

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



**FACTORS INFLUENCING UTILIZATION OF INSECTICIDE TREATED
NETS AMONG CHILDREN UNDER FIVE YEARS IN KPONE-ON-SEA
TOWNSHIP OF GREATER ACCRA REGION OF GHANA.**

BY

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF
GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT
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HYGIENE DEGREE**

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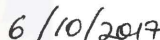
DECLARATION

I, Rebecca Amara hereby declare that except for references to other people's works which have been duly acknowledged, this dissertation is my original work done under the supervision of Professor Isabella A. Quakyi. I further declare that this work has not been submitted for the award of any other degree in any institution.

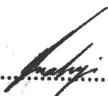


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DEDICATION

This dissertation is dedicated to my loving husband Rev. Dr. John Tamba Moses and my children: Paul, Silas, Salome, Deborah and Joshua for consenting and enduring my absence from home during my studies.



ACKNOWLEDGEMENT

I first and foremost give thanks and praise to the Almighty God for giving me the ability to complete this work.

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Finally, I use this opportunity to acknowledge with gratitude the contribution and the role played by Mr. Nathaniel Coleman throughout the development of this piece of work. May God richly bless you.

ABSTRACT

Background: Children under five years are among the vulnerable group mostly affected by morbidity and mortality due to malaria. Among the malaria preventive intervention, insecticide treated net (ITN) has emerged as an efficacious tool that has proved effective in reducing malaria transmission and increasing child survival. Therefore, its utilization has been recommended by the World Health Organisation especially among vulnerable groups including children under five years. Significant investment into scaling up of ITN has been done but achieving actual utilization among beneficiaries is still a challenge in malaria endemic regions including Ghana.

Objective: The purpose of this study was to assess factors influencing utilization of ITNs among children under five years of age at Kpone-On-Sea in the Kpone Katamanso District near Tema.

Method: A cross-sectional community based study was done using mixed methods. A sample of 325 caregivers with children under five years randomly selected was used for the quantitative arm of the study and for the qualitative arm, six in-depth interviews with relevant leaders and two focus group discussions with care givers of children under five years were conducted.

Result: Findings from the study indicated that the proportion of children sleeping under ITNs was 91%. Factors associated with ITN utilization among children under five were: caregiver's level of education ($p<0.01$), their awareness that children under five years are most at risk of malaria ($p<0.05$), knowledge that ITN protect against mosquito bite ($p<0.02$) knowledge on the importance of ITNs in preventing malaria ($p<0.01$), ITN ownership ($p<0.03$), type of ITN ($p<0.02$) and the period within which respondents uses ITN ($p<0.00$).

Conclusions: Knowledge on malaria and its prevention and the ownership of ITN among care givers at the Kpone community were almost universal. These translated into high utilization of ITNs among children under five in the community.

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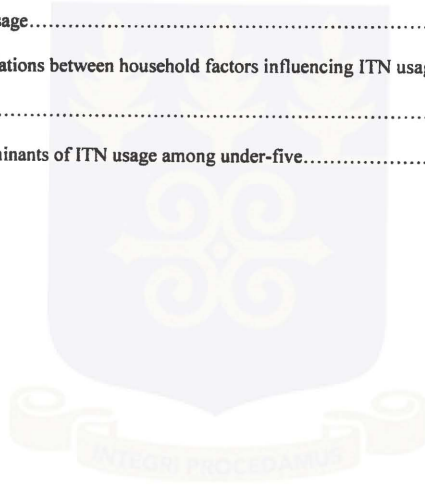
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LIST OF ABBREVIATIONS

FGD	-	Focus group discussion
GDHS	-	Ghana Demographic and Health Survey
GHS	-	Ghana Health Service
GIS	-	Geographical Information System
GSS	-	Ghana Statistic Service
ITN	-	Insecticide Treated Bed Net
LLIN	-	Long Lasting Insecticide Treated Bed Net
MICS	-	Malaria Indicator Cluster Survey
MOH	-	Ministry of Health
NMCP	-	National Malaria Control Programme
PMI	-	Presidents Malaria Initiative
RBM	-	Roll Back Malaria
UNICEF	-	United Nations Children's Fund
WHO	-	World Health Organization

DEFINITION OF TERMS

ITEM

OPERATIONAL DEFINITIONS

Children under five

Children aged 0-59 months at the time of study

Insecticide treated net

Refers to bednet that has been impregnated with an insecticide whether of short (ITN) or long (LLIN) duration

Utilization of ITN

Sleeping under ITN

Ownership of ITN

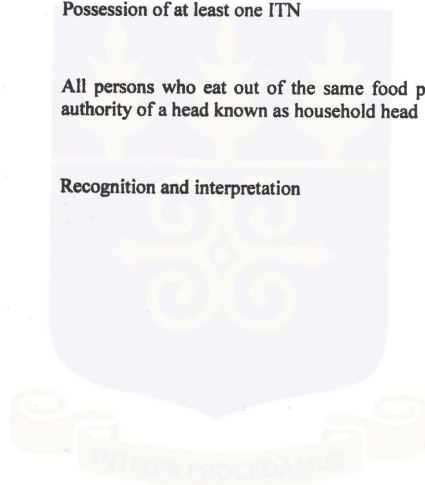
Possession of at least one ITN

Household

All persons who eat out of the same food pot and recognizes the authority of a head known as household head

Perception

Recognition and interpretation



CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUD

Malaria is a disease caused by infection with the genus Plasmodium and is transmitted to man through the bite of an infected female Anopheles mosquito. It is endemic in over 100 countries globally, 45 countries within sub-Saharan Africa Region and over 2 billion people are at risk including children under five years of age. Malaria is the fourth highest cause of death of children in sub-Saharan Africa (WHO, 2015 ;Kilian et al., 2016).

An estimated prevalence of 214 million and 438, 000 deaths to malaria was recorded globally in 2015 of which about 88% of the cases and 90% of the death occurred in Africa Regions infecting mostly children under five years and pregnant women (WHO, 2015). Malaria is said to be a major killer of children, claiming the life of a child every two minutes (WHO, 2015 ;UNICEF, 2015). The cost of malaria in sub-Saharan Africa is about US\$ 300 million every year for case management and it is estimated that it cost up to 1.3 per cent of GDP in Africa(WHO, 2015).

Malaria in children under five years is associated with considerable morbidity with life threatening complications which manifest as severe malaria; severe anaemia and cerebral malaria which can result in neurological sequelae (UNICEF, 2007). It is estimated that about 2% of children who recover from cerebral malaria also suffers from brain damage including epilepsy(WHO, 2014 ;UNICEF, 2015). Frequent episodes of severe malaria among children may impact negatively on their learning abilities and educational attainment (Boivin, Griffiths, & Venetis, 2011).

Malaria among children also contribute indirectly to illness and death from respiratory infection, diarrhoeal diseases and malnutrition (Ezeigbo, Ejike, & Nwachukwu, 2016). Malaria in school children is also attributed to absenteeism in endemic countries (Ankomah& Asenso-okyere, 2003).

In Ghana, malaria is tagged as the main cause of illness predisposing the entire Ghanaian population with children under five years of age at greater risk(GHS, 2013).

In 2015, malaria accounted for about 73.6% OPD cases, out of which 26.7% was among children under five years. Out of 409,446 patients that were admitted to hospitals due to malaria, 209,164 were children under five years leading to 1,033 of the total 2,133 deaths (GHS, 2015).The use of ITN is recommended by the World Health Organization and its partners especially for vulnerable group including children and pregnant women(WHO, 2013).

The regular and timely use of ITNs is a powerful way of interrupting transmission of malaria as ITNs works by both repelling and killing mosquitoes. Results from controlled trials of ITNs show that mortality in children less than five years old can be reduced by 17% with high coverage of this intervention. (WHO, 2015).

Studies have demonstrated the protective efficacy and effectiveness in addition to the cost effectiveness of ITNs. Lengeler (2004) reviewed these studies, and assessed 81 trials and over 30 descriptive studies carried out in malaria setting worldwide documenting the positive impact of ITNs on child and adult morbidity and mortality. Diallo et al., (2004)also found that the probability of a child dying before his/her fifth birthday was reduced from 240 per 1000 to 170 per 1000, a difference of 29%, with the use of a bed net.

Sleeping under ITN regularly is one of the most effective ways to prevent malaria transmission and reduce mortality in children. ITNs have been shown to significantly reduce malaria –related morbidity and all-cause child mortality by 14-33 percent in sub-Saharan Africa (Binka et al., 1996). In Ghana ITNs are associated with 17 percent reduction in all-cause mortality in children (Adongo, Kirkwood, & Kendall, 2005) leading in advocacy for the inclusion of ITNs as a tool in malaria prevention and control.

1.2 PROBLEM STATEMENT

Insecticide treated nets are efficacious tool that has proved effective in reducing malaria infection and increasing child survival(Afoakwah, Nunoo, & Andoh, 2015). Significant investment into scaling up ITN ownership has been done, but achieving actual utilization of available ITNs by beneficiaries in Ghana is still a challenge (WHO, 2014 ; Pulford et al., 2012 ;GSS, 2014).

In Ghana, according to the report of the National survey in 2014, only 47% of children under five years slept under ITNs the night before the survey and 25.9% in Greater Accra region (GSS., 2014).

Non-utilization of ITNs by children under five years can expose them to intensive mosquito bites and malaria and it's complications leading to poor development and burden on the family and the country as a whole.

According to studies, utilization of ITNs is influenced by factors such as socio-demographic characteristics, level of awareness, knowledge and cost of ITNs(Adeneye, Jegede, Nwokocha, & Mafe, 2014). Household factors such as decision making, sleeping space, fewer nets in the households, impact of media messages, community knowledge and large household size or family size affect the use of ITN as well as poor sleeping arrangements (Adjah & Panayiotou,

2014 ; Adongo et al., 2005 ;Okoko & Yamaahb, 2006) perception and beliefs on effectiveness of ITN as a preventive measure affects its utilization within the household (Ruyange et al., 2016). Good household practices, perception and improved level of awareness towards ITN utilization, proper deployment of ITNs leads to increased utilization (Dzator & Asafu-adjaye, 2004).

Also, Behavior Change Communication campaigns as well as other media has shown to contribute to an increase in net culture (Kilian et al., 2016)

In Ghana including the research area, where malaria is said to be perennial, there are limited information regarding ITN use and it's barriers specifically among children under five years as studies done were not focused on this phenomenon.

Assessment of actual use of ITNs among children under five years is very important as it can provide understanding of how to plan more targeted interventions to protect these vulnerable group from malaria and it's graved complications.

This study therefore seeks to assess the factors influencing utilization of ITNs among children under five years in Kpone-On-Sea Township.

1.3 JUSTIFICATION

The objective of the National Malaria Control Programme is to reduce disease and death due to malaria by 75% by 2020 and to achieve this by a strategy known as scaling up intervention coverage for impact (SUFi) through Universal coverage of malaria prevention and control interventions which include ITNs coverage among vulnerable groups (GHS, 2015). To complement scaling up of ITNs, periodic assessment of its actual use among beneficiaries is very important as ownership of ITNs may not imply their use (Wiseman, Scott, Mcelroy, Conteh, &

Stevens, 2007). Therefore, understanding factors influencing use of ITNs targeted at specific groups is timely.

Evaluating the effectiveness of utilization of ITNs in Kpone-On-Sea Township as a locality where malaria is said to be perennial can identify possible factors acting as barriers to utilization of ITN among children under five years so that subsequent interventions can be based on local evidence.

