Bawku Municipality was selected, central zone Bolgatanga municipality while in the western zone the Kasena Nankana East Districts assemblies. These selected Districts of the Upper East Region constituted the study sites.

3.3.2 Sample Size

There were two separate assortments of samples that took part in the quantitative and the qualitative facets of the study. The structured field surveys constituted the quantitative while Key Informant Interviews (KII) made up the qualitative aspects.

Three (3) district malaria control coordinators / officers were involved in the key informant interviews (KII) (one person from each chosen district).

In the quantitative session, one hundred and fifty two persons representing their individual households responded to the structured questionnaire. This was made up of fifty respondents in Kasena Nankana East District and fifty one peoples in each of the municipalities (Bolgatanga and Bawku municipalities) selected for the study. The aggregation (quantitative and qualitative facets) of these participants completed a sample size of one hundred and fifty five (155) people.

3.3.3 Sample Selection and Characteristics

KEY INFORMANT INTERVIEW: Purposive sampling technique was used to select three District Malaria Control Coordinators (one in each study district) for the qualitative aspect of the study based on their in-depth knowledge on the ITN use or its distribution in the region or the role they generally play in the total control of malaria in the region. These officers even though had additional responsibilities in the district, were the officials designated for malaria control, distribution and usage of the ITN, indoor residual spraying and prophylaxis treatment of pregnant women.

QUESTIONNAIRE: Respondents for the quantitative study were interviewed within their households. Each respondent represented his/ her individual household. The probability sampling technique was used for selection of participants. The stratified random sampling method was adopted following the wide spread nature of the study sites and very large populations involved. Time and resources made it relatively difficult to create a credible sample frame. Households included in the study were those that have a child of under five years or that have a pregnant woman.

The inclusion criteria for selection of a household to be part of the structured survey included; for each pregnant woman and each child under five; owning at least one bed net for their household. The head of such household or caregiver or the pregnant woman was interviewed. Data on knowledge of the person interviewed in the household was obtained through a series of questions concerning malaria prevention, the use of the insecticide treated bed net within the household, barriers to bed net usage and measures to ensure sustained usage.

The researcher and his assistants visited households within their homes and persons who consented to the study were allowed to or assisted to complete the questionnaire. In each District fifty (50) or fifty one (51) questionnaires in the municipalities were administered comprising one hundred and fifty two (152) questionnaires in all.

3.4 Research Variables

This study specifically stems from the health belief model of behaviour change and how this model has an influence on the patterns of behaviour and decisions made in the household as to how the ITN is used, level of knowledge on the risk of the none use of the insecticide treated bed net within the household, barriers to sustained usage of the ITN and the factors that promote sustained usage of ITN. The health belief model takes its locus from the fact that when people are given adequate knowledge and attains explicit understanding about their own health, they change towards positive behavioural health outcomes provided the right conditions are available and there are enough queues to behaviour change. People are also likely to change towards a particular behaviour provided they perceive such behaviours' as being positive and beneficial to their very existence.

The research variables for this study include the pattern of behaviour in the household that influence the choice of use of the insecticide treated bed net; who sleeps under the net, how are decisions made within the house hold in the use of the ITN, process of acquisition of the ITN, how the vulnerable are protected etc. The other variables include the cultural, social, economic physical technical and anthropological variables that act as barriers to sustained use or promote sustainable use of the insecticide treated bed net within the household. The study also assessed the understanding of the people of the Upper East Region of the repercussions of the non-use of the insecticide treated bed net in the prevention of malaria.

3.5 Data Collection and Study Instrument

This section specifies the various methods that were adopted by the researcher in obtaining the data. It also outlines the various sources of data and how data was treated during collection.

3.5.1 Key Informant Interview

The research used self-developed interview guides for the key informant interviews (KII). The interview guides did cover four segments as it corresponds to the objectives of this study with prompts that allowed for clear base for eliciting unmentioned terms / views. The data from participants of the key informant interviews was obtained by audio recording, transcribed verbatim. Data sources mainly included; interviews and unstructured observations by the researchers.

3.5.2 Questionnaire

Structured questionnaire encompassing the four thematic areas of this study was used. Participants were expected to self-complete the questionnaire developed or was

assisted by the researcher or his assistants depending on whether the respondent could read and write to complete the questionnaire. These questionnaires were then vetted for completeness and appropriateness for the study before analysis was then commenced. Questionnaires properly completed were collated for analysis.

3.6 Data Analysis

The digital (audio) recordings of the interviews were transcribed verbatim. The transcripts and notes from the interviews were analysed manually into themes and patterns. Themes and patterns was then identified in the script and used as the yardstick for analysis and presentation of findings in consonance to the objectives of this study.

Completed questionnaire was scrutinized for appropriateness and completeness. Incomplete or inappropriately responded to questionnaires were withdrawn. The structured questionnaires were analysed using Statistical Package for Social Sciences (SPSS) version 20. Data was entered in their raw form in to Statistical Package for Social Sciences (SPSS) and descriptive statistics used as bases for analysis. Data was presented in charts, tables and or simple narratives. Simple proportions in percentages formed the base for analysis of quantitative data.

Subsequently, there was a purposive fusion of qualitative data to quantitative data to give reason and support findings so as to form a basis for in-depth discussion of research findings.

3.7 Quality Control

This section outlines the various methods and systems that were adopted to ensure that research ethics and study instrument were valid and reliable. This also ensured the respondents' right in research were also respected.

3.7.1 Validity of Instrument

It is used to determine if an instrument measures what it is intended to measure. Therefore to ensure the validity of the questionnaire and the interview guides, draft copies were given to some lecturers of the University for Development Studies, Tamale campus, who read through and made necessary corrections to ensure face validity. The questionnaire and interview guides were again subjected to critique by friends and course mates. After this review, the questionnaire and interview guides were sent to the researcher's supervisor for further review. The study tools were then piloted in the Talansi District of the Upper East Region. From the responses in the pilot study, it was clear that respondents understood the questions and the questions did not pose any ambiguity as they were fully and well answered.

3.7.2 Reliability of Instrument

To ensure reliability of the instrument used for the study, a pilot testing was conducted at the Talansi District of the region which has the same respondent characteristics as the study sites in the region. The researcher chose this district because it was one of the districts which exhibit the same characteristics as the districts chosen during sampling for the research to take place in them.

Time was made by the researcher and the respondents to discuss any ambiguity, doubt and incoherencies that the respondents may face with any aspect of the draft.

Respondents thereafter, were given time to complete and return the questionnaire to the researcher. These views were collated and studied closely by the researcher .The pilot study helped to remove ambiguous statements, all necessary corrections and changes were made before the data collection was then started.

3.7.3 Pretesting

The tools were pretested with participants who are not within the study area so as to test for consistency and validity of the tool. Pretesting was done in the Talansi District of the Upper East Region because it has a blend of both rural and urban characteristics and will be able to test for the resilience of the study tool. The district also has social, cultural, anthropological and geographical characteristics as the study Districts.

3.8 Research Ethics

A letter from the University for Development Studies through the Department of Allied Health Sciences was obtained to the various District Health Directorates where the research was conducted to introduce the researchers to these institutions. Participants were recruited ahead of time and verbal consent sought for their participation or otherwise into the study. Participation in the study was purely on voluntary basis and participants were eligible to opt out of the study at any time they deemed necessary.

3.9 Methodological Limitations

This study was purely a mixed method study design (it employed both quantitative and qualitative methods) that was specifically a descriptive explorative cross sectional study that sought to identify; patterns of behaviour, decision making process, level of risk awareness of the none use of the ITN in the region, those factors in the Upper

East Region that act as barriers to sustained usage of the ITN and the measures to promote sustained bed net usage in the region.

The study was conceived within the context of the Health Belief Model of behaviour change that generally belief that the level of knowledge of an individual on a particular behaviour, cues to action, presence of enabling environment for behaviour change, prompts to take action by a third party; influences the general adoption of positive behavioural outcomes including the use of the insecticide treated bed net.

The study was purely descriptive and did not identify any cause effect relationship neither did the study identify the efficacy of the bed nets use in the various homes. The spread of sampled participants across several cultures and geographical locations within the upper east region makes the sample views a reflection of all the indigenes of the region. Even though the study was limited to a small but representative sample size of the study population because of time and resource constraints in-depth views represented the totality of the region. Also while the study also assesses the perception of the burden of malaria to the region and the family to be particular, it does not diagnosis or makes use of any current statistics of diagnosed persons with malaria.

However as participants were much representative of the study district generalization of this study findings is worth it.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Introduction

In this chapter, information and data gathered in the field during data collection: the administration of the structured questionnaire to households and the findings of the interview sessions with the District Malaria Control Officers in the Upper East Region are analysed and presented systematically. The data is analysed in two sections as quantitative and qualitative using the objectives of the study as thematic areas in each section. In each thematic area; the quantitative research findings is presented first before the qualitative findings.

4.2 Presentation Of Data/ Research Findings

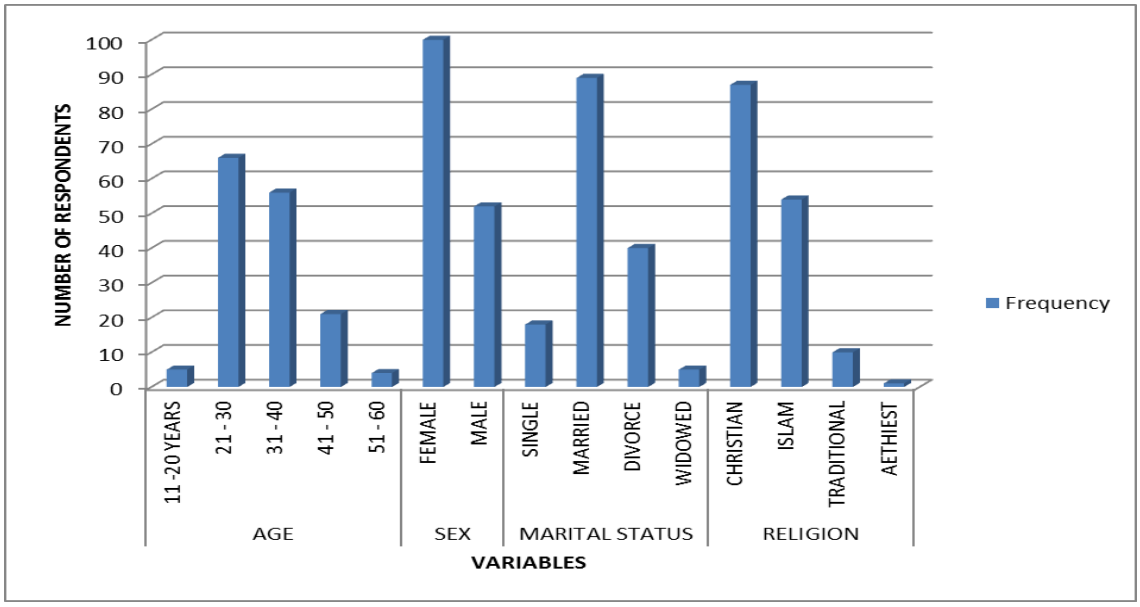
Both the quantitative and qualitative data was presented in the various sections. These sections include demographic characteristics of respondents, patterns of behaviour and decision making processes in the use of the ITN, general level of risk awareness of the non-use of the ITN, barriers to sustained usage of the ITN and those factors that facilitate sustainable use of the ITN in the upper east region

4.2.1 Demographic Characteristics of Respondents

Households were interviewed, assisted to or made to respond to a structured questionnaire through an adult resident representative of the household; a person who had understanding of the family dynamics. All the representatives of households (respondent) in this study were persons who own an ITN and have a malaria vulnerable person within their household. These vulnerable persons considered in this study were pregnant women and children under five years. The District Malaria

Control Officers were the respondent for the qualitative aspect of the study. The District Malaria Officers are civil servants who apart from their normal responsibility are also given the additional role to coordinate all malaria control activities in the district. Major malaria control activities in the district include indoor residual spaying exercises, distribution and usage of the insecticide treated bed net, case management of malaria and general education of people on the preventive methods of malaria. Some of these officers used in the various districts varied. Some of the Malaria Control Officers are originally assigned as District Public Health Nurses, District Disease Control Officers or District Health Information Officers.

Respondent responded based on their understanding of the dynamics within the household, and / or in the District on the use of the insecticide treated bed net for the vulnerable and any other member of their family or household.



Field Data Collection : march 2015

Figure 2: Distribution of Demographic Characteristics of Respondents.

Table 1: Household Size and Use of ITN In The Household

VARIABLES	RESPONSES	FREQUENCY	PERCENT
HOUSE HOLD SIZE	1 - 3	31	20.4
	4 - 6	84	55.3
	7 - 9	36	23.7
	ABOVE 9	1	0.7
NUMBER OF PERSONS SLEEPING UNDER THE ITN	1 -3	133	87.5
	4 -6	19	12.5
VULNERABLE POPULATIONS SLEEP UNDER THE ITN	YES	68	44.7
	NO	62	40.8
	NOT CERTAIN	22	14.5
VULNERABLE CONSISTENT USE ITN IN THE LAST YEAR	YES	47	30.9
	NO	103	67.8
	NOT CERTAIN	2	1.3

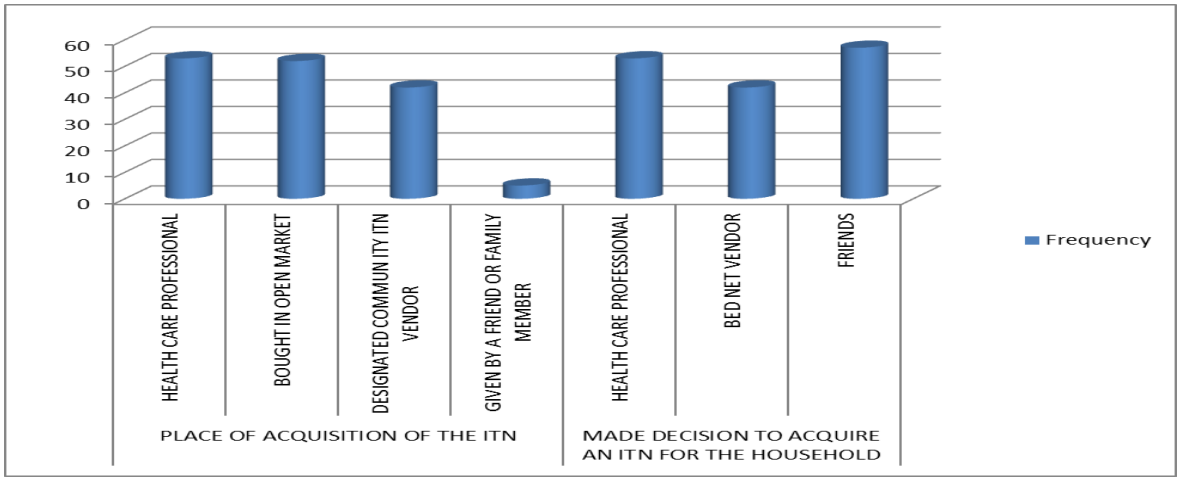
Source: Field data collection, March 2015

Majority (55.3%) of households had sizes (household size) ranging from four to six people within those households while some (23.7%) households were generally very big and had seven to nine people. Only one household (0.7%) with member(s) more than nine persons were included in the study. On the number of people who is currently sleeping under the insecticide treated bed net in the family or within the various households a large percentage of the households represented in the study of 87.5% had one to three persons sleep under the ITN consistently. In each household represented for the study at least one person slept under the insecticide treated bed net. However majority of household members did not sleep under the insecticide treated bed net. On prioritization of the vulnerable populations in the use of the ITN for malaria control, a comparatively large percentage of 40.8% did prioritise the vulnerable populations to sleep under the ITN even though they all respondents owned one or more ITN in their household and 67.8% indicated the vulnerable did not consistently use the ITN within the last one year.

4.2.2 Patterns of Behavior: Decision Making Processes

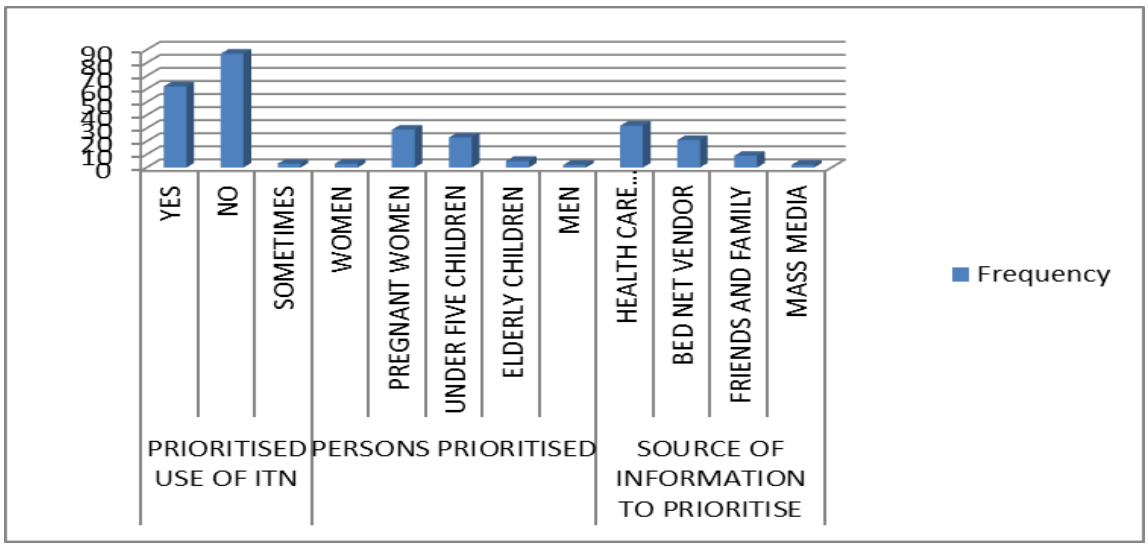
This referred to those factors that influence the patterns of behaviour - the very circumstances pertinent to ITN usage in the home.

4.2.2.1 Quntitative research Findings on Partterns of behaviour and decision making processes



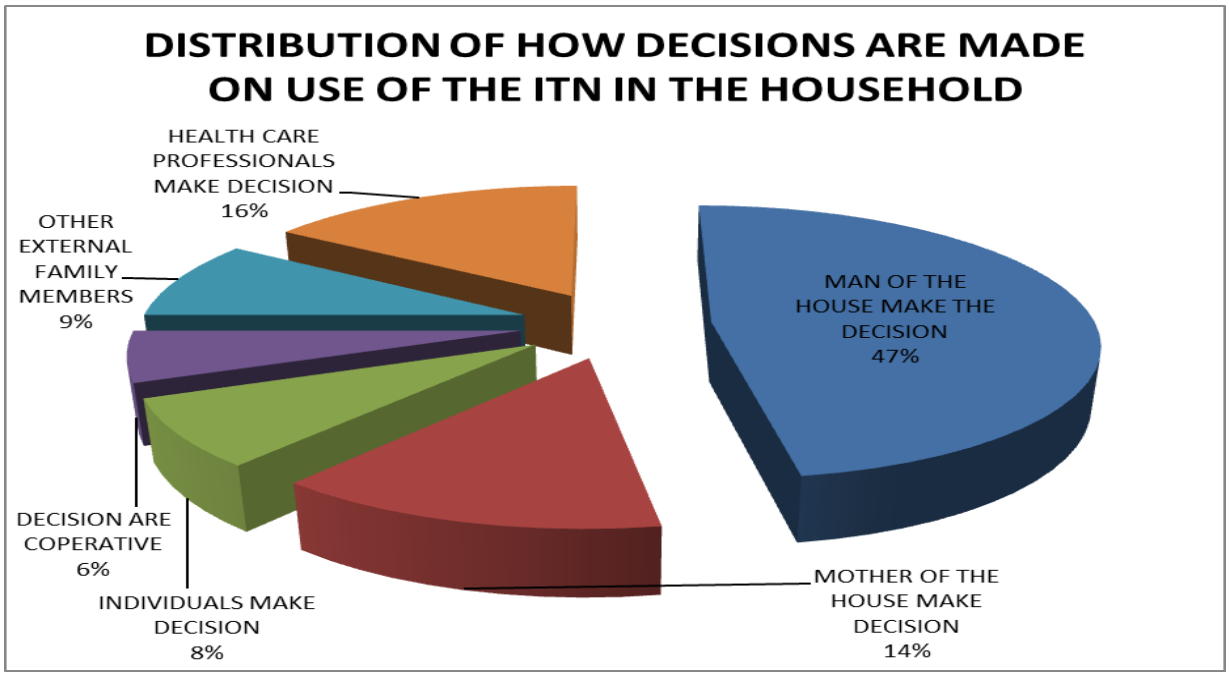
Source: Field Data Collection, March 2015

Figure 3: Distribution of Variables on acquistion and ownership of an itn in the region.



Source: Field Data Collection: March 2015.

Figure 4: Priority For The Vulnerable Populations



Source: Field Data Collection: March 2015

Figure 5: Distribution of how Decisions are Made on use of the ITN in the Household

GIVEN INFORMATION ON NET USAGE DURING NET ACQUISTION: On whether the respondent were given information about the ITN during the acquisition of the net, only 22.4% stated that they were given education and information on the use of the ITN and its retreatment modalities during the acquisition of the net. The remaining 77.6% were not given any information or education during the acquisition of the net. They relied solely on individual perceptions and information acquired from friends and individual family members.

4.2.2.2 Qualitative Research Findings on patterns of Behaviour and Decision Making processes on the use of the Insecticide Treated Bed Nets.

PATTERNS OF BEAHAVIOR: The District Malaria Control Officers intimated that the patterns of behaviour within the household on the use of the ITN is varied and differed from one district, community or household to the other as some people do not

have the net at all and hence will not be able to use it. The patterns of behaviour were identified to range from ignorance on the importance of ITN usage to over complacency in the use of the ITN as the two extremes of the patterns of behaviour within the households. While some people did not use the net because they did not have adequate knowledge on its use, lack of net, lack of access, myths and inexperience on the use of the net, some do have, understand the need to use the net and prioritise the vulnerable and used the net correctly and according to instruction while the last category were expected to have an understanding to the use of the net but were only over complacent on the net usage and hence did not use the insecticide treated bed net at all time or did not use it at all. In this patterns of behaviour identified, there were the fact that people do not have a sustained use of the insecticide treated bed net in the community. A respondent indicate "*some people will not just use the ITN because they belief that they will not get infected with malaria"* a clear manifestation of complacency he lamented

On access respondent explained that even though free distribution and subsidized distribution of the nets is on-going in their district. Free distributions of the net are usually done during mass campaigns and malaria prevention outreach programmes but subsidised distributions are largely a routine in ante natal clinics or within some Community Health Planning and Services (CHPS) compounds in all the three study sites / districts. They also contend they were yet to get to the target of 100% coverage of all the vulnerable populations and issues of sustained usage of the ITN also remain a challenge. "……*Even though we are doing all this towards malaria control and bed net distribution, we cannot say we have had hundred percent coverage for the distribution of the ITN to the vulnerable populations".*

On culture and traditional practices that have an influence on the usage pattern of the ITN in the region, respondent indicated that male dominance in the study setting has an influence on the use of the ITN within the various households. The region is highly patrilineal and male are highly valued and domineering in all affairs of life including the manner that the ITN is being used in the household. A respondent summarised this view by saying "*The men decide what their wives and children will do and so if the man decide that the woman will sleep under the ITN, the woman will surely do, but if he decide otherwise, then it also means the woman will not sleep under the ITN".* The men of the house, largely the husbands of pregnant women or fathers of under five children; level of knowledge on the use of the ITN will influence the decisions made within the household on its usage and hence influence the pattern of behaviour within such specific households. Further on culture; when is mandated for the woman to stay indoors during the peuperium, then nursing mothers are likely to sleep under the ITN with the baby in other to provide warmth. In this instance the culture of the people promotes the use of the ITN to protect the post natal woman and her baby. On the other hand because of male dominance that is endorsed by the culture, it may act as a hindrance to the use of the ITN. For taboos, none of the respondents mentioned taboos as a major influence to the use of the ITN in the Upper East Region.

On other factors that influence the pattern of behaviour within the households and within the communities on the use of the ITN, the District Malaria Officers mentioned; The season of the year, whether characteristics, atmospheric temperature, presence or absence of rain, relative humidity, room size, number of persons sleeping in one room, level of ventilation influence the patterns of behaviour on the use of the ITN in the region. a respondent indicated that *"in the rainy season when the weather*

is generally humid and cold, people are more likely to sleep under the ITN compared to the dry periods of February to April when the weather is generally very warm and dry, many persons in the region sleep outside their rooms and are not likely to use the ITN then". In conclusion, culture, child birth, climatic characteristics, season, knowledge and level of formal education are the variables that influence the pattern of behaviour on the use of the insecticide treated bed net in the prevention of malaria in the region.