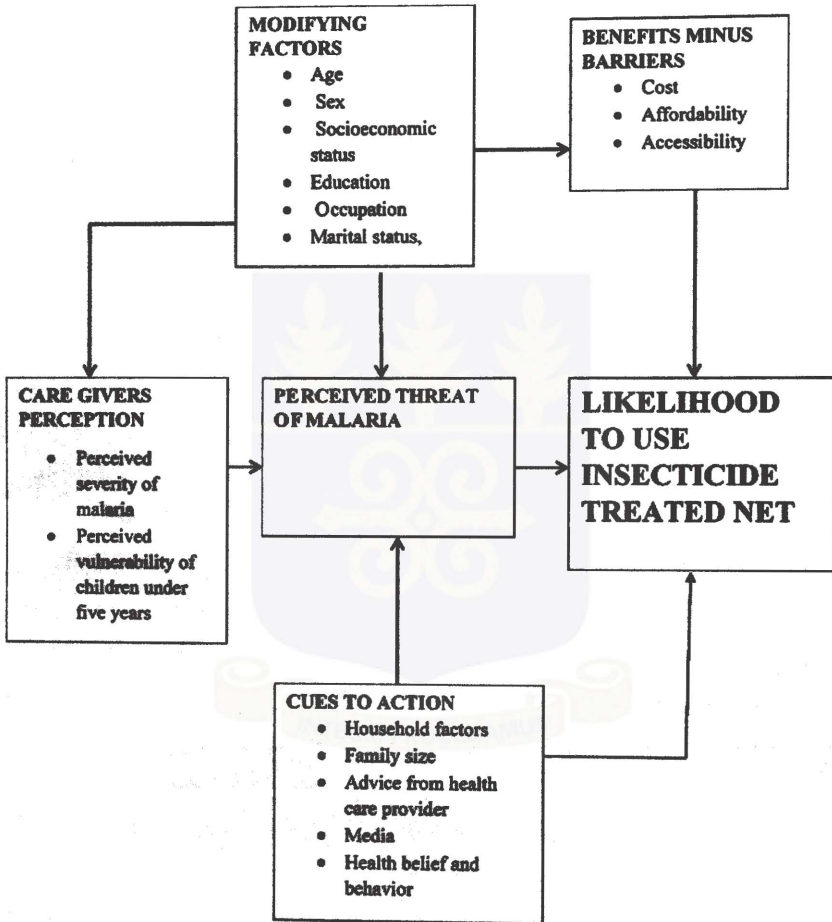
This present study seeks to utilize both quantitative and qualitative methods not only to determine ownership of ITNs but also to find out the factors contributing to the gap between ownership of ITNs by caregivers and its utilization by children under five years whose protection against malaria solely lies in the hands of caregivers.

The finding will contribute to existing body of knowledge and also fill information gap regarding ITN use among children under five years.

The findings will also be used by stake holders to develop more targeted cost-effective strategies to maximize ITN use among this vulnerable group.

1.4 CONCEPTUAL FRAMEWORK

Figure 1. Components of the conceptual framework of the study.



1.4.1 OPERATIONAL DESCRIPTION OF CONCEPTUAL FRAMEWORK

The conceptual frame work in figure 1 above is adapted from the Health Belief Model as described by Turner, Hunt, DiBrezzo, & Jones, (2004).

The Health Belief Model is a conceptual framework used to understand behavior and possible reasons for non-compliance with recommended health behavior. In this model, two main factors influence the likelihood that a person will adopt a recommended preventive action. Firstly, a person must feel susceptible and threatened by the disease, with perceived serious consequences. Secondly, the person must believe that the benefits of practicing prevention measure outweigh the perceived barriers to the preventive action.

It addresses four major components for compliance with recommended health actions:

The individual's perceived susceptibility to a disease. When a person believe that they are at risk of contracting a disease, they will be more likely to do something to prevent it. Consequently, caregivers of children under five will seek for ITN only when they believe that their children are at risk of malaria.

Perceived severity of the disease. If the caregiver does not perceive malaria as being a major cause of morbidity and mortality for children under five years, he/she will not seek preventive measures for their children.

Perceived benefit versus barriers. This is the evaluation of the individual of obstacles in the way of adopting the new behavior. Among all the four constructs, it is regarded as the most significant in determining behavior change. This implies the caregiver's conclusion as to whether using ITN is better than not using it and their opinion of what will stop them from using ITNs for their children.

The caregiver may not use ITN except they perceive it as having greater benefit than cost. Perceived benefit should outweigh the consequences of continuing the old behavior.

The individual cues to action. These are events, people, or things that move individuals to change their behavior example, illness of a family member, media report, mass campaigns, advice from health provider and health warning labels. Lack of cues to action can reduce the likelihood of prevention. Therefore, the individual's choice to utilize health services may be contextually dependent on the cues to action.

The four major constructs are modified by other variables such as culture, knowledge level, age, sex, socioeconomic status. These are the individual characteristics that influence personal perception. It is therefore important to understand caregiver's perceptions of malaria disease, their attitudes toward ITNs, and the influence of the social or subjective norm on use of ITNs, this knowledge can be used to maximize acceptability and sustainability of ITNs utilization.

1.5 RESEARCH QUESTIONS

- What is the proportion of children under five years sleeping under ITNs in Kpone-on-Sea Township?
- What are the factors influencing utilization of Insecticide Treated net among children under five years in Kpone-On-Sea Township?

1.6. GENERAL OBJECTIVE

To assess the factors influencing utilization of Insecticide Treated Net among children under five years in Kpone-on-Sea Township.

1.6.1 SPECIFIC OBJECTIVES

- 1. To determine the proportion of children under five years sleeping under ITN**
- 2. To determine mothers/caregiver's individual factors influencing use of ITN among children under five years**
- 3. To determine household factors influencing use of ITN among children under five years**



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 MALARIA

Malaria is a parasitic disease caused by the protozoan *Plasmodium* and mainly transmitted to humans through the bite of an infected female *Anopheles* mosquito. Malaria may also be transmitted through transfusions of infected blood, and from an infected pregnant woman to her unborn child (CDC, 2016). Malaria is characterized by cyclical bouts of fever, headache, muscle and joint pains, nausea, and general malaise. Untreated malaria can result in anaemia, kidney failure, coma, and death. Humans are generally infected by four types of malaria parasite; *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium malariae*.

Plasmodium falciparum is regarded as the most common and virulent type. It multiplies rapidly and can clog in small blood vessels, causing dangerous complications such as cerebral malaria (CDC, 2016).

In 2015, there was an estimated 438 000 malaria deaths globally, of which approximately 69% were children under 5 years of age (WHO, 2014b)

Severe anaemia, hypoglycemia and cerebral malaria are features of severe malaria which are mostly seen in children than in adults (WHO, 2016).

Increased efforts by the World Health Organization and its partners have led to the reduction of malaria burden in many countries. There has been massive scale-up of malaria prevention and treatment interventions resulting in reduction of malaria death rates in Africa (WHO, 2016 ;CDC, 2016).

2.2 MALARIA PREVENTION AND CONTROL

Studies have shown that most of the morbidities and mortality due to malaria could be reduced, provided that preventive tools are made accessible and are used effectively (Initiative, 2016).

Among the preventive and control strategies, insecticide-treated bed nets (ITNs) have emerged as the most cost-effective intervention (Lengeler, 2004; Afoakwa et al., 2015; Binka et al., 1996; Nevillts, Hospital, & Ox, 1996; Habluetzel, Diallo, Esposito, & Lamizana, 1997). Studies have shown that six out of one thousand lives could be saved when children use ITNs, meaning that approximately 336,000 malaria deaths could be averted if every child slept under ITNs (Lengeler, 2004). Recent studies on association of ITN and malaria prevention in sub Saharan Africa showed positive health gains in children and malaria reduction (Lim et al., 2011)

In an effort towards achieving malaria free world, the World Health Organization (WHO), through its Roll Back Malaria (RBM) movement are in constant investment into promoting malaria control interventions including scaling up ITNs coverage (WHO, 2016).

2.3 INSECTICIDE-TREATED BEDNETS (ITNS)

Insecticide treated net (ITN) is one of the most effective tool used in the prevention of malaria in endemic areas. The insecticides used for treating bed nets do not only kill mosquitoes and other insects, but they also repel mosquitoes, leading to reduction in the number of mosquitoes entering to feed on the people inside the house (Maxwell et al., 2002).

An insecticide-treated net (ITN) is defined as a factory-treated net that does not require any further treatment or a net that has been soaked with insecticide within the past 12 months.

Long-lasting insecticidal nets (LLINs) are a subset of ITNs. A LLIN is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibres.

The use of ITNs has repeatedly been shown to reduce the incidence of severe disease and mortality due to malaria in malaria-affected regions (Lim et al., 2011). Major control trials on malaria transmission in Africa have documented a reduction in all-cause mortality of children associated with ITN protection (Binka et al., 1996 ; Habluetzel et al., 1997). These controlled trials have shown that ITNs reduce clinical malaria episodes by 48% and protect six (6) of every 1000 lives of children in the age group of 1-59 months every year” (Lengeler, 2004).

This implies that even though ITNs are regarded as efficacious tools that are effective in the reduction of malaria transmission, if compliance or utilization is low, the effectiveness will be poor. The effectiveness of ITNs therefore depends on their actual use and sustainability over time.

2.4 OWNERSHIP AND UTILIZATION OF ITN

The use of ITNs is a major intervention designed to reduce malaria transmission in Ghana. According to reports from the Ghana Demographic Health Survey in 2014, among all households in Ghana, 68 percent possess at least one ITN.

Ownership of an ITN vary by residence; 61 percent of urban households own at least one ITN, as compared with 79 percent of rural households. Households in the Greater Accra region were least likely to own an ITN (53 %), while households in Brong-Ahafo are most likely to own one (81 %).

The average number of ITNs owned per household in Ghana is 1.3, whereas utilization of ITNs among children under five years overall was 47% but these, differs according to residence,

region and locality. In Urban residence, utilization of ITNs among under five children was 35.8% and in Rural residence it was 56.1% (GHS, 2015a)

This implies that the supply of free ITNs cannot solve the problem of access. People must be educated on the need to take good care of the nets they are supplied. Also in Ghana, in their study on ITN use, Adjah & Panayiotou, (2014) found that, the percentage of children less than five years that slept under a net the night before the study was 15.5% and the percentage of households that own a net was 45%. Determinants of ITN use were dependent on messages delivered by a health worker or radio programme (OR adjusted = 1.65; 95% CI = 1.44 to 1.88 and OR adjusted = 1.26; 95% CI = 1.12 to 1.42 respectively).

Okafor & Odeyemi, (2012) in their study on use of insecticide treated mosquito net for children under five years in Lagos Nigeria, reported a high rate ITN use among under-fives (61.8%).

Respondents that were married had a higher rate of ITN use for children under five years, than respondents who were single or separated/divorced care-givers, $p < 0.001$. The number of children under five years in the household also influenced ITN use among under-fives, $P = 0.006$. Care-givers levels of education were not associated with ITN use also respondents' knowledge of mosquitoes as the only cause of malaria was not a determinant for utilization of insecticide treated nets for their children.

2.5 PERCEPTIONS, ATTITUDES, MISCONCEPTION, KNOWLEDGE AND BELIEFS OF USING ITNS

In a study carried out in Mbarara district in western Uganda on the perceptions about Malaria prevention (Nuwaha, (2001), avoiding mosquitoes was the most common method mentioned for

prevention of malaria but use of bed net was low (26%). Heat, humidity and high cost of ITNs were reasons for non-use of ITNs.

For example, some of the respondents expressed doubts about the effectiveness of bed net in preventing malaria as some participants stated that although some households slept under mosquito nets their children die of malaria.

Lencha & Deressa, (2015) reported from a study on utilization of ITNs and its barriers among under five children in Ethiopia, all of them agreed with vulnerability of children and pregnant women to malaria and said that ITN has no side effect. They also found that ITNs were used for other purposes such as carrying of harvest materials, using net for mattresses and covering toilets which served as barriers for ITN use; (Adeneye et al., 2014) in their study in Nigeria also reported that 66.5% of mothers correctly mentioned children less than five years as the vulnerable group most in need of ITN. They found that educational level significantly correlated with their perceptions of child vulnerability to malaria.

In their study among caregivers of children admitted in hospital, Ameyaw, Dogbe, & Owusu, (2015), found that 89.7% knew mosquito bite as a cause of malaria, 85.3% mentioned ITN as preventive method for malaria, 34.3% insecticide sprays, 15.2% environmental hygiene and 6.4% mentioned good food, use of orange peels and electric fans as methods of prevention. About 55.9% indicated using ITNs for their children.

Similarly in a study conducted to assess the distribution, knowledge and utilization of ITNs in selected malaria prone areas of Ethiopia, (Animut et al., 2008) indicated that 60.1% of the respondents had knowledge about nets. The highest source of information was health workers (59.1%), followed by radio(34.3%). Most of the respondents (60%) in this study agreed on use of ITNs as a means to prevent mosquito bite and 39% to prevent malaria. However, about 22% of the respondents believed that they could still be infected with malaria while using ITNs. More

than 97% of the households found no problems while sleeping under ITN. Problems mentioned by the remaining small percentage of respondents included nets are too hot to sleep under, time taking to tuck net every night, difficult to get up at night, mosquitoes can still bite through the net and net do not allow enough air through.

Similarly, Dunn, Le, & Makungu, (2011) in their study found that virtually all participants in the study were knowledgeable about malaria as all of them noted that mosquitoes were cause of malaria, though about 47% mentioned an incorrect cause in addition to mosquitoes.