DECISIONS: On how decisions are made within the household respondent indicated that despite the male dominance in the region, health workers also have greater influence on the manner in which decisions are made even though the final prerogative still lies with the head of the family – the man of the house. The health worker's counsel to the family is usually much adhered to and treated as a "gospel truth". Most men are likely to take decisions based on that made by the health service provider to the family "*The people are concerned of their health and see the health worker as the knower of all, they will believe, obey and practice all that is thought them by the modern health practitioners as long as it benefits their health……. Most health information given by health professionals is not queried."*

On how the vulnerable populations are prioritised in the use of the ITN, respondent indicated that the National Malaria Control and the UNICEF sponsored malaria net distribution programmes actually prioritised the vulnerable populations and for that the vulnerable are given priority during the distribution of the ITN. Indeed the vulnerable populations are the target for the National Malaria Control Programmes and other net distributions programmes in the Region. They could not however indicate if the vulnerable actually use this net consistently during bed time. A

respondent indicated; "*For the NMCP we give the nets or subsidize it for the vulnerable populations but we cannot be sure if they are those who actually use it in the night."* The challenge with this however is that not all vulnerable populations are actually cared for due to lack of access to modern health facility where the net distributions actually take place. The ITNs are subsidized at the ANC and with only accredited bed net distributors in the Districts but not all pregnant women attend ANC services or have access to the accredited bed net distributors and for that matter are not able to get the ITN during the distribution at the ANC. *".... Not everyone get health care services from modern facilities and for that matter they may be vulnerable but will not be catered for because of the lack of access to health facilities."* This lack of access to modern health facilities still serve as a major challenge in getting to the universal coverage of all vulnerable populations in the use of the ITN.

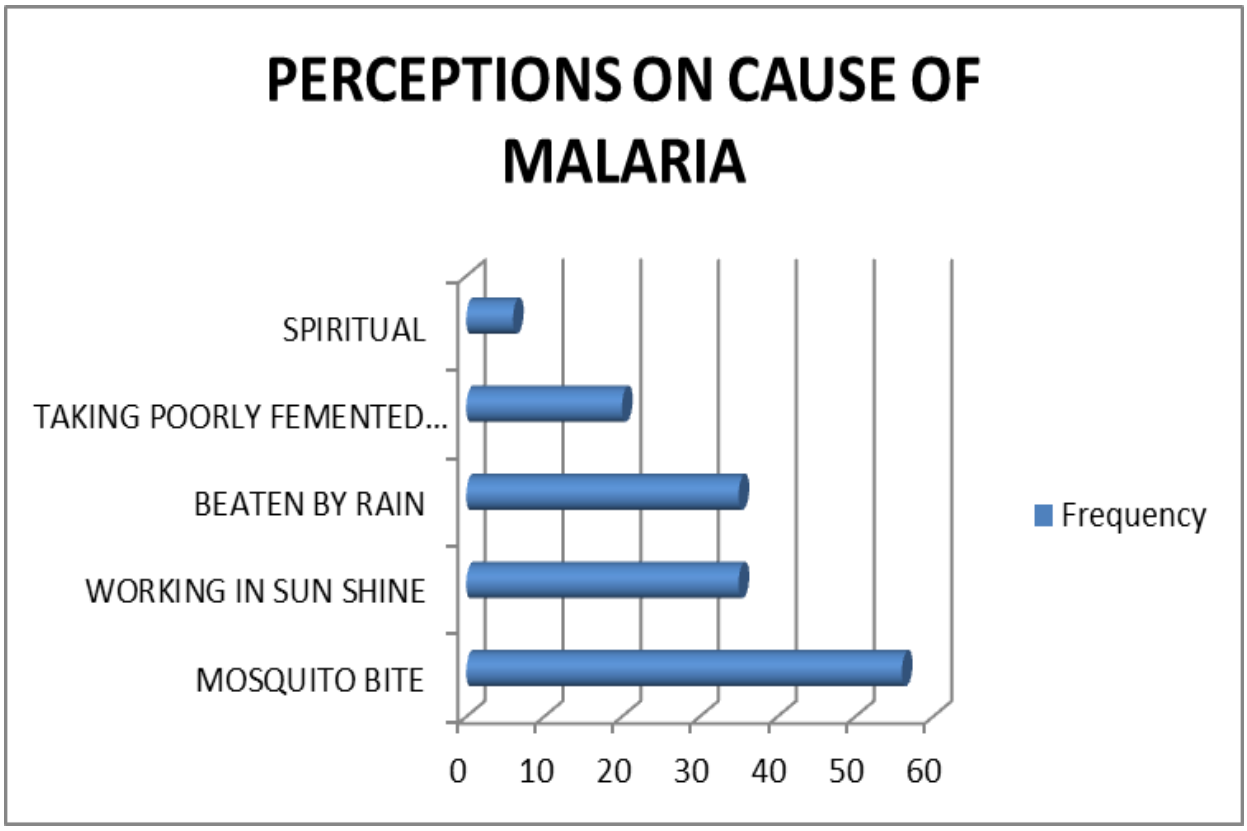
On the socio political factors that influence the use of the ITN in the households, male dominance was identified as one of the factors that influence the use of the ITN in the family. The political dynamics of the households place the man in an indispose positions as far as decisions and decision making processes are concerned.

4.2.3 General level of Risk Awareness of the non use of the Insecticide Treated Bednets in the Upper East Region

This explored the specific thematic area that determined the level of risk awareness of the non-use of the insecticide treated bed net in the upper east region of Ghana. It explored the peoples understanding of the dangers that are associated with the non-use of the ITN in the region both from the household representatives and the Malaria Control Officers.

4.2.3.1 Quantitative Research Findings on risk Awareness

PERCEPTIONS OF MALARIA BURDEN IN THE REGION: In the Upper East Region, in assessing the perceptions of the impact of control measures of malaria in the region; 16.4% responded that malaria is well controlled and interventions are leading us to the right direction (malaria is not a burden to the community members) while a large majority constituting 83.6% of the respondent identified malaria as a burden and out of these persons who see malaria as a burden in the region, majority (75.7%) showed that governments, communities and non-governmental organisations in the area have invested large amounts of resources in the eradication of malaria in the region yet very little results is gotten. It is a burden because many children and pregnant women still suffer the devastating impact of malaria. People assess the burden of malaria based on the number of people who are infected and affected by the disease both within and without their individual specific households. They also identified the effects of malaria on the health delivery system, its effect on socio-economic development and Gross Domestic Production, and generally the morbidity and mortality associated with the disease. The perception of malaria as a burden to every individual household is still deeply engraved in the people's desire for health.



Source : Field Data Collection: march 2015

Figure 6: Perception Of Cause Of Malaria

CATEGORY OF VULNERABLE PEOPLE: Respondents were asked to mention some of the people they considered to be more vulnerable in getting malaria infection and needed to sleep under the ITN, 47.4% responses were pregnant women, 9.2% for women who were not pregnant and 1.3% men or household heads. The remaining 40.8% and 1.3% mentioned under five children and older children more than five years respectively. Majority of the responses representing 40.8% was for under five children.

CHEMICAL USED IN ITN INJURIOUS: When asked if the chemicals used in the ITN were injurious to human health, 13.2% responded in the affirmative that the chemicals used in impregnating the ITN could be injurious to their health. The remaining respondent did not see the chemicals to be injurious to human health. They

believe it could not be injurious to human health in the quantities that are used for the ITN.

MORE PEOPLE WILL USE THE ITN IF IT WERE GIVEN FREE: A whooping majority of respondent (76.3%) believed that if the ITN were given for free, they were more likely or more people were more likely to use the insecticide treated bed net in the community. The remaining of the respondents does not think the inability to acquire the ITN had an influence on its use.

DANGERS OF NON USE OF THE ITN: On the dangers of the non-use of the insecticide treated bed net 8.6% inferred there are no dangers for not sleeping under the ITN while the rest of the respondent constituting the majority of responses disclosed that the non-use of the insecticide treated bed net may lead to malaria infection.

4.2.3.2 Qualitative Research Findings on Level of Risk Awarness on the use of the Insecticide Treated Bed Nets

Malaria control officers of the three study districts believed that formal education have a relationship to knowledge of the dangers of the non-use of the ITN by beneficiaries. People who had formal education used the insecticide treated bed net compared to those who did not get formal education. However the higher one went in to education e.g. to the tertiary level, the more complacent the person become on the use of the insecticide treated bed net as the person begin to believe that he or she is immune to the disease. Educated pregnant women and educated mothers of children under five years were more likely to sleep under the ITN and to prioritise vulnerable populations compared to non-educated women. *"A woman or even the man of the family who is educated will always prioritise vulnerable members of the family and*

ensure that they sleep under the ITN." Another factor that contribute to this none use of the ITN is complacency. On the disadvantage to some section of the educated people, they believe that they were immune to getting malaria while others also see malaria as a normal occurrence and not necessarily a dangerous illness that warrant the rigorous use of the ITN. A respondent state *"sometimes it's surprising to see an educated person even to the tertiary level; a graduate that thinks she / he will not get malaria and hence will not be sleeping under the insecticide treated bed net, but in the nutshell, education promotes use of the ITN in the communities"* So even though the elite categories have adequate knowledge on the ITN, their inability to use it consistently has to do with complacency.

The vulnerable populations who have access to the insecticide treated bed net cannot be said to benefit from its specific use. Even though they asset the National Malaria Control Programme prioritize the vulnerable populations in the use of the ITN, respondent could not be firm that community members do prioritize the vulnerable populations. "… *The bed net is distributed to the vulnerable populations, but no one can be certain that the vulnerable actually use the insecticide treated bed net during sleep or in the night, it is surely discretion of the family members".*

On the chemicals used in the ITN been injurious, all respondent indicated the chemical is not injurious to human health in the quantities that are used in the ITN. A malaria control officer asserted that: *"These nets have undergone clinical trials and cannot be harmful to human health in either way; the chemicals could be injuries to human health but not in the quantities that are used in the ITN"*

On cost of the ITN, respondent believed that if the ITN were distributed free of charge devoid of the subsidies that are usually required to the beneficiaries; there is more

likelihood that more people will use the ITN. A respondent queried this view by saying; *"... some people cannot even afford a daily meal, how can he then have money to purchase an ITN?*

4.2.4 The Barriers to Sustained use Of ITN

The specific factors that hinder the use of the ITN by the people are explored under this specific thematic area. These factors actually influence and or affect the sustained use of the ITN in the Upper East Region of Ghana.

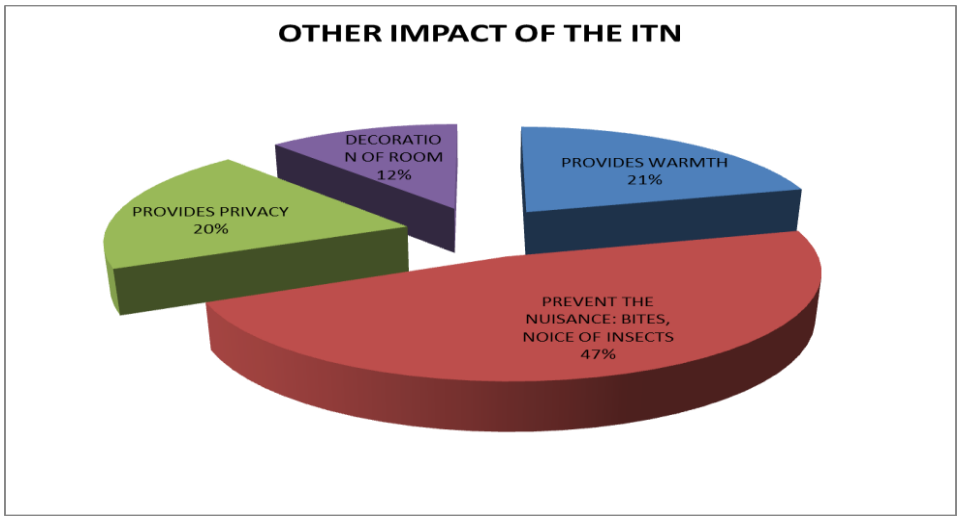
4.2.4.1 Quantitative Reseach Findings on Barriers to ITN Use

USES OF ITN: All the responded indicated that the primary use of the ITN within the household is to sleep under it during bed time to be protected from mosquitoes and subsequently malaria. However the researcher also wanted respondents to indicate other non-conventional methods that the ITN is put to. On the other uses of the ITN apart from sleeping under the ITN respondent mentioned: nursing of seedlings (19.1%), nursing of chickens (37.5%), fishing (33.6%) and the remaining 9.9% mentioned that it is used for fencing animal pens. Animals like goats, rabbit, sheep and sometimes cattle are kept in this fence made by using the net. The purpose is to wade off predators to the animals or the seedlings

ITN EFFECTIVE TO CONTROL MALARIA: Respondent were asked to indicate if the ITN is effective to control malaria: 43.4% were to the affirmative that the ITN is able to protect them from getting infected with malaria while 31.6% thinks that it is not effective as proclaimed in the protection from malaria. The remaining 25% thinks that the ITN is only effective only sometimes and dependent on the consistent usage and using the net appropriately. They contend if the ITN is not used according to the

manufacturer's instructions and the advice of the health care providers, then it will not be effective in protecting beneficiaries from getting infected with malaria.

COST OF ITN PREVENT USE: When whether the cost of the ITN prevents use of the ITN, 32.2% were to the affirmative while 67.8% thinks that cost is not a challenge in the use of the ITN. Respondent indicated that the ITN is distributed on subsidised pricing which should be a minimum amount for community members to be able to purchase.



Source: Field Data Collection: March 2015

Figure 7: Other Impact of Malaria

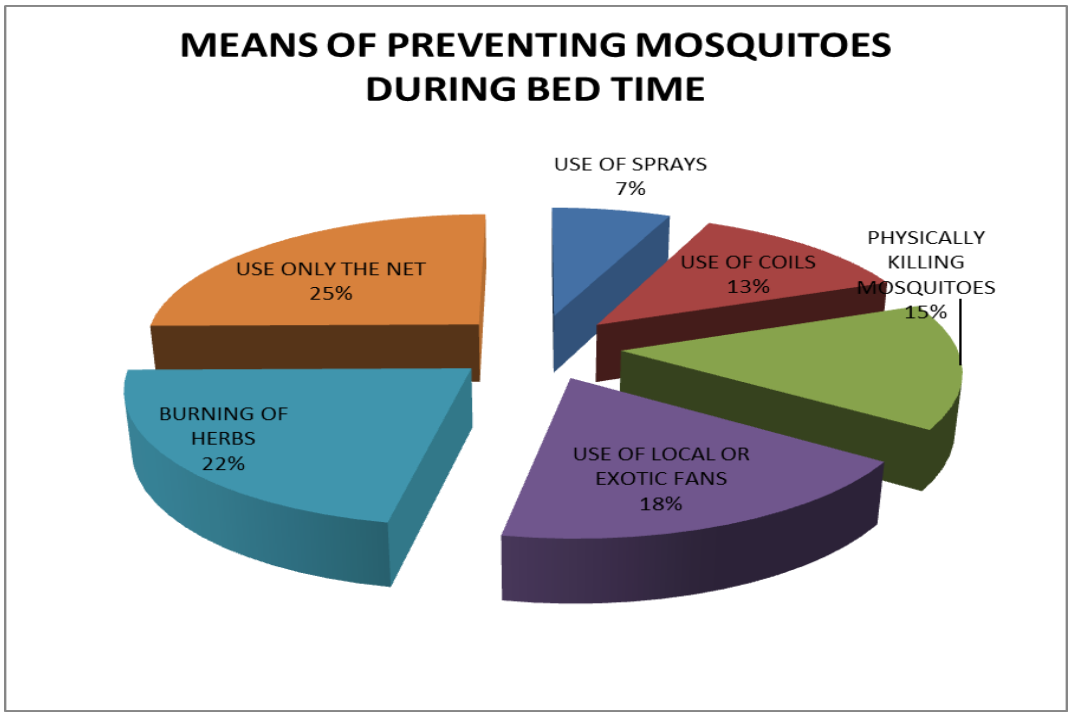
On the other impacts espoused by the use of the ITN in the household, responses generally varied and included used to provide privacy where the children and parents share a common room (20.0%), decoration of the room especially as window curtains (12.0%), provision of warmth during cold weather (21.0%) and the large majority indicated the other impact of the ITN to be prevention from the nuisance (bits and noise from insects) effects of insects to be (47.0%) of the entire responses.

ROOM SPACE HINDRANCE: On whether room space had a hindrance on the use of the ITN 21.7% responded to the affirmative while 78.3% responded that there is no

challenge of room space in using the ITN. In the various households (general smaller in size) had more than one room for members and space to accommodate household members. Space therefore is not a hindrance to sustained usage of the insecticide treated bed net.

DESIGN AND ROOM SHAPE HINDRANCE: The room design and shape of the ITN act as a hindrance to the use of the ITN; 39.5% were to the affirmative the discrepancy in the design of the insecticide treated bed net to the shape of the room affected the sustained use of the ITN in their households while the remaining 60.5% thinks that the discrepancy in the shape of the ITN to the shape of the room does not necessarily affect their ability to use the insecticide treated bed net in their homes.

OTHER MEANS TO CONTROL MALARIA



Source: Field Data Collection: March 2015.

Figure 8:Means of Preventing Mosquitoes During Bed Time

PREFERRED NET DESIGN: On preferred net design, 4.6% and 20.4% preferred circular / cylindrical and rectangular / square nets respectively while the remaining 75.0% of the respondents believe that the shape of the net does not matter as long as it provided the protection it needed to provide. They did not think whether nets are cylindrical or rectangular, it will influence sustained use of the ITN in any way

CHALLENGE IN HANGING THE NET: On challenges in hanging the net 41.4% responded that they are challenged in hanging the net while the remaining 58.6% does not believe they have a challenge in hanging the net for use in their rooms. They believed that room space was enough and local material to be used for the hanging of the ITN was readily available. Community members learn about the hanging of the net from friends and family members.

CHALLENGE BY LOSS OF POTENCY: On whether they are challenged of the loss of potency of the ITN, 58.6% were to the affirmative that they are challenge when the net loss its potency and they do not know exactly how to or where to acquire the chemicals used for the retreatment of the ITN. The remaining respondent indicated they will be able to retreat their ITN when it loses its potency and therefore think that the loss of potency of the ITN is not a challenge.

4.2.4.2 Qualitative Research Findings on Barriers to ITN Usage

What constituted the major barriers to sustained use of the insecticide treated bed net in the region, respondent mentioned complacency and the influence of male dominance as the number one panaceas to the hindrance. Other factors include lack of access to the ITN, improper usage, lack of knowledge on usage, inappropriate treatment of the insecticide treated bed net and over complacency of some persons to the use of the insecticide treated bed net as barriers to sustained usage of the ITN in

the region. Continues shortages of the supply of the insecticide treated bed net both at the regional and district stores and lack of access to modern health services (where the bed nets are usually distributed at) to some section of remote communities also accounted as barriers to distribution of the ITN and to sustained usage of the ITN in the region. *"... Some people do not even have access to modern health facility, no CHPS compound, no clinic, not even a drug store – nothing; ...how can they then be gotten to be given the ITN"* a district malaria control coordinator lamented.

Some people within the communities do not sleep under the insecticide treated bed net because of claustrophobic tendencies. Claustrophobia refers to the feeling of being in an enclosed environment or the feeling that one is sleeping in an enclosed environment. "*People see the bed net as small spaces that force them not to be free but feel limited even in their sleep".* Other factors include lack of space and ventilation in very small rooms that accommodate a large number of people during bed times. *"Sometimes you may want to sympathise with the locals, the rooms are too small and poorly ventilated, and so you can't imagine they will be able to hang a net in them....."*

Primarily the ITN is use to protect beneficiaries / users from the nuisance associated with insects including mosquitos during bed time. While community members acknowledge that the primary use of the ITN is to prevent them from been beaten by mosquitoes, several other uses of it remain imperative to them. Due to the level of ignorance and wide spread poverty, community members put the ITN to other various uses apart from sleeping under them, these uses include making a fence to their gardens, nursing of seedlings and protecting chicken from predators while others use it for fishing. In all this uses the ITN is put into, some people stated that it were

expired nets used but no one could determine the efficacy of the net as at the time of this study. A malaria control officer lamented *"people say they are expired nets, but how do we know"* a malaria control officer stated.

On other means used to control malaria, Malaria Control Officers of the study district mentioned burning of herbs and / or coils, use of fans (both local and electrically empowered fans), wearing of protective clothing's during night times and physically killing mosquitoes during bed time as the means of controlling mosquito bites in the communities. The goal of all this interventions is to prevent the nuisance effect produced by mosquitoes during bed time and the subsequent destruction of a good night sleep. All this measures adopted by the people were accepted by the malaria control officers as effective in the control of the nuisance effects associated with mosquitoes.

The District Malaria Control Officers also mentioned that because the insecticide treated bed nets are subsidized by the National Malaria Control Programme through partnership with UNICEF, cost of the ITN is not largely seen as a major barrier to sustained usage of the insecticide treated bed net in the region. However they intimated that because poverty may be endemic, some people will still be challenged to raise the meagre sums of money to purchase the subsidized insecticide treated bed net. A malaria control officers summarised this view by saying; *"For now cost should not be a barrier to ownership and use of the ITN, however some people are so poor in this region that they cannot even afford to purchase the subsidized bed net"* a district malaria control officer identified

Concerns of safety of the chemicals used as insecticides within the ITN are not still seen as an important factor that acts as barriers to sustained usage of the insecticide

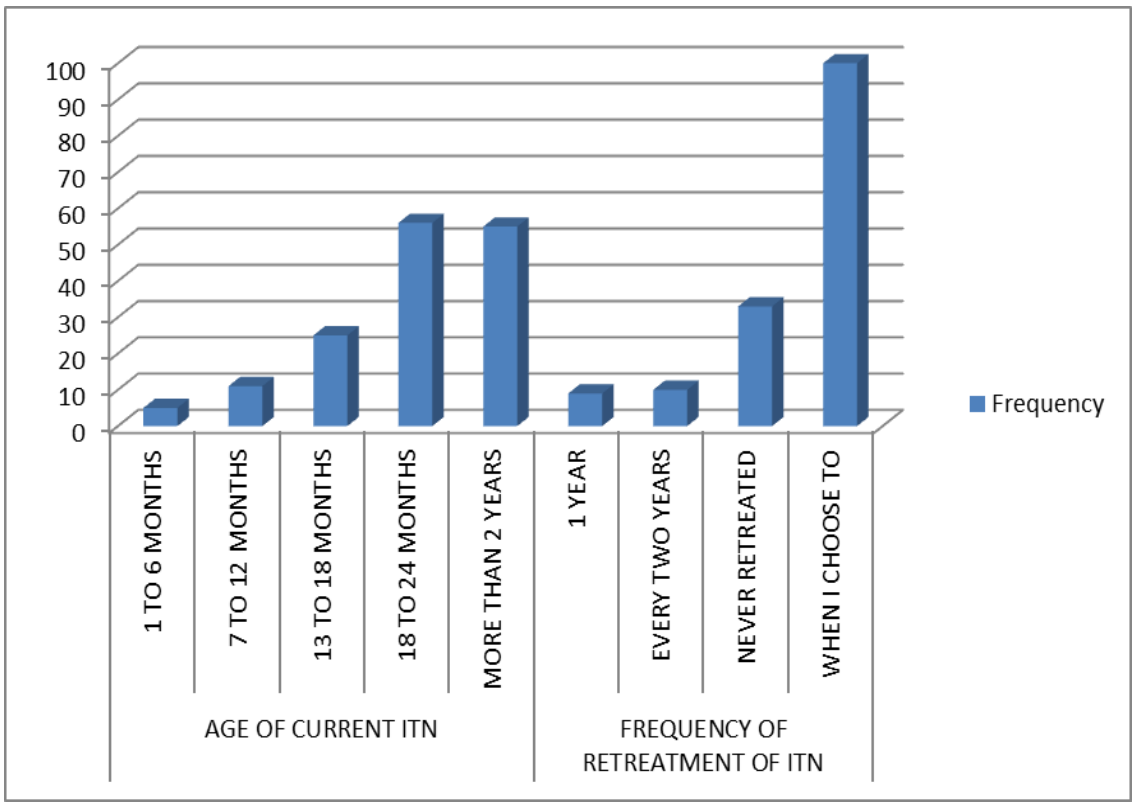
treated bed net. "*Apart from the concerns of allergy which is not wide spread, there are no dangerous effects of the net as espoused by the community members."* malaria control officers threw all assertions away and indicated that the bed net contains chemicals but in the quantities used for the ITN, it cannot be said to be injurious to human health.

4.2.5 Factors that Facilitate Sustained use of ITN

To be able to control malaria in the region, sustained usage of the ITN is very incumbent. The following are the research findings of the factors that influence the sustained usage of the ITN in the upper east region.

4.2.5.1 Quantitative Research Findings on Factors to Facilitate Sustained usage of ITN

ITN IS DURABLE: On durability of the ITN, 69.7% of the respondents were to the affirmative and that they have had value for money for the purchase of the ITN. They believed for the cost at which they bought their current ITN, then the ITN have lasted long as they expected. The remaining of the respondent thinks that the ITN is not durable and commonly loose its potency or is torn.



source: Field Data Collection: March: 2015

Figure 9: Age and Frequency of Retreatment of current ITN

CURRENT AGE OF HOUSEHOLD NET: On the age of each household net at the time of this study, largely most household nets used were more than eighteen (18) months with a majority having their nets more than two years old. On the frequency of retreatment of the ITN just a minority did the retreatment in less than a year with a large majority not using any specific measures of time to do the retreatment and only at their convenience or when they choose to do retreatment of their ITN. Some large proportion of respondent have never retreated their ITN at all. The retreatment of ITN is erratic and did not fellow any specific pattern in the study settings.