Consistent with this result is the study in Ghana on knowledge among caregivers at a teaching hospital which showed that their knowledge level was high (85.3%) and 55.9% said they were using ITN on their children (Ameyaw, Dogbe, & Owusu, 2015b).

A study conducted in Aliero Kebbi state Nigeria, also found majority of caregivers with adequate knowledge on ITN which corresponded with net use behavior although only 31.9% own ITN and 64% had non ITNs(Singh, Brown, & Rogerson, 2013).

In southwest Nigeria, Hill et al., (2013)in their study, found that out of the 631 respondents, 84.9% were caregivers of under-five children and 67.7% were married. 91.1% had at least primary school education and 60.2% were traders. Also, their findings indicated that, 57.7% of the respondents had poor knowledge on malaria prevention. 83.5% were aware of the use of ITN for malaria prevention while 30.6% had poor knowledge of its use.

Results from another study in Nigeria, Delta state, Galvin et al., (2011) reported that reasons for lack of use of ITNs were issues of difficulties with net set up and dismantling; safety concerns; issues of space; weather conditions; and concerns of cost implications.

Kimbi et al., (2014) in their study on Knowledge and perceptions towards malaria prevention among vulnerable groups in the Buea Health District, Cameroon, reported that the health facility was the main source of information (74%), 92% of respondents had the right perception of

malaria and 88% recognized fever as sign/symptom of malaria, majority (88%) of respondents had good levels of knowledge on malaria. The good knowledge on malaria was determined by respondent's level of education. Respondents with secondary school education (91%) was significantly higher ($p = 0.01$) than in those with \leq primary school level (83%); 99% perceived ITNs as an effective way of preventing malaria; most respondents (57%) used ITNs mainly for protection against mosquito bites while 48% used them for protection against malaria.

Utilization of ITN is shown to be affected by the weather conditions as reported in a study in communities in Malaita, Solomon Island, ITN use was affected by seasonality; 99% of the population used ITNs during the rainy season, whilst 52% used them all year (Yohannes, et al., 2000). The hot weather conditions seems to makes the use of bed nets uncomfortable.

2.6 HOUSEHOLD FACTORS

Household factors are known to play a vital role in net ownership and use, nets in most instances are given for free, households with good socioeconomic status and know the importance of this preventive measure may not hesitate to purchase a net (Gebresilassie & Mariam, 2011), but in a situation where one has to purchase the net then the socio-economic level of the house becomes important. In some countries, a sizable number of nets owned were not used.

In a cross-sectional study of countries in sub-Saharan including Ghana, findings revealed that 91% of household were owners of at least one ITN, but only 65% of those who owned ITNs used them the night prior before the study. The findings also showed that determinants of ITN use was family size (Baume, Reithinger, & Woldehanna, 2009). Similarly in another study it was observed that one of the significant predictors of ITNs use was household with larger family size (Kassie, Wale, & Fekensa, 2014). In a study conducted in suburban Accra where groups of families were assessed for treatment delays in accessing health care, findings showed that only

half of families in the lowest income group utilized ITN, while all families in the highest income group use it(Wong, 2011).

In a cross-sectional study conducted in rural Kenya to assess determinants of retail sector acquisition of nets, homestead wealth (adjusted OR = 10.17, 95% CI = 5.45-18.98), was a determinant ITN use by children under five years(Noor, Omumbo, Amin, Zurovac, & Snow, 2006), but Bennett et al., (2012), found no difference by socioeconomic status of house hold head six months after a mass distribution of nets country wide in Sierra Leone to determine possession and use of the nets. In another study in Northern Nigeria among women of different wealth quintiles it was observed that utilization of ITNs among respondents from households owning at least one ITN, was 53.1% with no statistically significant difference between the lowest and the highest wealth quintile (Kilian et al., 2016).

Bed net density is associated with net use (Doolan, Doban, & Baird, 2009) the number of nets in the household will determine how many of the households would sleep under net, priority given to the head of households. In a descriptive study in 4 districts in Uganda examining household net allocation preferences, sleeping space surveys revealed that heads of household have priority over children under five years when there are few nets in the households(Lam et al., 2014) but in other situations such as in households in Tanzania children under five years were more likely to sleep under an ITN compared to adults (Tsuang, Lines, & Hanson, 2010).

CHAPTER THREE

3.0 METHODOLOGY

3.1 THE STUDY AREA

The study was conducted at Kpone-On-Sea, a GIS mapped study site developed by the School of Public Health (Tchouassi et al., 2012).

Kpone-on-Sea also known as “Poni” is a fishing community situated in the Kpone-Katamanso municipality (a newly created District) in the Greater Accra Region of Ghana. It is bordered on the east by Prampram, on the south by the Gulf of Guinea, on the west by Tema, and on the north by the industrial Free Zone. The community is surrounded immediately by shrub land except for the southern part that is bounded by the sea. It is one of the constituencies represented in the parliament of Ghana. It stands at an altitude of 50m to 100m above sea level and has an equatorial climate with a mean temperature of about 26 °C.

The occupation of household members are mainly agricultural activities. The township has a centrally located health center which was founded in 1992 by the Rotary Club of Tema. It was subsequently completed and equipped with the assistance of the Tema Municipal Assembly. The health center is currently operating under the Directorate of Ghana’s ministry of health and staffed with Doctors, Nurses, Midwives, Lab technicians and orderlies.

Malaria is perennial in the region though its transmission varies throughout the year with highest intensity in the raining season and declines in the dry season. Studies have shown that *Anopheles gambiae* M molecular form is responsible for malaria transmission at Kpone-on-sea. (Tchouassi et al., 2012).

The district analytic report of the 2010 population and housing census shows that in Kpone-Katamanso district, children constitute the highest proportion of about 38.4%, with the proportion of children in male-headed households of about 39.2% slightly higher than their female counterparts of about 37.7%. In the district, there is child dependency ratio of 54.5% which is higher than the old age dependency ratio of about 3.5% (GSS et al., 2014). This implies that these large number of vulnerable children depend on caregivers for protection from malaria.

3.2 STUDY DESIGN

A Cross-sectional study was carried out utilizing both quantitative and qualitative methods between the period March 2017 and June 2017 to assess utilization of Insecticide Treated Nets among children under-fives of age in the Kpone-on-sea Township.

3.3 STUDY POPULATION

The study population was made up of caregivers with children under five years in a household and some other stake holders in the township as required by the study.

Inclusion criteria

Caregivers in a household with at least a child under five years of age and consent to participate were included in the study.

Exclusion criteria

All caregivers without a child under five years and those who did not consent to participate in the study.

3.4 SAMPLE SIZE DETERMINATION

The sample size calculation formula by Pourhoseingholi, Vahedi, & Rahimzadeh, (2013) is used to calculate the sample size.

A desired precision (d) of $\pm 5\%$ with 95% confidence level (z) and a frequency of Insecticide treated net use of 25.9% (P) (which is the prevalence of children sleeping under nets in the Accra Region is used as a proxy)(GSS et al., 2014), imputed into the formula below gives a sample size(n) of 295

Formula:

$$N = \frac{z^2 * p * (1 - p)}{d^2}$$

$$n = \frac{1.96^2 * 0.259 * (1 - 0.259)}{0.05^2} = 295$$

Description:

n = required sample size

z = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of ITN use in in greater Accra region (25.9%)

d = desired precision at 5% (standard value of 0.05) Taking into account contingencies such as non-response, recording errors, the number will be adjusted by 10% to have a final sample size of 325 for the study.

3.5 SAMPLING METHOD

QUANTITATIVE ARM

A multistage sampling method was used to select participants for this study. In the first instance, two sections out of the four sections of Kpone township were selected. This was done using four sheets of papers, two of the papers had the word 'yes' and the other two had the word 'No'. these sheets were folded in to balls put in a plastic bag and mixed thoroughly. Four members of the Township, one from each section was asked to pick one ball of sheet from the plastic bag. Those that picked the paper ball bearing 'yes', the sections they represented were included in the study and those that picked the paper balls that had the word 'No' on it, their sections were exempted from the study.

The section that was studied first was also randomly selected by asking the representatives to pick a ball of paper from a plastic bag. The one who picked the paper bearing first was the section that was first studied. In each section, alternate houses were used, if a house consisted of more than one caregiver that meets the study criteria, one was randomly selected. This continued until the total sample size was exhausted.

QUALITATIVE ARM

Two focus groups discussions comprising of eight (8) participants each were conducted in the study community. One group comprising mothers and the other group comprised of fathers of children under five years of age. They were purposively selected for the discussion. This was because they were directly involved in child care and their experiences regarding ITN use and child protection was very vital to the study.

For the in-depth interview, the following category of leaders were purposively selected; the in charge of the health center, one opinion leader, the district malaria focal person, one women traditional leader and two religious leaders from the main religion practiced in the community. These were considered because they are directly involved in the welfare of community members including children under five years and their opinion about ITN as a preventive tool for malaria prevention and it's utilization among children under five in the community was considered very important.

3.6 STUDY VARIABLES

Dependent variables: Utilization of Insecticide-Treated Bed Nets (ITN)

This is defined as sleeping under an ITN the night before the study.

The independent variables;

Caregivers individual characteristics; the age, sex, marital status, level of education and occupation

Perceptions of caregivers about: the vulnerability of their children to malaria infection, the seriousness and threat of malaria, importance of ITNs and the barriers to its utilization.

Household characteristics; number of children in the house and number of ITNs in the household.

Ownership and source; possession of ITN by caregivers and how it was acquired.

knowledge on malaria, and ITN; This included information on malaria and it's prevention, ITNs and its uses.

3.7 DATA COLLECTION TOOLS AND TECHNIQUES

Tools which were employed in the collection of data included structured questionnaires for the quantitative arm and semi-structured interview and focus group discussion guide for the qualitative arm.

The Questionnaire consisted of three sections: Section A: Socio-demographic information of caregivers, Section B: Knowledge on malaria and its prevention, and knowledge on ITNs, Section C: ownership and use of ITNs for children under five years of age. Participants were required to choose options as applies to the questions.

Data was collected through home visits during the study period. After getting approval from the participants through informed consent, the research assistants administered the questions to the respondents, one at a time in their preferred language. Responses from the respondents were then recorded accordingly.

The in-depth interview and focus group discussion guides consisted of topics from the study objectives and included knowledge on malaria, its complications and prevention, perceptions of severity of malaria and vulnerability of children under five years, ITNs and its benefits and barriers toward ITN utilization for children. The focus group discussions and in-depth interviews were facilitated by the principal researcher and two assistants. The discussions were tape recorded with consents from participants and notes taken to aid analysis. Participants gave their ideas freely throughout the discussion until each idea was saturated.

3.8 QUALITY CONTROL

The following measures were put in place to ensure quality, validity and reliability of data.

Firstly, the data collection tools were reviewed by my supervisor for correction and mistakes were amended. The tools were translated into the local language of the community (Ga) and back into English by a qualified translator and were double checked. The questionnaire was then pre-tested in a Neighboring community in Katamanso District to test its reliability. After data collection, the data was checked for completeness, errors and omissions and necessary corrections were made before analysis.

Secondly, all data collected were entered twice into computer system and checked by two qualified personnel to ensure completeness.

3.9 TRAINING OF RESEARCH ASSISTANTS

Four research assistants who could read and write English and could speak and understand the local language [Ga], Twi and other Ghanaian local languages were recruited. The content of the training included the purpose and objectives of the study, data collection techniques and tools to be used. Translation of questionnaires, actual data collection and ethical issues or considerations.

3.10 DATA PROCESSING AND ANALYSIS

Data collected in the form of answered questionnaires, field notes and tapes were checked in the field to ensure completeness and were kept securely in a locked bag pending analysis.

For the quantitative study, the data was checked again for completeness and internal consistency and then coded. Microsoft office Excel 2016 was used for data entering and cleaning. The results were then presented in frequency tables based on the objectives. Further analysis was

done using STATA version 14 software. Chi-square test was used to test for associations and multiple logistic regression to determine strength of associations.

The qualitative data was first analyzed manually by summarizing findings at the end of the day per each interview and discussion, bringing together similar views from different respondents and then finally analyzed using NVIVO followed by description and interpretation of results.

3.11 ETHICAL CONSIDERATIONS

Ethical approval was sought from the Ghana Health Service Ethical Review Committee (GHS-ERC). Permission was also obtained from appropriate leaders at the study site. Informed consents were obtained from the respondents and they were assured of confidentiality before their engagement in the study. The study objectives and procedures were carefully explained in English and the local language (Ga) to the participants before their recruitment into the study. Persons eligible for the study were recruited after signing the consent form as an indication of their willingness to participate in the study.

The study participants were adult and there were no risks associated with the study. However, respondents were told that they might be uncomfortable with some of the questions that will be asked but that they are free to provide or refuse to provide answers without negative effect and their decisions were respected. The study would be beneficial to the participants as information from them will help to improve on malaria preventive interventions for children and also add to existing knowledge.

Compensation in the form of two bars of soap worth five cedis was given to caregivers for their time spent in providing responses for the questionnaire (quantitative arm of the study). Refreshment and transportation fare of twenty [20] Ghana cedis each was given to respondents

who participated in the focus group discussion as the discussions were conducted at a location away from their homes (qualitative arm of the study).

3.12 LIMITATIONS

The study was only conducted in Kpone-On-Sea due to time constraints therefore the result cannot be generalized to the entire Greater Accra.



CHAPTER FOUR

4.0. PRESENTATION OF RESULTS

4.1. INTRODUCTION

This chapter focuses on the presentation of the results concerning the utilization of ITNs among children under five years in the Kpone community, Greater Accra Region of Ghana. The results are presented according to the objectives of the study.

4.2. BACKGROUND CHARACTERISTICS OF RESPONDENTS

A total of 325 respondents were sampled for this study. In total, 139 (43%) of the respondents were between ages 26 to 36. Those who were between ages 37 to 47 represented 24% and those between ages 15 to 25 were 16%. On average, 26% of the respondents had stayed in the community for about 21 to 30 years, 22% were dwellers there for 10 years and another 22% had stayed there for more than 40 years. Almost all, 301 (93%) respondents were female, more than half (63%) were married and six in every ten (62%) had completed secondary education. Twenty percent had a primary level education, 11% had completed tertiary education and only 7% had no educational background. Also, 142 (44%) of the respondents were petty traders, 93 (29%) worked in other categories, 48 (15%) as public sector workers and 8% were business men and women. A near universal (96%) of them were Christians. *See Table 1*

Table 1: Background characteristics of respondents

Attribute	Frequency (N=325)	Percent (%)
Age of participant (in years)		
15-25	52	16.0
26-36	139	42.8
37-47	79	24.3
48-60	41	12.6
60 and above	14	4.3
Length of stay in community (in years)		
1-10	72	22.1
11-20	33	10.2
21-30	85	26.2
31-40	65	20.0
40 and above	70	21.5
Gender of participant		
male	24	7.4
female	301	92.6
Marital status		
married	206	63.4
not married	119	36.6
Level of education		
primary	65	20.0
secondary	201	61.8
tertiary	36	11.1
no education	23	7.1
Occupation of participant		
public worker	48	14.8
fishmonger	15	4.6
petty trader	142	43.7
business man/woman	27	8.3
other occupation	93	28.6
Religion background		
Christianity	311	95.7
Islam	14	4.3

4.3. MOTHERS'/CARE GIVERS' KNOWLEDGE ON MALARIA AND ITN USAGE

In total, 312 (96%) of mothers/care givers were aware that the main cause of malaria was through mosquito bite. On assessing the sources of respondents' education on malaria, respondents selected multiple options as sources. In all, 252 (76%) said they had malaria information through the radio, 306 (94%) had information from health workers and 103 (32%) from family and friends. Only 16% had information on malaria through a religious medium and newspapers 25 (8%). Similarly, a little over half 172 (53%) of the respondents had knowledge that mosquitoes transmit malaria, and had fair knowledge of the signs and symptoms of malaria. Among the signs and symptoms mentioned by respondents were fever 275 (85%), headache 199 (61%), vomiting 225 (69%), diarrhea 50 (15%), loss of appetite 178 (55%), and body weakness 170 (52%). In addition, 270 (83%) were aware that using or sleeping under an ITN could prevent malaria, 35 (11%) thinks keeping the house clean was the best preventive method and 14 (4%) thinks using or sleeping under an insecticide could prevent malaria. Only 2% were of the view that malaria can be prevented by taking preventive medicine.

Again, more than half, 168 (52%) of the respondents were aware that malaria is a serious condition and the group most at risk were elderly persons 72 (22%). Eight in every ten were aware that children under five years (87%) and pregnant women (49%) were most at risk. Those who had knowledge children above five years 63 (19%) and all family members were also at risk of malaria were also 143 (44%). Respondents' knowledge on Insecticide Treated Nets (ITN) was also assessed. More than half of the respondents had heard of ITN through the hospitals and clinics, 23% had ITN information from the television and 14% from the radio. Almost all 320 (99%) mothers/care givers were aware that ITNs are used to protect against mosquito bite and 81% emphasized the importance of ITNs in preventing malaria. *Other details are on Table 2.*

Table 2: Mothers'/care givers' knowledge on malaria and ITN usage

Attribute	Frequency (N=325)	Percent (%)
Main cause of malaria		
drinking dirty water	6	1.8
mosquito bite	312	96.0
others specify	7	2.2
Source of education on malaria		
radio	252	77.5
newspaper	25	7.7
posters	20	6.2
family/friend	103	31.7
health worker	306	94.2
government official	10	3.1
religious house	53	16.3
Mosquito transmit malaria		
yes	172	52.9
no	131	40.3
don't know	22	6.8
Signs and symptoms of malaria		
fever	275	84.6
headache	199	61.2
vomiting	225	69.2
diarrhea	50	15.4
loss of appetite	178	54.8
body weakness	170	52.3
Best preventive method		
taking preventive medicine	6	1.8
Sleeping under ITN	270	83.1
using insecticide spray	14	4.3
keeping the house clean	35	10.8
Seriousness of malaria		
very serious	113	34.8
serious	168	51.7
not serious	44	13.5
Persons most at risk		
elderly persons	72	22.2
adult men/women	18	5.5
pregnant women	160	49.2
children under-five years	283	87.1
children above 5years	63	19.4

all family members	143	44.0
Where respondents heard of ITN		
radio	46	14.2
television	74	22.8
hospital/clinic	205	63.1
Knowledge on uses of ITN		
protecting against mosquito bite	320	98.5
to keep insects away	5	1.5
Knowledge on the importance of ITN		
very important	262	80.6
important	63	19.4

4.4. HOUSEHOLD FACTORS INFLUENCING ITN USAGE

The study also assessed household factors to ascertain which factors were influencing the use of ITNs among children under five years. The results indicate that majority of the respondents were owners of at least an ITN 285 (88%). However, 25 (8%) did not own an ITN with the reason that they were not supplied, while 15 (5%) said they had not ITNs because the nets were not available. Among those who owned an ITN, more than half 197 (69%) owned an insecticide treated net, 80 (28%) owned a LLIN and 8 (3%) owned ITNs that were non-treated. Similarly, 143 (44%) owned only a net, 93 (29%) owned 2 nets, 34 (11%) had 3 nets and 41 (13%) had no net in their possession. Most 125 (39%) of the respondents had their nets from mass campaign. Respondents whose child usually uses a bednet were 264 (81%). However, the rate of insecticide treated net usage among children under five years at Kpone was 91%.

Among respondents who had children at the time of the study, more than half (65%) of the respondents had just a child. A little over half (56%) of the respondents used bed nets throughout the year and 26% used bed nets only during rainy seasons. On the reasons for using ITNs within households, 95% agreed that ITNs keep mosquitos away, and protects them from malaria 316 (97%). Majority (83%) of the respondents also disagree that ITNs keep flies and other insects away. In addition, 56% of respondents said ITNs generates too much heat, are too expensive (4%) and have several adverse effects (9%). Respondents (69%) suggested the free distribution of ITNs as a method to improve the usage of ITNs. However, 25% suggested intensive education while 6% thinks modification of the shape and size of ITNs will be a best method to improve usage. *See Table 3.*

Table 3: Household factors influencing ITN usage

Attribute	Frequency (N=325)	Percent (%)
Respondents who owned a bed net		
yes	285	87.7
no	40	12.3
Reasons for not owning a bed net		
nets are not available	15	37.5
I was not supplied a net	25	62.5
Type of net owned		
non-treated net	8	2.8
insecticide treated net	197	69.1
long lasting insecticide net	80	28.1
Number of nets owned		
none	41	12.6
1	143	44.0
2	93	28.6
3	34	10.5
4	8	2.5
5	6	1.8
Source of respondents' bed net		
given to me by relative/friend	15	4.6
it was bought	21	6.5
got it from the clinic	123	37.8
from mass campaign	125	38.5
not applicable	41	12.6
Family member using net		
Mother and children under five years	142	50.0
Everybody (including under five)	130	45.8
nobody	12	4.2
Respondents' child usually uses nets		
yes	264	81.2
no	61	18.8
Children under five using ITNs		
yes	260	91.2
no	25	8.8

Table 3 continue: Household factors influencing ITN usage

Attribute	Frequency (N=325)	Percent (%)
No of children under five in the household		
1	210	64.6
2	107	32.9
3	8	2.5
Period of net usage		
all year round	182	56.0
during rainy season	83	25.5
not applicable	60	18.5
Reasons for not using bed net		
it is uncomfortable	12	3.7
nets are too hot	12	3.7
use spray and coil	31	9.5
not applicable	270	83.1
Bed nets keep mosquitoes away		
no	17	5.2
yes	308	94.8
Bed nets protects from malaria		
no	9	2.8
yes	316	97.2
Bed nets allow enough sleep		
no	301	92.6
yes	24	7.4
Bed nets are warmer		
no	316	97.2
yes	9	2.8
Nets keep flies and other insects away		
no	268	82.5
yes	57	17.5
Problems associated with bed nets		
nets are too expensive	14	4.3
nets generate too much heat	183	56.3
nets have adverse effects	30	9.2
there is no problems associated with nets	98	30.2
Suggestions for improvement		
free distribution of ITN	225	69.2
modification of shape and size of nets	18	5.6
intensive education on ITN usage	82	25.2

4.5. ASSOCIATIONS BETWEEN BACKGROUND CHARACTERISTICS AND ITN USAGE

In building a chi-square model to test the associations between background characteristics of respondents and their ITN usage, several demographic factors were considered. Among all background characteristics, the age of respondent ($p < 0.32$), their length of stay in the Kpone community ($p < 0.64$), and the gender of a respondent ($p < 0.61$), there were no statistically significant association with their use of an ITN. Again, respondents marital status ($p < 0.79$), their type of occupation ($p < 0.32$) and their religious background ($p < 0.76$), were also no statistically significant association with their use of an ITN. There was however a statistically significant association between their level of education and their use of an ITN ($p = 0.01$). (See Table 4)

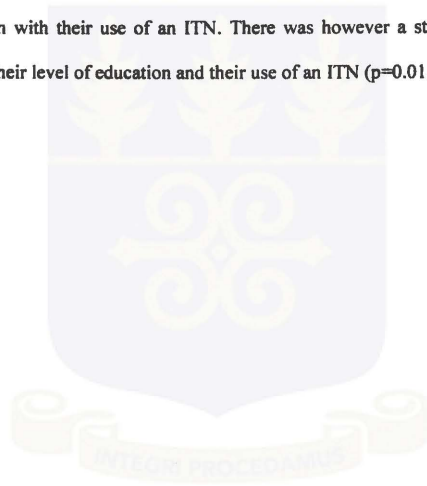


Table 4: Associations between background characteristics and ITN usage

Attribute	ITN Usage		P value *
	Yes Freq. (%)	No Freq. (%)	
Age of participant (in years)			
15-25	46(88.5)	6(11.5)	.322
26-36	131(94.2)	8(5.8)	
37-47	68(86.1)	11(13.9)	
48-60	37(90.2)	4(9.8)	
60 and above	12(85.7)	2(14.3)	
Length of stay in community (in years)			
1-10	64(88.9)	8(11.1)	.639
11-20	31(93.9)	2(6.1)	
21-30	74(87.1)	11(12.9)	
31-40	60(92.3)	5(7.7)	
40 and above	65(92.9)	5(7.1)	
Gender of participant			
male	21(87.5)	3(12.5)	.608
female	273(90.7)	28(9.3)	
Marital status			
married	187(90.8)	19(9.2)	.799
not married	107(89.9)	12(10.1)	
Level of education			
primary	61(93.8)	4(6.2)	.010
secondary	177(88.1)	24(11.9)	
tertiary	34(94.4)	2(5.6)	
no education	22(95.7)	1(4.3)	
Occupation of participant			
public worker	42(87.5)	6(12.5)	.315
fishmonger	13(86.7)	2(13.3)	
petty trader	127(89.4)	15(10.6)	
business man/woman	23(85.2)	4(14.8)	
other specify	89(95.7)	4(4.3)	
Religion background			
Christianity	281(90.4)	30(9.6)	.755
Islam	13(92.9)	1(7.1)	

• (Bi-variate analysis)

4.6. ASSOCIATIONS BETWEEN MOTHERS'/CARE GIVERS' KNOWLEDGE ON MALARIA, ITN AND ITN USAGE

The study also assessed the relation between mothers'/care givers' knowledge on malaria and ITNs and their usage of ITNs. Knowledge on the main cause of malaria ($p<0.49$), their source of information being radio ($p<0.06$), newspaper ($p<0.79$), poster ($p<0.39$) or health workers ($p<0.88$), were not significantly associated within their use of ITN. In addition, their knowledge on the signs and symptoms being headache ($p<0.99$), vomiting ($p<0.83$), diarrhea ($p<0.69$), loss of appetite ($p<0.13$), or body weakness ($p<0.65$), were all not significant. Again, respondents' knowledge on the best preventive method for malaria ($p<0.65$), their knowledge on the seriousness of malaria ($P<0.93$), and awareness that the elderly were most at risk ($p<0.15$), were all not significant. Respondents who had knowledge that adult men and women ($p<0.77$), pregnant women ($P<0.63$), children above five years of age ($p<0.99$), and all family members ($p<0.17$) were most at risk of malaria, were all not significant in determining their use of an ITN. Furthermore, respondents source of information on ITNs ($p<0.85$) was also not statistically significant. However, respondents' awareness that fever is a sign and symptom of malaria ($p<0.02$), and that children under five years ($p<0.05$) were most at risk, were significant to their ITN usage. Their knowledge that mosquitoes transmit malaria ($p<0.02$), knowledge on the uses of ITNs ($p<0.02$), and knowledge on the importance of ITNs in preventing malaria ($p<0.01$), were all significant to a respondent usage of ITNs. See Table 5 below for details.