Table 2: Measures to Ensure Durability of ITN

On the means to ensure durability of their individual household net responses are represented in the table below;

RESPONSES	Frequency	Valid Percent
Carefully rolling and tucking in the net appropriately	6	3.9
Checking mosquitoes trap in the net before use	57	37.5
Following strict retreatment schedule	65	42.8
Inspecting the net for holes and tears and mending	24	15.8
Total	152	100.0

Source: field data collection: march 2015.

PERCEPTION OF BENEFITING FROM THE ITN: Majority 53.3% of the respondents benefited from the use of the ITN while 20.4% believed they sometimes benefited from the use of the ITN and the remaining of the respondent (26.3%) believe they do not necessarily benefit from the use of the ITN. Benefit of the ITN designates that they have been protected from malaria for sleeping under the ITN.

HOUSEHOLD FACTORS TO MODIFY: On the household factors to modify to ensure sustained use of the insecticide treated bed net 34.2% thinks sleeping space be modified, 28.9% think there can be modification of the sleeping arrangement in the house to prioritize the vulnerable while 36.8% thinks in the current state of their households there is no need for any modifications. They contend people will invariable use the ITN irrespective of whether their sleeping or room space is modified or not.

EDUCATION DURING DISTRIBUTION OF THE ITN HELP: On whether respondents were educated during the net distribution, 61.8% were to the affirmative that they received health education during the distribution of the ITN. The remaining respondent did not receive any health education on the measures that need to be adopted in the usage and measures of retreatment of the ITN.

4.2.5.2 Qualitative Research Findings on the Factors that Facilitate Sustained Usage of the ITN

On durability of the ITN, the entire respondent indicated the ITN is much durable. They intimated that the ITN could last more than twenty years and still potent in preventing mosquito bites if proper care is given to it and retreatment is done as schedule. The age or durability of the ITN will depend on the ability of the individual to care for its specific needs however in the nut shell each ITN in regard to durability provides cost effective value. "*Yes the ITNs do keep long depending on who is using it and how much care he or she gives to it. But on the average one can last more than five years even if it is used every day. Individual care can prolong this life Span"* a respondent reiterated. Another respondent said *'.... just take care of your net and it will keep as long as you want it'*

The following measures are those to be adopted to ensure durability of the ITN. Malaria Control Officers were quick to enumerate these strategies to ensure prolonged life span of the insecticide treated bed net. This steps include rolling up the net when not in use; rolling out the net carefully at night; tucking in the net partially; tucking the net in fully when in bed; washing instructions; a re-impregnation schedule; inspection for holes; checking for mosquitoes trapped inside; and sleeping away from the edge of the bed. When all this are done and done meticulously, the officers indicated the net can last for more than twenty years.

On the benefits of the ITN to the community members respondent asserted the ITN is the most cost effective and efficient means of controlling malaria and the concomitant effects of malaria both on the individual, the family and the state in general. A malaria control officer summarised this when he said *"The ITN is cost effective because*

money spent is only once and yet it is able to continuously prevent mosquitoes from coming in to contact with a beneficiary."

Respondent did not think that there is any specific need to change in the household to ensure sustainable use of the ITN. They intimated that for the ITN, people need to have mental edge to use it irrespective of their household factors and they will do that. "*People do not need any changes in the household before they use the ITN; all we need to do is to change our mind-set to adapt to positive behavioural outcomes including use of the ITN"*

Major challenge to the use of the ITN is the ability to implement the recommended schedule for retreatment of the ITN. The challenge ranges from inability to purchase retreatment chemicals to lack of knowledge and understanding of re-treating the net themselves. This challenge serves as a substantive barrier to have sustained use of the ITN even when the person has planned and is willing to use the insecticide treated bed net within his or her household. The net will eventually loose potency and will need to be retreated and this then becomes a need if the family have not yet gotten a new net.Net vendors give health education on methods of retreatment of the ITN within the household during the selling and distribution of the net. All the respondents were not firm the education granted to bed net users during the distribution was enough to ensure sustained usage of the ITN in the region.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

In this chapter results are discussed. Meaning, interpretation, understanding and implications of research findings are put in the context of the research objective so as to act as a basis to influence policy and decisions. The reviewed literature, juxtaposed with the research findings acted as a basis for this discussion. The merger of the qualitative data and the quantitative data is discussed under the thematic areas that formed the base for the objectives of this study. These thematic areas included patterns of behaviour and decision making process in the use of the ITN, general level of risk awareness of the non-use of the ITN, barriers to sustain use of the ITN, and the factors that promote sustained usage of the ITN in the Upper East Region of Ghana.

5.2 Patterns of Behavior and Decision Making Process in the use of ITN

For the quantitative study respondents were largely of the reproductive age group of twenty one to fifty years with some outliers. Female constituted the majority of household representatives that responded to the structured field survey questionnaire. All the three religions were proportionally represented while majority of the respondents were married persons. These cadres of respondent understand the dynamics of the household largely and are capable of giving information on the intricacies involved in the use of the ITN within the household. The qualitative study interviewed District Malaria Control Officers who are involved in the day to day distribution, education, and monitoring of the use of the ITN in the Region. They

therefore represented the most appropriate officers within the various districts who have apt knowledge on the means of facilitating sustainable use of the ITN.

A Household referred to the category of people who take their meal from a collective cooking pot or those who cook their meals together as a unit. In this study a typical household included a father, mother and children even though in some instances the external family members were included in the household. The household generally shared very common basic essentials like common source of water, meals and sleeping place etc. they provide support to each other both in need and during celebrations. On household size, Majority (55.3%) of households had four to six persons within those households while some (23.7%) households were seven to nine people. The Upper East Region generally has larger household sizes based on multiple marriages or giving birth to many children by one couple. Only one household with member's more than nine people were included in the study. While the average household sizes may be more than five persons, fewer members of the households (of (87.5%) making up of one to three persons within the individual household's) actually slept under the insecticide treated bed net each night. This was an indication that in almost all the households, not all members actually slept under the insecticide treated bed net.

This finding was at variance with the dictates of the World Health Organisation (WHO). The World Health Organisation (WHO) recommends that every one to two persons within the household should own and sleep under an insecticide treated bed net and every vulnerable population should sleep under the insecticide treated bed net (WHO, 2012). All households interviewed had a malaria vulnerable person, specific

determination cannot be made that those who slept under the ITN were these vulnerable populations.

On prioritisation of the vulnerable in the use of the ITN, District Malaria Control Officers indicated that the National Malaria Control Programme (NMCP) and the UNICEF sponsored malaria net distribution programmes actually prioritised the vulnerable populations and for that the vulnerable are given priority during the distribution of the ITN. The net are generally distributed or the subsidised ones are sold in the antenatal or at the post natal clinics or at the Community Based Health Planning and Services (CHPS) compounds to promote access to the vulnerable populations in the remote areas of the region. These centres where the nets are actually sold are the places where vulnerable populations actually receive health care services and serves as the most convenient avenues to reach them. This was in support of the survey findings, the Malaria Control Officers could not however indicate if the vulnerable actually use this net consistently during bed time. In the quantitative study, a large percentage of 40.8% of the communities' members did not prioritise the vulnerable populations to sleep under the ITN even though they owned one in their household and 67.8% indicated the vulnerable did not consistently use the ITN within the last one year. Also Gyapong et al (1996) in the upper east region reported that "If the use of insecticide treated nets is to be beneficial to non-immune children, the nets have to be provided for the entire family because children tend to sleep with the mother, grandmother or an older sibling. This could have cost implications which would be beyond the means of a subsistence farming community. Alternatively, nets could be provided for women and children only initially, but in a male dominated society, one could not guarantee that they would remain with them" (Gyapong et al 1996)

The inability for vulnerable populations to use the ITN consistently still exposed them (vulnerable populations) to the effects of being infected with malaria making malaria a burden to household members, the community, to the health delivery system and the region at large. While prioritization is not given to these populations by individual households, the effects and total impact of malaria infection remain devastating in the region and to the family. While this study showed majority of respondent did not prioritise the vulnerable populations in the use of the ITN. This study finding is actually in discrepancy to that which was reported by Lea et al (2009) in the Burkina Faso that when the method of prevention was available, the vulnerable was prioritised. However Lea et al (2009) research findings followed a rigorous campaign for the usage of the ITN when community members were encouraged to prioritise the vulnerable while this study in the Upper East Region was conducted with a population that used the ITN as a routine malaria preventive measure. A further revelation that routine activities are not strictly adhered to by community members compared to heighten campaign periods. To reduce the burden of malaria within the upper east region, there is the need for household members and leaders in the community to consciously prioritise the vulnerable populations in the usage of the ITN to ensure that success is guaranteed in the fight against malaria.

In this study only a small proportion of respondent actually did the prioritization. And among those who prioritised: pregnant women and children under five were those prioritised while others did the priority for elderly children, men and women who were not pregnant. Those who prioritised children under five and pregnant women were in conformity to the World Health Organisation status on bed net prioritisation but this was not universal as people did prioritised other members of the family who are not under the dictates of the World Health Organisation. This is an indication that

community members did not understand the concept of prioritisation of the ITN and used individual discretion and understanding as the yardstick for prioritization. World Health Organisation recommend strongly the prioritization of children under five and pregnant women, some community members varied as to who is to be prioritised.

Also while Andrew et al (2011), a qualitative study reported that people generally accepted the concept of the use of the insecticide treated bed net, the study findings in the Upper East Region was different as not everyone agreed with the concept of prioritisation of the ITN. On the sources of information for prioritisation of the use of the ITN, majority mentioned health care professionals, bed net vendors, friends and family and the mass media advertisements or campaigns. The varied sources of information did not give impetus for one to understand which specific source of information gave inappropriate massage on the prioritization of usage of the ITN. It is important to succeed efficient prioritization of the ITN in the region; there must be a single information source. District Malaria Control Officers indicated that people were more likely to accept and practice any information advanced to them by the health care professionals than that which they heard on the radio or from any other ordinary member of the public. It is important that when information is advanced to communities' members the reliable conduit are health care professionals who are generally trusted by the community. This will allow for universality in information delivery and better understanding of the various practices adopted by individual households on the usage of the ITN.

On acquisition and ownership of the ITN, respondent acquired the bed net from various sources, this places include from the health care professional (nurse or midwife at the clinic, CHPS compound or at the any other health facility), bought ITN

from the market, bought from or given by the community designated ITN vendor or were given the ITN by a friend or a family relative. While the qualitative study identified the man as the one who made the decision for the acquisition of the ITN, the quantitative respondent identified largely health care professionals; friends while a minority were community bed net vendor as those that made the decision for the household to acquire an ITN for use. The culture of the people of the upper east region designates the man as the head of the family and is vested with much authority and power. In the region, men actually make decisions for their households and women only echoed this and implemented those decisions to the later as made by their husbands or their household heads. To have total coverage and efficient distribution of the ITN in the Upper East Region, then male involvement in use and distribution is very inescapable. If one man is educated on the use of the ITN, the rippling effects will be seen in the entire family.

In most of the households, the man of the family made the decision for the specific person who use the ITN on daily basis while others include health care professionals, external family members, and individual user made the decision for the daily use of the ITN in the family, only 6% made the decision cooperatively (involvement of all members of the family). Even though the households owned an ITN, the individual daily use of it is still subjected to approval by the man of the house or the specific household head. A much smaller number suggested that decisions were co-operative (6%), or that the man or father of the house made the decisions in consultation with other members of the family. While the male made the decision as to who is to sleep under The ITN, he slept separately from the vulnerable and could not determine if the person he nominated slept under the net throughout the night (granted that the man's decision even prioritised the very vulnerable person within that household). The very

strict gender roles and the patrilineal nature of the inhabitants of the Upper East Region and the private nature of marriages / relationships, combined with the high esteemed held for the man of the family' allowed for the domineering effects that men exert on their individual families. This finding is strongly in support of what was found by Andrew et al, (2011) that male influence has an impact on the daily use of the ITN in the family.

The qualitative study also identified culture and traditional practices that have an influence on the usage of the ITN in the region, malaria control officers indicated that male dominance in the study setting has an influence on the use of the ITN within the various households. It is therefore very important to incorporate males or household heads in the decision to acquire and to use the ITN by vulnerable members of his family to ensure strict compliance to the World Health Organisation's principles. While this may look as a good alternative to ensuring usage, conscious efforts must be made to ensure that decisions taking within the household are cooperative and that enables everyone to understand the need to prioritise usage of the ITN to protect the vulnerable persons so as to ensure strict compliance to usage as enshrined by the World Health Organisation.

On whether the respondent where given information about the ITN during the acquisition of the net, only a few of the participants were to the affirmative that they were given information on the uses and retreatment of the ITN during acquisition while the remaining majority of mosquito bed net beneficiaries were not given any information or education during the acquisition of the net on usage. Health education, quantity and quality of information influence ones knowledge. Based on the health belief model of behaviour change, when information is made available to a group of

people, with cues to action, such persons are likely to adopt and practice healthy behavioural outcomes. It is therefore imperative that net distribution is accompanied with health education on malaria and the essence of bed net use to the vulnerable populations. While the amount of information given to bed net beneficiaries are regarded as not been very important by malaria prevention campaigners, its very essence are the basics to a successful programme implementation.

The District Malaria Control Officers identified the season of the year (rainy or dry), weather characteristics, atmospheric temperature, presence or absence of rain, room size, level of ventilation to influence the pattern of behaviour on the use of the ITN in the region. A variation in any of these variables that may not necessary be under the influence of a particular individual, influence greatly how the ITN is use within the family. There is a growing need to ensure that all members of the community in the Africa context are protected from the ITN. To be able to achieve this very beneficial need, Galvin et al, (2011) concluded that, in malaria endemic Africa, school age children are the least protected, and advocated school-based initiatives for delivery of ITNs, and further argued that up scaling malaria control to universal African coverage requires a better understanding of groups who are least protected. They also point to the significance of sharing sleeping structures; young children most often sleep with mothers or both parents, and older children sleep on separate beds or mats.

5.3 General Level of Risk Awareness of the Non-Use Of ITN

The level of knowledge of people influence their choice and general risk taking behaviour. According to the Health Belief Model (HBM) of behaviour change, peoples level of knowledge, understanding of level of risk their exposed to and the presence of cues to take action with the availability of chance of taking action are the

antecedent for healthy behaviour choice and outcomes. The level of knowledge is generally what is been espoused by the Health Belief Model of health behaviour change and the essential need of sleeping under the insecticide treated bed net. People in a community need to have an in-depth knowledge of the presence, transmission and remedy modalities to malaria before action is taken to a successful behaviour change towards prevention and control of endemic malaria in the region. The District Malaria Control Officers of the three study districts believed that formal education have a relationship to knowledge of the dangers of the non-use of the ITN by beneficiaries. Educated pregnant women and educated mothers of children under five years were more likely to sleep under the ITN and to prioritise vulnerable populations compared to non-educated women. This finding also agrees to the findings of Gyapong et al (1996) that identified in the Kasena Nankana District of the same region that formal education was related to the people's knowledge of the causes of malaria and such people are more likely to take measures towards its prevention; including sleeping under the ITN.

Another factor that contributes to the intricacies involved in the use of the ITN is over complacency. People of the elite category are over complacent that they are not likely to get malaria infection even if they do not sleep under the insecticide treated bed net. This over complacency on the cause of malaria was again identified by Andrew et al (2011) in the Kenya where they reported that communities that were malaria endemic believed they were immune to the disease (malaria). Inconsistency in the use of the insecticide treated bed net may be self-limiting in the prevention of the spread of malaria in endemic regions. The fact that malaria is said to be endemic in the Upper East Region of Ghana (a sub-tropical African zone) may also be a hindrance to the use of the ITN as people get use to the disease and see it as an everyday life pattern.

This identification clearly supports a report in Nigeria that summarised this view by stating that; although most people in the study area knew ways of preventing malaria, the findings documented that this knowledge is not used in daily practice. The reason for this seems to be that people, including pregnant women, are not really concerned. Several explanations can be given for this behaviour. It is known that in highly endemic areas, people get used to sickness and with time, they adopt to the disease (Chukwuocha, et al.,2010).

Burden of malaria to the household and community: Majority of the research participants (83.6%) still identified malaria as a burden within their households and feels that despite the interventions and resources channelled in the control of malaria; much deserves to be done to alleviate their plight. This believe of the people that malaria is a burden to them and their individual households and the community at large is in strong consonance to the 2013 annual report of the Ghana Health Service that reported malaria as the number one reason for all OPD attendances and among the first ten causes or reasons for all facility based deaths and the leading cause of all under five deaths. Malaria remaining a burden to community members was also reported by Andrew et al, (2012) in the Kenya an indication that seems to divert the ovation the WHO gives to herself for controlling endemic malaria in the West African sub region. While the WHO seems to show that the trends of malaria are reducing in the sub region, individual households still identify malaria as a major threat to their health. To what extend a particular disease remains a burden is not the determination of policy makers and researchers generally but a clear indication of what the indigenes perceives the disease to be.

Perception of causes of malaria: A larger percentage of the respondent identified mosquito bites as the cause of malaria while some identified working in the sun,

beaten by rain, eating poorly fermented meals or foods or it can also be transmitted spiritually. Myth and incongruent beliefs have an influence on the people's practices of healthy behaviour outcomes. While people do not largely belief that malaria is transmitted through the bites of mosquitoes, the chance of using the insecticide treated bed net in sleep hours is reduced. This finding is in strong support of the findings of Gyapong et al, (1996); Information from the general discussions and previous studies in the area revealed that knowledge about the cause and transmission of malaria in most parts of the Kassena Nankana district is very low." (Gyapong et al 1996) The health belief model allows that the amount of knowledge of an individual is directly related to the people's health behaviour practices, choices and outcomes. People who belief that malaria is transmitted by mosquito bites and nocturnal are more likely to use the bed net during sleep hours compared to those who think cause of malaria is working in the sunlight, eating poorly fermented foods or been beaten by rain. This finding was also identified by Agyapong et al (1996) in a study within the Kasena Nankana District where varied contrasting responses were identified as the causes of malaria. The need to intensify health information delivery on the causes of malaria is imperative to sustained usage of the insecticide bed net and is imperative to the control of malaria in the region.

Perceptions of vulnerable populations to malaria infection: On the category of vulnerable populations in the transmission of malaria that need to be protected on the use of the ITN in the household, 47.4% were pregnant women, 9.2% women and 1.3% men. The remaining 40.8% and 1.3% mentioned under five children and older children more than five years respectively. This acknowledged that people's knowledge and practices that promote vulnerable populations sleeping under the ITN was different from their perception of the people who should sleep under the ITN.

This finding agrees with Chuckwuocha et al (2010) who reported that participants knew people who are vulnerable to the use of the ITN and prevent malaria but did not consistently prioritise such populations in the use of the ITN in the household. The non-use of the insecticide treated bed net by this identified vulnerable populations was partly attributed to the high cost of ITNs (where subsidizes were unavailable) and negative perceptions on the chemicals used to treat them, and to poor utilization of health services limiting access to the bed nets, particularly antenatal care and delivery care or post natal care services, leading to missed opportunities of getting the ITN through the National Malaria Control Program (NMCP).

When asked if the chemicals used in the ITN were injuries to human health, a few respondents were to the affirmative; they believe that the chemical can be injurious to human health. This perception of the dangers of the chemicals associated with the use of the ITN could serve as a hindrance to use. While the remainder of the respondents indicated that the ITN has under gone rigorous clinical trial and will pose no harm to users as it is certified by the World Health Organisation. Also in the same light, the District Malaria Control Officers indicated the chemical is not injurious to human health in the quantities that are used in the ITN. This was also consistent to the 1996 report of Gyapong and his colleagues that very few people complained about side-effects of the chemical. These include minor skin irritations, especially during the first week of impregnation, when the smell of the chemical was strong. One woman complained about sneezing during the first night of use but she said she did not have any other problems after that. No scientific research is done to determine the hazards that are associated with the prolonged, sustained and consistent use of the ITN in the communities especially within the Sub Sahara Africa.

A whooping majority of respondent (76.3%) believed that if the ITN were given for free, they were more likely or more people were more likely to use the insecticide treated bed net in their community. The remaining of the respondents do not think the inability to acquire the ITN had an influence on its use. Even though the ITN is subsidized, more people still have a challenge in acquiring and owning an ITN within their households.

On the dangers of the non-use of the insecticide treated bed net a very small minority constituting only 8.6% inferred there are no dangers for not sleeping under the ITN. This population are strongly deficient in knowledge and understanding of the characteristics of the mosquito that transmit malaria – the mosquitoes are indoors and generally nocturnal. While the majority of the respondent showed that the non-use of the insecticide treated bed net may lead to malaria infection and subsequently the related implications to the family and the community is devastating. This indicated that a majority of the respondent understands the insecticide treated bed net to be a good tool in the prevention of malaria infection. While knowledge may be available on the use of the ITN, general practices of the people differed and the need to use socio psychological models of behaviour change to encourage sustained use of the ITN is imperative.

5.4 The barriers to sustained usage of ITN

As indicated by the literature and this research findings, the barriers to sustained use of insecticide treated bed nets are much more complex than can be addressed by the national malaria control programme or the ministry of health alone.

All the responded indicated that the primary use of the ITN within the household is to sleep under it during bed time to be protected from mosquitoes and subsequently

malaria. However, on the other uses of the ITN apart from sleeping under the ITN respondent mentioned: nursing of seedlings, nursing of chickens, fishing and the remaining minority of the participants mentioned that it is used for fencing animal pens. This is in strong consonance to the findings of Noboru et al 2008 around the Lake Victoria in the Kenya that identified the misuse of the ITN to hamper efforts made by governments and other non-governmental organisations in the fight against malaria. Noboru and his colleagues identified the ITN to be used for varied purposes e.g. fishing apart from sleeping under them. The fact that the ITN is not used solely for what it is meant for actually further emphasis the economic calculations households had to make before the actual use of the net. The strong need to protect property and animal life to the detriment of individual (human) life is further highlighting the region as poverty enshrined area. This finding was further supported by the findings of the qualitative study. The qualitative study identified that due to the level of ignorance and wide spread poverty, community members put the ITN to other various uses apart from sleeping under them, some use it as fence to their gardens, nursing of seedlings and protecting chicken from predators while others use it for fishing. The widespread misuse of the ITN, inappropriate use acts as barriers to sustained use of the ITN and the resultant protection of vulnerable populations.

What constituted the major barriers to sustained use of the insecticide treated bed net in the region, malaria control officers mentioned over complacency and the influence of male dominance as the number one precursors to the hindrance of sustained use of the ITN. Other factors include lack of access, improper usage, lack of knowledge on usage, claustrophobia, inappropriate treatment of the insecticide treated bed net and over complacency of some persons as barriers to sustained usage of the ITN

On effectiveness of the ITN in the control of endemic malaria: 43.4% indicated the nets were effective in controlling mosquitoes and malaria consequently while 31.6% thinks that the ITN is not effective in controlling malaria. The remaining 25% thinks that the ITN is only effective only sometimes and is dependent on the level of consistent usage and correct usage of the ITN. The technical officers were firm the ITN is the only reliable tool in the prevention of endemic malaria. While a large proportion of respondent do not see the ITN as a reliable tool in protecting them against malaria, its effective and consistent usage is likely to be hampered. The level of belief of a person of the healthy nature of a particular behaviour will aid the person to choose healthy behavioural outcomes like sleeping under the insecticide treated bed net. The World Health Organisation (WHO) has indicated that the mosquito bed net and indoor residual spraying exercises are the two most reliable methodologies in the control of endemic malaria in the West African sub region. The perception of the people of the Upper East Region on the effectiveness of the ITN in the prevention of malaria, spread through two dichotomies of being effective in one end and not effective on the other. This belief that the net is not effective in the prevention of malaria eventually influences the people's choices of sleeping under the ITN or otherwise. This further enhances the need as espoused by the district malaria control officers to use social psychological models in enhancing healthy behavioural choices and outcomes.

When whether the cost of the ITN prevents use of the ITN in the region: 32.2% of the respondent saw cost of the ITN as a barrier to ownership and sustained use of the ITN in the households while 67.8% think that cost is not a challenge in the use of the ITN. Those who think cost is not a barrier to the use of the ITN assets the ITN provides value for money and it is been subsidized, hence provides an advantage to the poor

and needy to be able to purchase. While Noboru et al 2008 identified cost as a substantive barrier to the use of the insecticide bed net, this findings indicate that people gets value for money in the acquisition of the ITN and also the highly subsidized nature of the ITN in the region does not make cost a barrier. In mass malaria control campaigns, mosquito bed nets are distributed free of charge hence may be responsible for people not to perceive cost as a major barrier to sustained use of the ITN in the region. To have sustainable use of the ITN in the region, there should be sustained sources for funding for subsidizing cost to make it possible for vulnerable populations and the poor to able to purchase and use.