Table 5: Associations between mothers'/care givers' knowledge on malaria, ITN and ITN usage

Attribute	ITN Usage		P value *
	Yes (%)	No (%)	
Main cause of malaria			
drinking dirty water	6(100.0)	0(0.0)	.490
mosquito bite	281(90.1)	31(9.9)	
others specify	7(100.0)	0(0.0)	
Source of education on malaria (multiple responses)			
radio	232(92.1)	20(7.9)	.068
newspaper	23(92.0)	2(8.0)	.785
posters	17(85.0)	3(15.0)	.391
family/friend	96(93.2)	7(6.8)	.252
health worker	277(90.5)	29(9.5)	.880
government official	8(80.0)	2(20.0)	.253
religious house	45(84.9)	8(15.1)	.132
Mosquito transmit malaria			
yes	152(88.4)	20(11.6)	.024
no	124(94.7)	7(5.3)	
don't know	18(81.8)	4(18.2)	
Signs and symptoms of malaria (multiple responses)			
fever	252(91.6)	23(8.4)	.041
headache	180(90.5)	19(9.5)	.994
vomiting	203(90.2)	22(9.8)	.826
diarrhea	46(92.0)	4(8.0)	.687
loss of appetite	165(92.7)	13(7.3)	.131
body weakness	155(91.2)	15(8.8)	.646
Best preventive method			
taking preventive medicine	6(100.0)	0(0.0)	.646
using mosquito coil	243(90.0)	27(10.0)	
using insecticide spray	12(85.7)	2(14.3)	
keeping the house clean	33(94.3)	2(5.7)	
Seriousness of malaria			
very serious	103(91.2)	10(8.8)	.933
serious	151(89.9)	17(10.1)	
not serious	40(90.9)	4(9.1)	
Persons most at risk (multiple responses)			
elderly persons	62(86.1)	10(13.9)	.154
adult men/women	7(87.5)	1(12.5)	.773
pregnant women	146(91.2)	14(8.8)	.634
children under-five years	253(89.4)	30(10.6)	.051

children above 5years	57(90.5)	6(9.5)	.996
all family members	133(93.0)	10(7.0)	.166
Where respondents heard of ITN			
radio	42(91.3)	4(8.7)	.847
television	68(91.9)	6(8.1)	
hospital/clinic	184(89.8)	21(10.2)	
Knowledge on uses of ITN			
protecting against mosquito bite	291(90.9)	29(9.1)	.019
to keep insects away	3(60.0)	2(40.0)	
Knowledge on the importance of ITN			
very important	245(93.5)	17(6.5)	.001
important	49(77.8)	14(22.2)	

- (Bi-variate analysis)

4.7. ASSOCIATIONS BETWEEN HOUSEHOLD FACTORS INFLUENCING ITN USAGE AND ITN USAGE

On assessing the influence of household factors on the usage of ITNs, the stated reasons for not possessing an ITN ($p < 0.08$), the source of respondents' ITN ($p < 0.09$), the family member that uses the possessed ITN ($p < 0.09$), and whether a respondent's child usually uses an ITN ($p < 0.38$), were all not significantly associated with ITN usage. Other household factors that were also not significant to ITN use included stated reasons for not using ITN ($p < 0.07$), and other uses of ITNs including the use of nets to keep mosquitoes away ($p < 0.75$), for protection from malaria ($p < 0.32$), for allowing enough sleep ($p < 0.09$) and for providing warmth ($p < 0.87$). Respondents' view on the problems with ITNs ($p < 0.48$), and their suggestions to improve ITN usage ($p < 0.56$), were also not significant. Among household factors, only ITN ownership ($p < 0.03$), the type of ITN a respondent owned ($p < 0.02$), and the number of ITNs owned by a respondent ($p < 0.05$), were significant in determining ITN use among respondents. Similarly, the number of children under five years in a household ($p < 0.01$), and the period within which respondents uses ITN ($p < 0.001$), were also significant. Other details are on Table 6.

Table 6: Associations between household factors influencing ITN usage and ITN usage

Attribute	ITN Usage		P value *
	Yes (%)	No (%)	
Respondents who owned a bed net			
yes	254(89.1)	31(10.9)	.028
no	40(100.0)	0(0.0)	
Reasons for not owning a bed net			
nets are not available	15(100.0)	0(0.0)	.084
I was not supplied a net	26(100.0)	0(0.0)	
not applicable	253(89.1)	31(10.9)	
Type of net owned			
non-treated net	7(100.0)	0(0.0)	.022
insecticide treated net	170(86.3)	27(13.7)	
long lasting insecticide net	76(95.0)	4(5.0)	
Number of nets owned			
none	41(100.0)	0(0.0)	.052
1	125(87.4)	18(12.6)	
2	88(94.6)	5(5.4)	
3	28(82.4)	6(17.6)	
4	7(87.5)	1(12.5)	
5	5(83.3)	1(16.7)	
Source of respondents' bed net			
given to me by relative/friend	13(86.7)	2(13.3)	.098
it was bought	20(95.2)	1(4.8)	
got it from the clinic	106(86.2)	17(13.8)	
from mass campaign	114(91.2)	11(8.8)	
not applicable	41(100.0)	0(0.0)	
Family member using net			
children under five years	27(87.1)	4(12.9)	.090
everybody	118(90.8)	12(9.2)	
mother and child	96(86.5)	15(13.5)	
nobody	12(100.0)	0(0.0)	
not applicable	41(100.0)	0(0.0)	
Respondents' child usually uses nets			
yes	237(89.8)	27(10.2)	.379
no	57(93.4)	4(6.6)	

* (Bi-variate analysis)

Table 6 continue: Associations between household factors influencing ITN usage and ITN usage

Attribute	ITN Usage		P value *
	Yes (%)	No (%)	
No of children under five			
1	191(91.0)	19(9.0)	.005
2	95(88.8)	12(11.2)	
3	8(100.0)	0(0.0)	
Period of net usage			
All year round	175(96.2)	7(3.8)	.001
during rainy season	59(71.1)	24(28.9)	
not applicable	60(100.0)	0(0.0)	
Reasons for not using bed net			
it is uncomfortable	12(100.0)	0(0.0)	.073
nets are too hot	12(100.0)	0(0.0)	
use spray and coil	31(100.0)	0(0.0)	
Not applicable	239(88.5)	31(11.5)	
Bed nets keep mosquitos away			
No	15(88.2)	2(11.8)	.748
Yes	279(90.6)	29(9.4)	
Bed nets protects from malaria			
No	9(100.0)	0(0.0)	.323
Yes	285(90.2)	31(9.8)	
Bed nets allow enough sleep			
No	270(89.7)	31(10.3)	.098
Yes	24(100.0)	0(0.0)	
Bed nets are warmer			
No	286(90.5)	30(9.5)	.871
Yes	8(88.9)	1(11.1)	
Nets keep flies and other insects away			
No	243(90.7)	25(9.3)	.780
Yes	51(89.5)	6(10.5)	
Problems associated with bed nets			
nets are too expensive	14(100.0)	0(0.0)	.484
nets generates too much heat	167(91.3)	16(8.7)	
nets have adverse effects	27(90.0)	3(10.0)	
there is no problems associated with nets	86(87.8)	12(12.2)	
Suggestions for improvement			
free distribution of ITN	204(90.7)	21(9.3)	.558
modification of shape and size of nets	15(83.3)	3(16.7)	
intensive education on ITN usage	75(91.5)	7(8.5)	

4.8. DETERMINANTS OF ITN USAGE AMONG UNDER-FIVE

Using a significance level of $p < 0.05$, all significant variables at the chi-square test were used to build a multiple logistic model. This model establishes the strength and direction of the significance and controlled for confounders of the study. The study results indicate that care givers who had completed secondary level education as compared to those who had a primary education, were two times more likely to use an ITN for children under five years (OR 2.07, 95%CI: 0.69-6.19). Again, respondents who were aware that children under five years were the most at risk group were almost five times more likely to use an ITN (OR 4.86, 95%CI: 0.64-36.63) than those that said that the elderly are the most at risk.

On the use of ITNs, mothers/care givers who were aware that ITNs are used as protection against mosquitoes, were almost seven times more likely to use an ITN for their children (OR 6.69, 95%CI: 1.07-41.68). Respondents who said ITNs were important were also four times more likely to use an ITN for under five (OR 4.11, 95%CI: 1.91-8.90). Other determinants of ITN use for children under five years included ownership of an ITN (OR 2.02, 95%CI: 3.25-5.68) and ownership of a LLIN (OR 3.33, 95%CI: 4.50-8.79). As compared to respondents who owned no ITN, care givers who owned one ITN (OR 0.41, 95%CI: 0.32-0.57), or two ITNs (OR 0.72, 95%CI: 0.08-6.52), or three ITNs (OR 0.28, 95%CI: 0.03-2.92), were all less likely to use an ITN for children under five. However, mothers/care givers who owned four ITNs were more likely to use them to prevent malaria in children under five years (OR 1.07, 95%CI: 0.11-10.91). Those who owned five or more ITNs were also less likely to use them (OR 0.74, 95%CI: 0.04-14.35). As compared to respondents who used ITNs throughout the year, those who used ITNs only during rainy seasons were ten times more likely to use them to prevent malaria in children under five years. See Table 7 below for details.

Table 7: Determinants of ITN usage among under-five *

Attribute	AOR	(95% CI)	
Level of education	Ref.		
primary	2.068	.690	6.198
secondary	.897	.156	5.154
tertiary	.693	.073	6.543
no education			
No of children under five	Ref.		
1	1.270	.592	2.725
2	1.054	.241	.543.
3			
Mosquito transmit malaria	Ref.		
yes	.063	.429	.176
no	.384	1.689	1.919
don't know			
Signs and symptoms of malaria (multiple responses)	Ref.		
not applicable	.479	.201	1.142
fever			
Persons most at risk	Ref.		
not applicable	4.862	.645	36.630
children under-five years			
Knowledge on uses of ITN	Ref		
to keep insects away	6.690	1.074	41.680
protecting against mosquito bite			
Knowledge on the importance of ITN	Ref.		
very important	4.118	1.905	8.902
important			
Respondents who owned a bed net	Ref.		
no	2.024	3.246	5.678.
yes			
Type of net owned	Ref.		
non-treated net	5.455	.480	2.565.
insecticide treated net	3.332	4.502	8.789.
long lasting insecticide net	1.354	.324	.731
none			
Number of nets owned	Ref.		
none	.412	.323	.573.
1	.720	.080	6.519
2	.284	.028	2.915
3	1.071	.105	10.914
4			

S	.714	.036	14.347
Period of net usage	Ref.		
all year round			
during rainy season	10.169	4.167	24.817
not applicable	.050	.362	.842

- (multiple logistic regressions)
- AOR means Adjusted Odds Ratio.

4.9. QUALITATIVE RESULTS

4.9.1 IN-DEPTH INTERVIEWS

The study also conducted an in-depth interview which assessed the knowledge of opinion/community leaders on malaria and the use of ITNs in preventing malaria among children under five. For the in-depth interview, the study selected and interviewed the district malaria focal person, one woman traditional leader, one opinion leader and one religious leader from the main religion practiced in the community. The study results were categorized into two main themes including respondents' knowledge on malaria and malaria prevention and ITN usage among children under five years.

A) Knowledge on malaria and malaria prevention

Knowledge on malaria and its prevention among stakeholders is an important factor in the control of malaria. Stakeholders like community leaders, senior health staff and religious leaders who take interest in health sometimes make decisions based on their own knowledge about a particular health situation. The study results suggest that all interviewees had in-depth knowledge on the main causes of malaria, the seriousness of the disease in Kpone community, the signs and symptoms of malaria and how malaria could be prevented. Some of the views were:

"Mosquitoes are the main cause of malaria and the disease is very serious in this community. It affects children a lot and when they are infected and care is not taken, it can really cause the life of the child. Most signs and symptoms are fever, loss of appetite, cold, crying a lot, body weakness and vomiting. The children, pregnant women and adults are mostly at risk. We need to

sleep in the bed nets regularly in order not to get infected with malaria. Also when we are infected and suffering from malaria, we need to quickly go to the hospital for care and when we are given medicines, we need to take the full course of it so that we will be fully recovered” (Woman traditional leader).

Similar views were expressed by the focal person at the Kpone health center, as he is quoted saying: *“Hmm, malaria is endemic and is caused by an infective female anopheles mosquito. Mostly people with low economic status come out more with the condition and it is very serious here. We also have a lot of slums around and that too is a major contributory factor to the fact that malaria is a serious disease in the district. Like I said earlier, people with low socio-economic status, children under five years and pregnant women are mostly affected, but we are doing a lot in terms of bed nets distributions which are mostly done at the child welfare clinics and antenatal care visits. There are also a lot of community sensitization on prevention and control of malaria. Pregnant women are given SP as preventive measures at antenatal care” (malaria focal person).*

In another interview, consistent views on the seriousness of malaria and its prevention were also raised. All interviewees are noted to be making similar efforts on the issue of malaria. While a religious leader (pastor's wife) thinks *“malaria is caused through the bite of an infected mosquito”*, she also expressed concern that *“Malaria is one of the dangerous diseases especially for children under five years and pregnant women. When children are infected they do not go to the hospital on time and so complications then sets in. Mostly children under five years, pregnant women, and the aged are most affected. Now we are using the insecticide treated bednets and we have to make sure that we clear the weeds around and keep the surroundings clean always. Also we should not allow stagnant waters around. We should drain off all choked gutters. That is what we are doing now in the community” (Community religious leader)*

On the issue of knowledge on malaria, the opinion leader also had a good understanding of malaria and its prevention and had indicated the contribution of other environmental factors as: *“Malaria is caused by an*

Anopheles mosquito. When it bites you, it puts the plasmodium parasite into you and then you get the sickness. The things that contribute to this malaria are dirty surroundings, bushy areas and frequent opening of doors at home that gives way to mosquitoes to enter our rooms. Also not sleeping in the mosquito nets gives way to the bites. Also when you wrongly dispose off empty milk or sardine tin, water gets stuck in it and that also gives room for breeding of mosquitoes which end up biting us. Also in our community, when there are stagnant water and chocked gutters, these gives way to mosquitoes to breed there and they then enter our rooms and bite us". He also expressed concern about the seriousness of malaria in the Kpone community and those that are mostly affected: "Malaria is one serious health challenge faced by the community members here in Kpone township. Children and pregnant women are the people malaria affect them a lot here" (Opinion leader).

However, he had his own views on how best malaria can be prevented: *"We have to ensure our environment is cleaner always. Secondly, we should always weed around the bushy areas and also dispose off refuse correctly by avoiding improper disposal of empty cans. In addition, we should ensure the free flow of all chocked gutters and all these activities will help to prevent mosquito breeding and biting us and getting malaria. Also, a lot of people cannot buy the mosquito nets and this bednets helps a lot to prevent mosquito bites and malaria. So therefore if they are freely distributed to the community members, then it will help us a lot to prevent malaria. I also think that once we get our doors, windows fixed with the mosquito screens, this can help to prevent the mosquitoes entering our rooms and later biting us" (Opinion leader).*

B) Factors influencing utilization of ITN among children under five years.

The second main theme under the in-depth interview was to assess the factors influencing the use of ITNs from the opinion of some stakeholders. Malaria prevention among children under five years could better be achieved through targeting the factors that influence the use of ITNs among under five years and it is important that holistic decisions are made by considering the opinions of stakeholders. In this interview, all interviewees had expressed similar opinions about the

factors that influence the use of ITN, indicating why it is important for children under five years to use ITNs. One had indicated: *"It is very important for children under 5 years to sleep in the insecticide treated nets every day because that is the only means by which they will be protected from mosquito bites and then they will also not get malaria. When children have malaria, it is really a worry to the parents so everyone has to try and let their children sleep in the bed nets always"* (woman tradition leader).

This was further confirmed by another stakeholder saying *"It is very important because children under 5 years do not have a matured immune system and they don't have any minimal immunity for the parasite that is why it is very necessary we give them the bed nets to use to prevent malaria"*(malaria focal person).

"I know for children under 5 years, their immune system is slow and they are prone to diseases easily so once they sleep in the nets, they will not get malaria and even not get in contact with the mosquitoes to bite them. Also when the children get in contact with malaria, they become anemic so also the prevention of anemia requires the use of the bed nets" (Community religious leader).

The opinion leader in an interview also confirmed the importance of ITNs in preventing malaria. He indicated why children under five years should sleep under mosquito nets but also indicated the importance of mass distribution of ITNs and how that has come to a stand-still: *"Yes, it is very important because when children get malaria, it is very serious so it is best that we prevent them getting infected with malaria that is why we advocate for the bed net use always"*.

"The ITNs were used to be sold at the markets but if my memory sets me right, close to four years ago, there was free mass distribution of the bednets through the Kpone health center. This made it easy for everyone to get the bednets and those who use it really benefitted from it a lot. Afterwards, there hasn't been any free net distribution again. I would have wished that they distributed the nets freely every year and that could help a lot. There are some people who have four or five children and may not have the

money to buy nets for all of them even finding it difficult to feed them. In this case the person wants to help prevent malaria but because of the money issue, the person will end up having difficulty even buying the net so the free distribution will help a lot" (Opinion leader).

Just like other interviewees had said, the opinion leader also outlined certain challenges with the use of ITNs as expressed by mothers and care givers, but suggested ways of improving ITN usage among children under five years. He said: *"I remember when the bednets were introduced, some people complained about the side effects like itching on the skin when they got in contact with the bednets. Another problem is that people have difficulty breathing when in the bed net and they also have cold so people dislike the bednets. I think the key thing is education to be given to the community members. Like I said earlier concerning the adverse effects like cold, itching and other challenges people face when using the bednets, once they are not given much education, then when they are given the bednets, they will not use it and it will be hanging there in their rooms. The education is very key. Since prevention is better than cure, it is best we give the necessary education in order to help prevent more malaria cases. Also once the individual is made to know and assess the effect of malaria on children; it will make them to use the bednets regularly." (Opinion leader)*

Respondents also indicated the importance of ITNs in preventing malaria in children under five years and how ITNs were acquired by mothers and care givers:

"We usually get the bed nets at the clinic/hospital, pharmacy, market and other places that people sell the nets" but was of the view that such ITNs had problems, as she said: "Some people complain that there is so much heat in the net so they don't like sleeping in it. They add that there isn't free circulation of air into the bednets. Also, some people prefer to use mosquito coil to prevent mosquitoes biting them in the room but with that, when the coil burns out, the mosquitoes can come back and bite you and your children can get the malaria" (woman traditional leader).

However, at the clinic level, means of acquiring ITNs was different. The malaria focal person had indicated that: *"For the pregnant women coming for antenatal care visit and children coming for child*

welfare clinic at the hospital are given the free bed nets. But there are other places that people can get bed nets from like the pharmacy, shops, open markets where people sell the nets. There is also school distribution of nets for pupils of primary two to six years. She further indicated the problems associated with the use of ITNs as stated by mothers/care givers:

"Community members complain about the heat from the bed nets and that makes them have difficulty using it. Also others complain that the bed nets we give them are too hard to use. They rather prefer the conical ones to the rectangular shapes. So more often when you share the nets and it's not conical, the community members reject it. Though some take the bed nets, others also reject the rectangular nets and thereby not sleeping in it. Community members explain that they find it difficult fixing the rectangular bed nets in their rooms that is why they preferred the conical types. But we keep explaining to them that there are new innovative ways of fixing the bed nets" (malaria focal person).

Distribution of free ITNs among pregnant women upon clinic visit is an important factor in controlling malaria and preventing malaria in children under five years and all interviewees seems to be expressing similar opinions about ITN use and their related factors. The community religious leader indicated how ITNs are acquired and the problems associated with ITN use as expressed by mothers and care givers: *When they (mothers) take their children for child welfare clinic, they are also given the bednets there. So I will say they acquire the nets at the hospital. I personally don't have any problem with the nets but some complain that they feel suffocated and there is so much heat in the bednets. They don't feel comfortable sleeping in it. And because of the heat, during the hamattan (dry) season, many people don't use the bednets" (community religious leader).*

More importantly, there were challenges and barriers that hindered the utilization of ITNs in Kpone community. Opinion leaders that were interviewed indicated these barriers to ITN usage but suggested methods to improve the utilization of ITNs among children under five years. One had said:

"Children don't have problems with sleeping in the bednets but I think it is the adults who have issues with that. Some don't have the nets so they cannot sleep in the bednets. Also, most people don't know how

to fix the bednets so though they have the bed nets; it's just lying down in their rooms so then that becomes a barrier to the children sleeping in the bed nets". However, "I think everyone should be given the bednets so that they can use it to prevent malaria. In my house I have two beds but only one net so once we are given free nets by the hospital, then everyone can sleep in the bednets freely. For those who don't have the bednets, then they will resort to using insecticide spray or mosquito coil while sleeping. But those who have the bednets and are not using them, I think the nurses should talk to them again on the benefits of the bednets and also show them how to fix in and always use them. Once that is done and with regular checks, I am sure children will be comfortable and free from malaria disease. I will advocate that parents and caregivers should consider using the bednets regularly to prevent malaria especially in children since malaria can kill" (female traditional leader).

On the same subject, the malaria focal person indicated other barriers to ITN utilization. Similar views were expressed by the malaria focal person during an interview: *"Like I said earlier, the issue of type of nets and the acceptance of it could be a barrier. So those who prefer conical bednets when given the rectangular will either not take the bed net or will not even have the poles and space to fix the bednets at home and use them. I think the issue of space for hanging the bednets will be a barrier. Also some say they use repellent and wearing protective clothing when outside to prevent mosquito bites and then malaria. But we have not had any research to prove the effectiveness of this so cannot confirm for that. The malaria focal person also suggested ways by which utilization of ITNs among children under five years can be improved: "I think because of the preference for the shapes and types of nets be it conical or rectangular, we have realized that more people will prefer the conical type to the rectangular so we will now request for the conical type to enhance effective acceptance, easy fixing and efficient use of the Bednets. Another is the fabric used in producing the bets. Some are cotton and others are linen. So once the bednets are made of cotton, I think that will help reduce the heat and people will use them often" (malaria focal person).*

Periodic intensive education is an important component in improving ITN usage, and even opinion leaders acknowledge this fact. During the interview, one method of improving ITN usage that was expressed was education of mothers and care givers. An opinion leader had this to say:

"I think there should be intensive education on malaria, causes, prevention and control mechanism. During the education, the mothers should be made to know the important points so that they have the main message and issues. Once they are made to understand the effects of malaria on their children, then I am sure they will use it regularly.

In the schools, there should be intensive education too. Also I remember that there was mass distribution of the bednets at the schools and once the teachers tell them to use it, when they come home, they will worry you to ensure that they sleep in the bednets regularly. So I think when they distribution is extended to the school, that will also help. I am saying that because the children under 5 years are given nets during the child welfare clinic so when the nets are shared in the schools, those who are more than 5 years could also get their bednets and use them at home" (Woman religious leader).

4.9.2 FOCUS GROUP DISCUSSION (FGD)

Two focus group discussions were held among female and male caregivers of children under-five to explore and understand perceptions about malaria and utilization of ITNs and barriers towards ITN utilization among children under five.

Three main themes were identified from the focus group discussion as follows: perception about seriousness of malaria and vulnerability of children, benefit and problems of ITNS and barriers towards utilization of ITN among children under five.