Room design, size and shape; A minority of the respondent 21.7% asserted that room space is a hindrance to the use of the ITN, as their rooms are generally small and could accommodate fewer people than is currently doing. While majority of the people responded that there is no challenge of room space in using the ITN. Households interviewed had a median size of five persons and each household used more than a room within the compound. This large percentage believing that room space is not a hindrance to the use of the ITN is different by what was identified by Lea et al, (2009) that described a functional and temporal organisation of house space, where its management differed between daytime and night time. In the Upper East Region, most rooms have designated area for sleeping and use largely for only that and the need to remove the net after each night sleep is not required. Mosquito bed nets can therefore be fixed to the designated area for use over a long period of time without removing it. While the functional organisation of the room thus not pose a significant challenge to the usage of the ITN, the need to consistently ensure that the ITN is hanged properly and used consistently is imperative to successful malaria control.

The ITN comes in various shapes like rectangular and or cylindrical in nature. Rooms in the region are also either designed to be cylindrical /circular or rectangular however during the distribution, the shape of one's room does not matter to the type of ITN given. In the study, minority of the inhabitants of the region indicated that the difference of the shape of the ITN to their room design acted as a hindrance to the use of the ITN. However, a majority (60.5%) did not identify this as a challenge to the use of the ITN. On preferred net design, 4.6% and 20.4% preferred circular or cylindrical and rectangular or square nets respectively while the remaining majority of the respondents believe that the shape of the net does not matter as long as it provided the protection it needed to provide. The basic concern is that the ITN must protect them from the nuisance effects of mosquitoes. While majority of the respondent in Andrew et al, (2011) had preference for a particular design of a net for use in their homes, this study did not identify any design issues as a barrier to sustained use of the ITN in the region.

On the other impacts espoused by the use of the ITN in the household, responses generally varied and included used to provide privacy where the children and parents share a common room, decoration of the room especially as window curtains, provision of warmth during cold weather and the large majority indicated the other impact of the ITN to be prevention form the nuisance (bites and noise from insects) effects of insects. In conformity to the findings of Aikins et al, (1994) reported that the bed net used by women with co wives with whom they share a room was to increase privacy. In this study, the reason showed was married couple who shared a common room with elderly children used the bed net to increase privacy. While the net provided other advantages to beneficiaries, it also ultimately protected them from mosquitoes and other insects.

Other methods that are used by the households in the prevention of mosquito bites during bed time and subsequently the prevention of malaria included that; the household members use mosquitos' sprays, use of mosquito coils, physically killing the mosquitoes and use of both local and modern fans and burning of herbs. Only a quarter of the respondents used only the insecticide treated bed net for the prevention of malaria. This finding was also in congruence to the findings of Aikins et al, (1994) where various means are employed by households in the prevention of malaria. The nuisance effects of mosquitoes and their subsequent destruction of sound sleep and its concomitant effects on the next day's output and general productivity ensures that community members invest large efforts towards the control of mosquitoes, the primary goal may not to prevent malaria infection. The combination of factors in the control of mosquitoes and malaria eventually is instrumental in the reduction of the burden of malaria both to the region and the country at large. The combination of all this non-conventional methods including the use of the insecticide treated bed net reduces significantly the chance of contracting malaria.

Technical factors related to mosquito bed net use: On challenges in hanging the net slight minority of participants responded that they are challenged in hanging the net while the remaining 58.6% does not believe they have a challenge in hanging the net for use in their rooms. During a vigorous campaign of bed net usage just recently, in the region, household members of the communities were educated on the means of hanging the ITN in their rooms and the technical officers further went on to ensure that households did that to be supervised. Storming from this campaign, households do not longer see the hanging of the ITN as a challenge. While on the other hand, on whether they are challenged of the loss of potency of the ITN, 58.6% were to the affirmative. In discrepancy to this challenge of hanging the bed net, Pulford et al,

(2011) review of related literature, identified Technical factors related to mosquito net use (i.e. not being able to hang a mosquito net or finding it inconvenient to hang) and the temporary unavailability of a mosquito net (primarily due to someone else using it) was reported. These Social, physical and technical obstacles to mosquito net use may be addressed by complementary mosquito control strategies that are largely already been implemented by a section of community members. These complementary mosquito control strategies include wearing of protective clothing during bed time, using of local and modern fans, physically killing mosquitoes and using of mosquito coils and sprays.

5.5 Factors that can Facilitate Sustained usage of the ITN

To have a sustained use of the ITN in the household then each individual household insecticide treated bed net must be durable and last longer in other to serve the family over a prolonged period of time. On durability of the ITN, a slight majority of the participants indicated that their ITNs are durable and have lasted longer as they expected; and that they have had value for money for the purchase of the ITN. Their household ITN is able to provide the protection they so deserve of it. The remaining respondent thinks the ITN are not durable as they expected. District Malaria Control Officers indicated the ITN is much durable. The measure of durability of a particular net does not necessarily refer to time or age of the ITN but to the amount of use that particular ITN is put to - whether the ITN has provided value for money service or has protected household members from the nuisance effects of insects and mosquitoes to be particular. They intimated that the ITN could last more than twenty years and still potent or capable of protecting beneficiaries from mosquitoes if proper care is given to it and retreatment is done as schedule.

The age or durability of the ITN will depend on the ability of the individual to care for its specific needs however in the nut shell each ITN in regard to durability provides cost effective value. On the age of each household net at the time of this study, largely most household nets used were more than eighteen (18) months with a majority having their nets more than two years old. On the frequency of retreatment of the ITN just a minority did the retreatment in less than a year with a large majority not using any specific measures of time or schedule to do the retreatment and only at their convenience or when they choose to. Some large proportion of respondent have never retreated their ITN at all. It is therefore possible that some ITNs currently in use by the individual households might have lost their potency in protecting the beneficiaries against mosquitos' bites. Households do not regard retreatment of the ITN as an essential component to protecting them against malaria, apart from the physical barrier provided by the net, individual households may not be protected using non potent mosquito bed nets. Retreatment should be an essential component of education during the purchase of the ITN from whatever source. It is also important to establish community mosquito bed net re impregnation centres at designated centres / places within the communities to be able to provide this highly technical and sophisticated service to beneficiaries or users of the ITN.

On methods used to ensure durability of the insecticide treated bed net in the household 42.8% mentioned regular retreatment, 37.5% checking for mosquitoes trapped in the net, 3.9% mentioned carefully rolling and tucking in the net appropriately while the remainder of the 15.8% mentioned inspecting the net for holes and tears; and mending them. Individually, each household did something to ensure durability of their net, while this may be a good will to bed net durability, the combination of all this principles is essential in providing a good environment to

ensure durability of their ITN. On the other hand, District Malaria Control Officers advocated for the adoption of all this methods: rolling up the net when not in use; rolling out the net carefully at night; tucking in the net partially; tucking the net in fully when in bed; adhering strictly to washing instructions; a re-impregnation schedule; inspection for holes; checking for mosquitoes trapped inside the mosquito bed net; and sleeping away from the edge of the bed to avoid tears. When all this methods are implemented as declared by the technical officers then the bed net can be said to become durable and may also last more than a decade. As the net will last longer, it will also be able to provide the very essential need of protecting beneficiaries.

Sustainable behaviour is further enhanced if the behaviour actually benefits the one who practices it. To use the ITN in a sustainable manner, the recipients must perceive sleeping under the ITN as beneficial. Majority 53.3% of the respondents indicated they benefited from the use of the ITN while 20.4% believed they sometimes benefited from the use of the ITN and the remaining of the respondent (26.3%) believe they do not necessarily benefit from the use of the ITN. On the benefits of the ITN to the community members District Malaria Control Officers asserted the ITN is the most cost effective and efficient means of controlling malaria and the concomitant effects of malaria both on the individual, the family and the state in general. This study also supported that as many people belief they will benefit from the specific use of the ITN, the proportion of users of the ITN still remained relative lower. In a related study in the Kasena -Nankana District of the Upper East Region, Adongo et al, (2005) asserted that; When asked whether the use of ITNs could help prevent convulsions in the qualitative interviews, respondents in the three settings held a strong view that ITNs could not prevent them because they are a spiritual illness that

require a spiritual solution. This shows how inadequacy of knowledge influences behavioural choices and practices of healthy behaviour outcomes. Enhancing and re-echoing the benefits that people are likely to derive from the use of the ITN during mosquito bed net campaigns, the realignment of myths, reformulation of incongruent belief systems and enhancing positive perceptions of the ITN will surely promote sustainable use of the ITN in the region.

Sleeping arrangement, sleeping space and general household tenants will need to be altered to ensure that there is a sustained usage of the ITN. On the household factors to modify to ensure sustained use of the insecticide treated bed net 34.2% thinks sleeping space be modified, 28.9% think there can be modification of the sleeping arrangement in the house to prioritize the vulnerable while 36.8% thinks in the current state of their households there is no need for any modifications. Children general sleep basically on the same mat in the same room with other older children. It is important to separate this under five children from the communal sleeping patterns to ensure that their monitored to sleep under the insecticide treated bed net – prioritizing the vulnerable populations. However, Malaria Control Officers did not think there are any specific needs to change in the household to ensure sustainable use of the ITN. They intimated that for the ITN, people need to have mental edge to use it irrespective of their household factors and they will do that. The desire and motivation to sleep under the ITN is important to ensuring sustainable use of the ITN instead of altering household factors that may not be sustainable it its own self.

On whether respondents were educated during the net distribution, majority indicated they were not educated on the use and methods of retreatment of the ITN. Specific

interest, will and adequate knowledge by households and household heads are the bed rocks to sustainable use of the ITN.

5.6 Conclusion of Discussion

On patterns of behaviour, nature of the weather, season of the year, temperature, relative humidity influence the level of consistent and sustained usage of the ITN within the household. Also other factors that influence the pattern of behaviour include education, access to the ITN, number of persons living in the household and the belief and understanding of the household head on the use of the ITN.

On the general level of risk awareness, Formal education is related to the level of prioritisation of the vulnerable populations in the household and the consistent usage of the ITN in the prevention of malaria in the region. Some respondent still identified malaria as a burden to the community despite the large sums of resources that are spent in the control of malaria in the region.

Major barriers to consistent use of the ITN in the region include over complacency, male dominance, and improper use of the ITN and technical factors like poor retreatment schedule and lack of understanding in hanging the net.

To have a sustained usage of the ITN in the region, the need to have a community retreatment centre for re-impregnation of the net is incumbent. To also ensure durability of the net by rolling up the net when not in use; rolling out the net carefully at night; tucking in the net partially; tucking the net in fully when in bed; washing instructions; a re-impregnation schedule; inspection for holes; checking for mosquitoes trapped inside; and sleeping away from the edge of the bed.

CHAPTER SIX

MAJOR CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This section is the final and conclusion part of this study. The chapter provides novel contributions and major findings, major conclusions and recommendations made, research methodological limitations and also provide directions for future trends of research.

6.2 Novel Contributions and Major Findings

In this section novel contributions and major findings of the study are highlighted. In order to give a precise response to the research questions as seen in chapter one of this script, the major findings of the study are highlighted under the various research thematic areas as it correspond to the objectives of this study as well as research questions asked.

6.2.1 Patterns of Behaviour; Decision Making Process in the use of the ITN

An average household size was five people with an average of less than two people currently sleeping under the insecticide treated bed net and specific indication could not be made that those who slept under the ITN were vulnerable people as enshrined by the WHO recommendations.

The National Malaria Control Programme in partnership with the UNICEF bed net distribution programmes and any other net distribution programme in the Upper East Region actually prioritise the vulnerable populations in the distribution of the ITN to households but the individual households did not prioritise the vulnerable populations

in the use of the ITN in the family. This prioritisation by the organisations involve in bed net distributions is seen as nets are subsidized and distribution takes place in the antenatal and post natal clinic where pregnant women and under five children can be reached. In this study only a small proportion prioritised the vulnerable populations and among those who did the prioritisation; pregnant women and children under five years of age were the majority prioritised- in conformity to the standards of the WHO.

Health care professionals like nurses and midwifes made the decision for the individual households to acquire an insecticide treated bed net but for the individual day to day usage of the net in the family, the man of the house made the decision. Household heads (who are mostly male) made the decision as to who is to sleep under the ITN at a particular point in time.

Education on bed net usage (method of hanging) and re-impregnation is not accompanied with the net distribution and therefore poses as a major challenge to beneficiaries as they encounter challenges in hanging, caring for and re-impregnation of the ITN when it loses its potency.

The study identified the season of the year (rainy or dry), weather characteristics, atmospheric temperature, presence or absence of rain, room size, level of ventilation to influence the pattern of behaviour on the use of the ITN in the region.

6.2.2 General Level of Risk awareness of the non- use of the ITN in the family

Formal education has a relationship to knowledge of the dangers of the non-use of the ITN by beneficiaries. Educated pregnant women and educated mothers of children under five years were more likely to sleep under the ITN and to prioritise vulnerable populations compared to non-educated women. However, some section of the elite

category is over complacent that they are not likely to get malaria infection even if they do not sleep under the insecticide treated bed net.

Majority of the respondent still identified malaria as a burden within their households and feels that despite the interventions and resources channelled in the control of malaria; much deserves to be done to alleviate their plight.