A) Perceptions about seriousness of malaria and vulnerability of children

Almost all of the FGD participants mentioned that malaria is a very serious medical condition in the community with great consequences on children though they explained it in different ways. One of the discussant said “*It is very serious in our community and it affects children a lot. This depends on where the child sleeps whether outside or in the room. The children sleep outside a lot and then the mosquito comes and bites them. Because they are children, they end up having more of the effect of the bites than adults*” (Male participant)

Another care giver from the female group emphasized the effect of malaria as illustrated “*it is very serious and it is even deadly. It can kill*” (Female participant) she went on further to justify her statement “*It is very serious because when it affects children and they are students, they cannot go to school and if it affects adult, they cannot even go to work so it's serious.*”

Similar views expressed were: “*Malaria affects children a lot. Just four days ago I brought my child here and she was suffering from malaria. So, it's really a worry to children.*” (Male participant)

“*It can give the child serious damage that can affect him in the future, the child becomes very weak and cannot do anything and it will affect you too, your time and activities*” (female participant)

B) Importance of ITNs

Participants discussed that ITNs could prevent malaria if used in appropriate manner. In addition, it protects from nuisance insects like cockroaches and housefly. A female discussant specifically experienced this “*The net kills mosquitoes and other insects like housefly and*

cockroaches. I remember when I first used my bed net, it killed other insects too because of the medicines inside it“(Female participant)

“It prevents mosquitos from biting your children and that is the most important use” (male participant)

Findings from the discussions also revealed that majority of the participants knew the importance of utilization of ITN by children under five. This was explained as follows:

“We all need the bednets but the people most in need of it is children and pregnant women. They are the most vulnerable to malaria and if care is not taken the child can even die in the stomach and the woman can also lose her life. So, they are the most people required to use the bednets.”(male participant)

“They (children under five years) should sleep in the nets always to prevent getting malaria. When you come to the hospital and the laboratory results shows that the child has malaria, the doctors really gets angry at us” (Female participant)

“The children cannot talk and even when the mosquito bites then they cannot say it so its better they sleep in the bednets always.” (Female participant)

“All the time children, should be made to sleep in the bednets because when they get bitten by mosquitoes, they get the infection faster than adults so I will entreat that the children sleep in the bednets always” (Male participant)

While majority emphasized that children should always sleep under bed net, one of the participants had a contrary view and I quote *“It is not compulsory that they should always sleep in the nets. If there are mosquitoes in the room, then they can sleep in the mosquito nets. But if*

they can use other means to kills the mosquitoes, then it is not compulsory for the child to sleep in the nets. So if mosquitoes are around, once awhile the child can be made to sleep in it"

C) Barriers toward ITN Utilization

The most common barriers raised by participants were, laziness of caregivers, misuse of the bed nets; too much heat generated by nets, issues of space, difficulties in fixing the net and negative perceptions about ITN.

Concerning laziness of care givers, a caregiver in the male FGD pointed out the negligence of caregiver, *"Sometimes parents feel lazy to fix the bednets for the children to sleep in and also others forget to fix the bednets" (male participant)*

Similar view was emphasized in the female FGD, *"for others, when they remove the nets when dirty, they delay in washing it and even when they wash it, they find it difficult and lazing in fixing it back" (Female respondent)*

"Some complain that there is nowhere to fix the net at home. No space in the room" (Female participant)

A negative perception about ITN was also expressed as quoted *"Others feels that sleeping in the bednet is like sleeping in a coffin so they don 't like using it" (Male participant)*

Misuse/wrong use of the ITN was another barrier mostly pointed out by the discussants for non-utilization of ITN among under five children.

“I also saw someone using it as a sieve (filter screen) when preparing porridge for children at home and they also use it for house gardening to prevent animals invading the farms” (male participant)

“I saw a woman use it as a fence at where she sells her food at night for the customers to sit comfortably” (female participant)

Free distribution of ITN, formation of task force and education on utilization of ITN were recommended by the participants as means of ensuring and improving utilization of ITN among children under five years.

“After the free distribution of bednets, there should be the formation of task force to follow the people to their home to ensure that the bednets are well fixed and the people are using it as expected. Once they are given the bednets, they can put them down without using it so once there are follow ups, it will really help a lot” (male participant)

“There should be free distribution of the bednets to enable the use of it. In addition, there should be effective training targeted at homes on the use and maintenance of the bednets because some just don't use the bednets because they don't even know how to hang it and then it becomes decoration in their rooms. The government can also subsidize the price so that people can buy extra copies” (male participant)

“I also think that there should be intensive education and regular reminder about the net use, the effects of malaria on children and families and that will put fear in the people and they will always use the nets” (female participant)

CHAPTER FIVE

5.0. DISCUSSION

The study sought to explore the factors that influence the use of Insecticide Treated Nets at Kpone community. It also assessed the situation from the perspective of stakeholders and opinion leaders. A total of 325 mothers and care givers were included in the study. The study also used qualitative methods to assess the opinion of religious leaders, a malaria focal person, and traditional leaders. In addition, focus group discussions were also conducted with a group of 8 males and 8 females.

5.1 USAGE OF ITN AMONG CHILDREN UNDER FIVE YEARS

The prevalence of children under five using ITN at the Kpone community was 91%. Okafor & Odeyemi (2012) also reported a considerably lower prevalence rate (62%) among a similar population in Nigeria. Other studies also reported lower ITN utilization than that reported by this study (Baume et al., 2009 ; Adjah & Panayiotou, 2014). Indeed, significantly lower 12% and 15% ITN utilization rate respectively have been reported among children under five years (Oresanya, Hoshen, & Sofola, 2008 ; Noor et al., 2006).

5.2 BACKGROUND CHARACTERISTICS OF RESPONDENTS

In the current study, parameters including age and gender did not have any significant influence on mothers' use of ITN in preventing malaria among children under five years. In related studies done in Cameroon, similar findings were also found (Oyekale, 2015). Contrary findings in a similar population however indicate that respondent's age was a significant determinant of ITN usage (Hill et al., 2013). Considering that these two studies were done at different locations, one

will not be wrong to say variations in population aging could account for the differences being noticed. Marital status was also found not to influence ITN usage for malaria prevention among children under years. In previous studies in Rwanda and elsewhere, mothers' use of ITN in under five malaria prevention, was associated with non-use of ITNs (Ruyange et al., 2016 ; Oe et al., 2015 ; Nuwaha, 2001). Both studies share contrary findings with that of Obol and colleagues (2014), where marital status was a significant determinant of ITN use among mothers of under-five. The current results further indicate that among all background characteristics, only educational background was a predictor of ITN use. In other studies contrary to this, mother/care giver's educational attainment also had no influence on their use of ITN (Adjei, 2012). Meanwhile, Ruyange et al., (2016), had cited findings that agree with results of this study. Indicating that a mother's educational attainment significantly determined their use of ITNs in the prevention of malaria among children under five years.

5.3 MOTHERS'/CARE GIVERS' KNOWLEDGE ON MALARIA AND INSECTICIDE TREATED NETS

Evidence from this study showed that knowledge on causes of malaria and malaria prevention among care givers was a factor that contributed to increased use of ITNs among mothers. In other reviews, similar results were reported that suggested the significance of knowledge on ITN usage and malaria prevention among under five years (Hill et al., 2013 ; Sichande, Michelo, Halwindi, & Miller, 2014). Meanwhile, Ruyange et al., (2016) had earlier reported the association of knowledge to lower ITN use among similar respondents. In considering the sources of information on malaria, information sources including radio, newspaper, poster and health workers had no influence on the use of ITN by mothers in the prevention of malaria. In

previous studies however, only poster and health workers as sources of information, determined the use of ITNs (Adjah & Panayiotou, 2014). While these finding share similar characteristics, they also indicate variations in findings. Considering that both studies were done in Ghana, different study periods with different periods of preventions campaigns could account for these variations.

Aside this, respondents knowledge that mosquitos transmit malaria also greatly determined their use of ITNs. This finding concur with studies in Ethiopia that assessed factors associated with use and non-use of ITNs (Baume et al., 2009), but disagrees with other studies that evaluated similar populations in Sierra Leone (Bennett et al., 2012). Current findings could be as a result of intensified health education and changes in recent programming. In addition, malaria is endemic in Ghana and most mothers and care givers would have shared knowledge on the role of mosquitos in causing malaria. With regards to knowledge on the signs and symptoms of malaria, majority of the respondents had adequate knowledge on the signs and symptoms of malaria (fever, headache, vomiting, loss of appetite). This knowledge translated significantly into the use of ITNs among mothers and care givers. Similarly, Ameyaw et al. (2015) had reported findings in other parts of Ghana that agrees with this study. Other studies that shared similar findings include (Zoungrana, Chou, & Pu, 2014 ; Maxwell et al., 2002). Another factor that determined the use of ITN among mothers in the prevention of malaria was their knowledge on the seriousness and severity of the condition.

Other studies have also reported this finding as a significant factor that motivated mothers to seek more health attention with their children and increased their use of ITNs in under five malaria prevention (Vijayakumar, Gunasekaran, Sahu, & Jambulingam, 2009). Conversely, respondents who were interviewed in Ethiopia had indicated that since malaria can be effectively

treated, it is not perceived as a threatening condition (Baume et al., 2009), resulting in their low usage of ITNs. While this study results indicate that respondents' had knowledge that only children under five were at high risk of malaria, the understanding of malaria risk population among same population from Ethiopian study indicate that risk of malaria is similar between children and adults(Haji, Fogarty, & Deressa, 2016). As mentioned by respondents in similar studies, universal knowledge about "at risk" group is mostly placed on children under five and pregnant women (Bo, An, Ji, & Gn, 2010). Findings like those of this study could reflect personal experience of mothers at their period of pregnancy and care for their under-five, as well as peer education. Previous studies have proven that less appreciation was placed on the importance of ITN and limited knowledge on their importance in preventing malaria was noticed among respondents (Hill et al., 2013)

5.4. HOUSEHOLD FACTORS INFLUENCING ITN USAGE

The ownership of ITNs in Ghana has been an important factor in preventing malaria among children under five years. Reports from this study indicate that respondents who owned an ITN were more likely to use them in preventing malaria among children under five years. Mass distribution of ITNs and hospital based education in Ghana has greatly influenced the ownership and use of ITNs. Similarly, Bennett et al., (2012) indicated that net ownership within households was a primary factor that influence the use of ITNs. In other reports however, ITN ownership in Kenya was reported to have less influence on their use among children under five (Dye et al., 2010). Other researchers that found negative association between net ownership and use include (Adjei, 2012 ; Musah, 2015 ; Pulford et al., 2012). In this study, the type of ITN owned was noted as a significant determinant of ITN use among children under five years. This finding supports that of Baume et al., (2009). Recent malaria control programs in Ghana have adopted

the mass distribution of improved ITNs among mother, this limits the discomfort associated with ITN use and increased patronage. In contrary findings Okumura & Kobayashi, (2007) had reported the negative associations between the type of net owned and its use among residence of Khammouane province.

Again, the number of nets owned in a household could positively influence the use of ITNs. In the Kpone community, mothers/care giver's ownership of between one to five ITNs greatly determined their use in preventing malaria among under five. Here, ownership and the advantage to have alternatives could have accounted for these significant results. The number of ITNs owned by mothers seems to be a universal determinant of the use of ITNs. For instance, several studies in other parts of the world earlier reported the positive association between number of ITNs and usage (Oyekale, 2015 ; Musah, 2015 ; Haji et al., 2016 ; Dagne & Deressa, 2005 ; Eisele, Keating, Littrell, Larsen, & Macintyre, 2009). Contrary findings were however reported in studies done across a number of African countries. Variations were observed in different countries on the association between number of ITNs owned and the use of ITNs among respondents (Lim et al., 2011). Another determinant of ITN usage at the Kpone community was the number of children within the household. Mothers who had two or three children were more likely to use an ITN as compared to mothers with fewer children. It can be noted that mothers with more children have more economic burdens and are likely to rely on the use of ITNs to prevent the burden of malaria and hospitalization cost among children. A Gambian study report had also indicated the positive association between number of children and ITN usage among care givers (Wiseman et al., 2007).