A larger percentage of the respondent identified mosquito bites as the cause of malaria while some identified working in the sun, beaten by rain, eating poorly fermented meals or foods while others said it can also be transmitted spiritually.

Whooping majority of respondent believed that if the ITN were given for free, they were more likely or more people were more likely to use the insecticide treated bed net in their community instead of the current policy where it is subsidised.

6.2.3 Barriers to Sustained usage of the ITN

All respondent understood the primary usage of the ITN to be to sleep under it and be protected from the nuisance effects of mosquitoes. While this understanding is widespread, due to socio economic needs of the people the ITN is put in to other uses like nursing of seedlings, protecting chicken, fishing and fencing of animal pens.

Major barriers to sustained use of the insecticide treated bed net in the region, included over complacency and the influence of male dominance as the number one hindrance to sustained usage of the ITN in the Upper East Region.

This study identified the ITN as the only reliable tool in the prevention of endemic malaria.

Cost of ITN, room shape and size, design of the ITN were not identified as major hindrance to the use of the ITN in the region.

The ITN apart from protecting people from mosquitoes is also used for other purposes that included used to provide privacy where the children and parents share a common room, decoration of the room especially as window curtains, provision of warmth during cold weather while other responses indicated the other impact of the ITN to be prevention from the nuisance (bits and noise from insects) effects of insects.

On how wide spread the ITN is used in the region, a quarter of the respondents use only the ITN in preventing the nuisance effects of mosquitoes while the others combined it with other methods of mosquito control.

The technical factors that act as barriers to sustained usage of the ITN include Challenge in hanging the net and loss of net potency due to inability to acquire the chemicals used and the lack of technical knowledge in re – impregnating the net and also lack of the chemicals used for the net re-impregnation.

6.2.4 Factors that Facilitate Sustained use of the ITN

Mosquito bed nets are durable and last long and offers value for money for community members who purchase it.

Schedule of retreatment of the ITN in the study area does not follow any designated pattern and is done haphazardly without any recourse to whether the net is potent or not.

The following measures are identified as the measures for ensuring durability of the ITN. These measures include; rolling up the net when not in use; rolling out the net

carefully at night; tucking in the net partially; tucking the net in fully when in bed; washing instructions; a re-impregnation schedule; inspection for holes; checking for mosquitoes trapped inside; and sleeping away from the edge of the bed. When all this methods are implemented as declared by the technical officers then the bed net can be said to become durable.

The study identified people will surely use the ITN irrespective of the conditions prevalent in their home as long as they have the mental edge to use it.

6.3 Study Recommendations

This study makes major strides in to a relative virgin area to determine the factors that must be implemented to promote / facilitate the sustained use of the insecticide treated bed net in the Upper East Region and the entirety of Ghana. Key recommendations to help promote correct and consistent bed net usage in the region include;

1. Malaria Control Campaigners Behaviour change communication methods should be adopted in educating the public on the measures to ensure sustained usage of the ITN in the region and to prioritize the vulnerable populations in the use of the ITN.
2. Specific malaria bed net campaign massages should target male or household heads that made the decision as to who is to sleep under the insecticide treated bed net. While this may not be enough, specific targets should also be made to beneficiaries like pregnant women and mothers of children under five years.
3. The study identified health care professionals to be the people who are general trusted and information by such professionals is usually adhered to. It is therefore imperative that health information massages on the use of the ITN should delivered in hospitals and during curative care services.

4. Education on net impregnation should be given during net acquisition and using the mass media to remind beneficiaries of this education.
5. Punitive measures should be instituted for persons who use the net for other purpose apart from sleeping under it to be protected from mosquitos and malaria.
6. The use of the ITN should be complemented with other non-orthodox means of controlling mosquitoes.
7. Strict net re impregnating schedule should be adhered to and members of the public who want to impregnate their nets should have community designated points and officers for that purpose.

6.4 Future Directions of Research

This study filled in a research gap identified in current knowledge and the Upper East Region of Ghana to be particular on how to facilitate and sustain the use of insecticide treated bed nets in the prevention of malaria in an endemic region. The study identified that more research work needed to be done in the use of ITNS particularly;

A longitudinal study designs is to follow participants over a period of time to determine if they slept under the insecticide treated bed net daily throughout the year and if that protected them from getting malaria.

Further studies are also required to determine the efficacy and potency (in the protection against malaria) of the current bed nets used by beneficiaries.

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APPENDIX

STUDY TOOLS

INTERVIEW GUIDES FOR DISTRICT MALARIA CONTROL OFFICERS ON SUSTAINING THE USE OF THE INSECTICIDE TREATED BED NET IN THE UPPER EAST REGION OF GHANA

UNIVERSITY FOR DEVELOPMENT STUDIES - DEPARTMENT OF ALLIED HEALTH SCIENCES

INTERVIEW GUIDE: SUSTAINING INSECTICIDE BED NET USE IN THE UPPER EAST REGION OF GHANA

INTRODUCTION: ……

PATTERNS OF BEHAVIOWR; DECISION MAKING PROCESS OF THE USE OF THE ITN IN THE FAMILY

1. What are the patterns of decision making process in the household on the use of the insecticide treated bed net? I.e. male dominance, room size and arrangements, ventilation, season of the year etc.
2. What aspects of the culture of the people promote the use or other wise of the insecticide treated bed net within the households? I.e. taboos, value systems, cost of ITN, etc.
3. How are decisions made in the house hold as to who is to sleep under the insecticide treated bed net?
4. To what extend do vulnerable populations actually use the insecticide treated bed net during bed time? How is the prioritization done?

5. What are the social/ political factors within the household that influence the use of the ITN?

THE BARRIERS TO SUSTAINED USE OF THE ITN

1. What are the other barriers to sustained use of the insecticide treated bed net in this district?
2. What uses do the community members put the ITN to apart from sleeping under it? Ie gardening, nest, fishing, etc.
3. What other means are used to control mosquitoes apart from using the ITN?
4. Does the cost of the ITN influence peoples use or owner ship of one? How?
5. What are the homes or housing design factors that influence the use of the insecticide treated bed net.
6. How safe is the use to the ITN to the community people.

GENERAL LEVELS OF RISK AWARENESS OF THE NON-USE OF THE ITN

1. Are the people aware of the dangers associated with the non-use of the insecticide treated bed net?
2. Are the vulnerable populations prioritized in the use of the ITN in this community?
3. Is the chemicals use in the ITN injurious to human health?
4. Are people likely to use the ITN if it were given free of charge?

THE FACTORS THAT FACILITATE SUSTAINED USE OF THE ITN

1. How durable is the ITN? Which other type of net do you think is more durable?

2. What measures do they use to ensure durability of their nets? How is retreatment of the ITN done in this community? To what extend are the house hold educated on the re-treatment of the ITN?
3. How beneficial is the ITN to the community members?
4. What household factors can be modified to ensure sustained use of the insecticide treated net?
5. What are the common challenges associated with the use of the ITN
6. Are the people educated during the distribution of the ITN

QUESTIONNAIRE FOR HOUSEHOLD WITH A VULNERABLE PERSON: SUSTAINING MOSQUITO BED NET USE IN THE UPPER EAST REGION OF GHANA

UNIVERSITY FOR DEVELOPMENT STUDIES (UDS).

DEPARTMENT OF ALLIED HEALTH SCIENCES

QUESTIONNAIRE DESIGNED BY KONLAN KENNEDY DIEMA (MPHIL COMMUNITY HEALTH AND DEVELOPMENT)

TOPIC: SUSTAINING MOSQUITO BED NET USE IN THE UPPER EAST REGION OF GHANA; BARRIERS AND PROSPECT

INTRODUCTION: I am a student of the University for Development Studies pursuing a Master's Degree in Community Health and Development. As part of the requirement for the award of an Mphil Community Health and Development Degree, and to contribute to the general body of knowledge, I am undertaking a research on the topic 'SUSTAINING MOSQUITO BED NET USE IN THE UPPER EAST REGION OF GHANA.

This study has been designed to find out the impact of the insecticide treated net (ITN) in the prevention of malaria as well as identify those factors that act as barriers or factors to sustain the use of the ITN in the region. You have been randomly selected for this study in view of the fact that you are a resident of the Upper East Region and your District is chosen to be part of the study. Your response will be treated with utmost confidentiality therefore your name is not required.

DEMOGRAPHIC DATA

1. Age: …….. ……
2. Gender: female ( ) male ( )

3. Marital status of respondent: single ( ) married ( ) divorced ( ) widowed ( )
4. Religious background: Christianity ( ) Islam ( ) Traditional ( ) specify others
5. Number of person within the household ……
6. Average number of people sleeping under an ITN each night ……
7. Do the vulnerable populations (pregnant woman and/or under five) sleep under ITN
   a. Yes
   b. No
   c. Sometimes
8. Have the vulnerable consistently used the ITN in the last one year a. yes ( ) b. no ( )
9. Is malaria a burden in your community
   a. Yes ( )
   b. No ( )
10. Are you worried malaria is a burden despite interventions put in place ……

PATTERNS OF BEHAVIOUR: DECISION- MAKING PROCESSES IN THE USE OF THE ITN.

1. Where did you receive your insecticide treated bed net?
   A. Health care professionals
   B. Bought it in the open market
   C. Designated Community ITN vendors
   D. Specify others …….
2. Who made the decision for you to acquire an ITN in your household?
   a. a health care professional

b. the bed net vendor

c. friends

d. family head

e. personal preference

3. Do you make special priority to certain groups of persons in your household to use the insecticide treated bed net?

a. Yes

b. No

c. Sometimes

4. If yes above, who are the people prioritized? ……

5. How do you get the information to prioritize the use of the insecticide treated bed net in your household?

a. From a health care professional

b. From the bed net vendor

c. From friends and family

d. From the mass media

e. Specify others……..

6. How are decisions made in the house hold as to who is to sleep under the insecticide treated bed net?

a. Man of the house make the decision to use the ITN

b. Mother of the house make the decision to sleep under ITN

c. Individuals within the household make decision to sleep under ITN

d. Decision making is cooperative

e. Other external family members make the decision to sleep under ITN

f. Health care professionals make the decision to sleep under ITN

g. Specify others …….

7. During the net acquisition where you given information on the methods of hanging and using the net

   a. Yes

   b. no

THE BARRIERS TO SUSTAINED USE OF THE INSECTICIDE TREATED BED NET

1. Apart from sleeping under the net, what else do you use the insecticide treated bed net for……
2. Is the insecticide treated bed net effective in control of malaria
   a. Yes
   b. No
   c. Sometimes effective
3. Does the cost of the ITN prevent you from using the ITN
   a. Yes
   b. No
4. Does room space act as a hindrance to you using you ITN
   a. Yes
   b. No
5. Does the design or room shape affect the use of the ITN
   a. Yes
   b. no
6. What impact do you think ITNs has apart from preventing mosquito bites
   a. Provides warmth

b. Prevent the nuisance; bites, noise of mosquitoes

c. Provides privacy for the family

d. Decoration of the room

e. Specify others ……

7. What other means do you use to control malaria apart from using the ITN

a. Use of sprays

b. Use of coils

c. Physically killing mosquitoes

d. Use of local or exotic fans

e. Burning of herbs

f. Specify others ……..

8. Describe you r preferred design of the ITN in relation to your room

.....

What other factors do you think can hinder your use of the ITN

……

Do you have challenges in hanging and using the ITN? ……

9. Are you challenged by the loss of potency of the ITN?……

GENERAL LEVELS OF RISK AWARENESS OF THE NON-USE OF THE INSECTICIDE TREATED BED NETS.

1. How is malaria transmitted?

……

2. What are the categories of people who are more vulnerable to malaria?

a. Pregnant women

b. Women

c. Men

d. Under five children

e. Older children

f. Specify others……..

3. Are the chemicals used in the ITN injurious to human health?

   a. Yes

   b. no

4. Are you likely to use the ITN if it were given free of charge to you?

   a. Yes

   b. No

   c. Sometimes

5. What are some of the dangers of the non-use of the ITN?

……

THE FACTORS THAT FACILITATE SUSTAINED USE OF THE INSECTICIDE TREATED BED NET

1. Will you consider your ITN to be durable?

   a. Yes

   b. no

2. How old is the ITN you are currently using ……

3. How often do you retreat your ITN?…….

4. What measures do you use to ensure durability of your net?

   ……

   Since you had the net has it benefited you in either way?

   a. Yes

   b. No

c. somehow

5. What other benefits do you derive from using the ITN?

……

6. What household factors can be modified to ensure sustained use of the insecticide treated net?

……

7. What can prevent a person from consistent use of the insecticide treated bed net

.....

8. Do you think when people are given information during acquisition on methods of hanging the nets in the room, it can improve sustained usage of the net

a. Yes

b. No