5.5. KNOWLEDGE ON MALARIA AND MALARIA PREVENTION (QUALITATIVE ARM)

In this current study, opinion leaders who were interviewed expressed awareness that malaria was caused by dirt and unhygienic environmental conditions. Similar interviews in Kenya also reported respondents being knowledgeable on malaria with responses that agree with findings of this study (Dye et al., 2010 ; Adongo, Kirkwood, & Kendall, 2005). Still on the causes of malaria, while results from this study interview indicate a clear demonstration of knowledge on the main cause of malaria being mosquitos, Vijayakumar et al., (2009) found misconceptions and limited awareness on the causes of malaria among other opinion leaders in India. Other expressions also indicated that respondents were knowledgeable on the fact that the at-risk group for malaria are children and pregnant women. Again, one will want to assume that maternal education, ANC visits and personal experience among opinion leaders and community stakeholders are accounting for this knowledge. For example, in studies done in other parts of Ghana, interviewees had expressed similar opinions during an interview (Anthony, 2015). The severity of malaria in the Kpone community was also acknowledged by interviewee as a threatening situation. This is because in Ghana, malaria is tagged as the main causes of illness that leads to hospitalization. In other regional surveys done in Ethiopia, interviewees had a different view concerning the severity of malaria and one respondent had indicated that malaria used to be rampant, but is no more. *"No one in this household has gotten malaria in the past two years"* (Baume et al., 2009)

5.6. FACTORS INFLUENCING UTILIZATION OF ITN AMONG CHILDREN UNDER FIVE YEARS

Evidence from this study also indicate that most interviewees and discussants confirmed that the use of ITN is particularly important to protect children under five years, considering that their immunity is low and incapable of fighting malaria. In Ghana, this practice has long existed and community leaders and mothers have experienced the evidence of its practice. In agreement with are studies done by Lencha & Deressa, (2015) where children's low immunity was the main reason interviewees assigned to the importance of under-five sleeping under ITNs. Further comparison has showed that both this study and findings by Animut et al., (2008) also emphasized the importance interviewees place on mass distribution of ITN and its impact on the prevention of malaria among under five years. The free distribution of ITNs is a sure measure to achieving a wider ITN utilization, considering that ITNs will be available to both mothers who can afford and those who lack the capacity to own nets. The distribution of bed nets coupled with social marketing has proven to achieve proper usage by mothers and care givers (Dye et al., 2010). As expressed by interviewees of this study, barriers that hindered the use of ITNs among under five were heat being produced by nets and difficulty on how to hang them. Similar findings were also reported by (Obol et al., 2014). Again, perceptions about discomfort and convenience which were expressed by interviewees of this study were also reported by a number of previous studies (Galvin et al., 2011 ; Adeneye et al., 2014). Contrary to these findings, other writers cited cultural (Wiseman et al., 2007), socio-economic (Apinjoh et al., 2015) and supply challenges as barriers to ITN utilization among under five.

CHAPTER SIX

6.0. CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

1. The proportion of children under five years sleeping under ITNs in Kpone-On-Sea was significantly high.
2. Mothers and care givers at the Kpone community were highly knowledgeable on the causes and prevention of malaria, as well as populations at risk to be children under five years and pregnant mothers.
3. More than half of the respondents were aware that mosquitos could transmit malaria and majority of them had knowledge on the signs and symptoms of malaria.
4. Health workers and radio were major sources of information on malaria and malaria prevention.
5. A little above half of the respondents had their information on ITNs from the hospitals/clinics and almost all respondents were knowledgeable that ITNs protect against mosquito bite.
6. Major determinants of ITN utilization in the Kpone community were level of education, number of children in a household, knowledge on the signs and symptoms of malaria, and knowledge on persons at risk. Other factors include knowledge on the importance of ITNs, ownership of ITN and number of nets owned.

6.2 RECOMMENDATIONS

6.2.1 RECOMMENDATIONS FOR POLICY MAKERS

1. Although scaling up the distribution of bed-nets will have the potential for facilitating increased use, it will be important for policy makers to enhance efforts on controlling household socio-demographic factors that impede utilization of ITNs.
2. Malaria control programmes targeting children under five are somehow well implemented at the Kpone community but could offer better solutions if they were linked to the prevailing environmental, social, economic and political environment.
3. Introducing a subsidized ITN market rather than free distribution for all to ensure sustainability and self-reliance in the prevention of malaria could be a more pragmatic approach.
4. The study revealed that respondents had preferences when it comes to the use of ITN, in addition to difficulty in the usage. It is recommended that provision of bednet to communities should be made based on their preferences and taking into consideration their housing conditions.
5. Although the distribution of free nets has shown remarkable progress in Kpone community, just increasing coverage will not be enough unless people are educated to use ITN correctly and consistently.

6.2.2 RECOMMENDATIONS FOR FUTURE RESEARCH

1. Future research utilizing a more in-depth qualitative data would enhance our understanding of the household level contextual challenges on bed net use.
2. Future research should also look at extending the study beyond the Kpone community to target other communities of rural nature. This gives a broader picture on the situation of ITN utilization among under five and enhances better policy formulation.
3. Further study using direct observation at sleeping time rather than reported use is important to determine actual utilization of ITNs at Kpone community.



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APPENDIX 1: INFORMED CONSENT FORM

Title of study: Assessment of factors influencing utilization of insecticide treated nets among children under five years of age at Kpone-On-Sea, Katamanso District, Greater Accra Region, Ghana.

Introduction

My name is Rebecca Amara, a student of the School of Public Health, University of Ghana, Legon, Department of Biological, Environmental and occupational Health Sciences (BEOHS). The purpose of this research is to assess the factors influencing utilization of insecticide treated nets (ITN) among children under five years in Kpone-On-Sea Township. This is purely an academic research and it is hoped that the findings of this study will help establish the proportion of children under five years sleeping under ITN, identify factors influencing ITN utilization and perceptions of ways to maximise utilization of ITNs in the prevention of malaria among children under five in this community.

Eligibility criteria

Caregivers with at least a child under five years and are willing to participate in the study will be included in the study.

Study Procedure

It involves questions and responses. With your permission, you will be required to give information on your background characteristics, knowledge on malaria and information on ITNs.

Risks and Benefits

This study is non-invasive, therefore there is no risk associated with it. However, you may be uncomfortable with some of the questions that may be posed but answers to them will provide very vital information for the study. The information will inform health care authorities in your community and the National malaria control programme about the gaps to be filled to improve ITN use among children under five years in this community.

Freedom to participate/ Voluntary withdrawal

Your consent to Participate in this study is voluntary, you can choose not to answer any individual question or all the questions. You are at liberty to withdraw from the study at any point in time. However, I encourage you to fully participate as your opinions are very important and will enable us to understand your needs, expectations and also help to improve prevention of malaria among under five children in your community.

Privacy and Confidentiality

Please be assured that whatever information you provide will be handled with confidentiality and will be used purely for research purpose. Your name will not be used in the report but your responses and suggestions will be used to design a program that will improve usage of ITNs in this community. Data will be analysed at aggregate level to ensure anonymity.

Compensation for participants

Compensation will be given at the time of data collection. Compensation is not payment for participating in this study but serves as a token of appreciation for participants' time as these caregivers will in a normal day may earn something more than the compensation reward. **Two bars of soap worth five cedis will be provided for all participants who provide answers for the questionnaire. Refreshment and transportation fare of twenty [20] Ghana cedis each will be given to respondents who participate in the focus group discussion as the discussion will be conducted at a location away from their homes.**

Declaration of conflict of interest

I, Rebecca Amara (Principal Investigator), declare that, to the best of my knowledge, there is no actual, perceived or potential conflict of interest that will or may arise as a result of my involvement with this study.

Who to contact

In cases of any question regarding the research, you can contact:

Prof. Isabella Quakyi (+233 20 818 4930), Prof. Julius Fobil. (+233 24 346 2541) all of the department of Biological, Environmental and Occupational Health Sciences, School of Public health, University of Ghana, Legon. Or Rebecca Amara (+233 27 746 1391).

• **For Ghana Health Service (GHS) Ethical Review Committee (ERC)**

Please contact the Administrator, Madam Hannah Frimpong, on +233 507041223 or Hannah.Frimpong@ghsmai.org

Before taking Consent

Do you have any questions you wish to ask about the study? Yes No

(If yes, please, indicate the questions below)
.....

Statement of consent

I, declare that the purpose, procedures and benefits of the study have been read/ had been explained and every question(s) have been answered to my satisfaction. I hereby give consent to participate in this study.

Signature/Thumbprint of participant..... Date...../...../.....

If participant cannot read the form themselves, a witness must sign here

I was present while the benefits and procedures were read to the participant. All questions were answered and the participant has agreed to take part in the study

Name Date

Signature/thumbprint.....

Interviewer's statement

I the undersigned have explained to the respondent in language he/she understands and the respondent has agreed to take part in the study.

Signature of interviewer..... Date.....

APPEDIX II: SAMPLE QUESTIONNAIRE

My name is I am part of a team who are carrying out a survey on factors influencing utilization of insecticide treated nets among children under-fives years in Kpone-On-Sea. I would like to ask you some questions and this will take about 45 minutes. Your answers will remain confidential, and we will not take down your name or address so that no one will know you gave us these answers.

IDENTIFICATION

Questionnaire Serial Number					
Respondent ID (H/NO)					
Date of Interview					
Name/code of Interviewer					

SECTION A

Please tick (✓) where appropriate or write down the appropriate response to each item as the question/statement may indicate.

SECTION A: SOCIO-DEMOGRAPHIC DATA

QUESTION		RESPONSE	REMARK
1	Age [years]	
2	How long have you stayed in this community [years]	
3	Gender	Male [1] Female [2]	
4	Marital status	Married [1] Single [2] Widow [3] Divorced [4] Co-habiting [5]	
5	Level of education (last level attained)	Primary [1] Secondary [2] Tertiary [3] No Education[4]	
6	Occupation	Public worker [1] Farmer[2] Fishmonger [3] Petty trading [4] Business man/woman [5] Others [specify]..... [6]	
7	Which religion do you belong to?	Christianity [1] Islam [2] Traditional [3] Others [specify] [4]	
8	How many children are less than 5 years in this household	INDICATE NUMBER

SECTION B: KNOWLEDGE ON MALARIA AND INSECTICIDE TREATED NETS

	QUESTION	RESPONSE	REMARK
9	What is the main cause of malaria?	Exposure to rain/cold[1] Drinking dirty water[2] Touching a person with malaria [3] Witchcraft [4] Mosquito bite[5] Exposure to sun/heat [6]Others [specify].....[7]	
10	Sources of malaria education	Radio[1] Newspaper/magazine[2] Posters[3] Family/friend[4] Health worker[5] Government official[6] Religious house[7]	MULTIPLE ANSWERS REQUIRED
11	Can mosquito transmit malaria from one person to the other	Yes[1] No[2] Don't know[3]	
12	What are the signs and symptoms of malaria	Fever[1] Headache[2] Vomiting[3] Diarrhea[4] Loss of appetite[5] Mouth bitterness[6] Body pain[7] Body weakness[8] Abdominal pain[9] Eyes becomes swollen[10]	MULTIPLE ANSWERS REQUIRED

QUESTION	RESPONSE	REMARK
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13	What is your best method of preventing malaria	Eating good food[1] Sleeping insecticide treated net[2] Taking preventive medicine[3] Using mosquito coil[4] Using insecticide spray[5] Keeping the house/surrounding clean[6] Drinking clean water[7] Malaria cannot be prevented[8]	
14	How serious is malaria situation in your community	Very serious[1] Serious[2] Not serious[3]	
15	Who do you think among your family members is most at risk of getting malaria	Elderly persons[1] Adult men[2] Adult women[3] Pregnant women[4] Children 5 years and below[5] Children above 5 years[6] All family members[7]	MULTIPLE ANSWERS REQUIRED
16	Have you ever heard about or seen an ITN?	Yes[1] No [2]	IF NO SKIP TO SECTION C
17	Where did you hear about ITNs?	Radio [1] Television [2] Hospital/Clinic[3] Relatives/Friends[4] others [specify] [5]	
18	What are the uses of ITNs	Room decoration[1] Protection against mosquito bite[2] For fishing[3] To keep rodents away[4] For farming [5] To keep insects away[6]	
19	How important is ITN	Very important[1] Not important[2] Important [3]	

SECTION C: OWNERSHIP AND USE OF ITN

	QUESTION	RESPONSE	REMARK
20	Do you have any bed net?	Yes [1] No [2]	IF YES SKIP TO QUESTION 22
21	If no, why don't you have any?	I do not want a net [1] Nets are not available[2] I was not supplied a net[3] Cannot afford to buy a net[4] Don't know where to get it [5]	
22	If have any net which type?	Non-treated net [1] Insecticide treated net [2] Long lasting insecticide net [3]	
23	How many do you have?	INDICATE A NUMBER
24	How did you get the ITN?	Given to me by a relative/friends[1] It was bought[2] Got it from the clinic[3] From mass campaign[4]	
25	Who sleeps under the bed nets that you have?	Father[1] Father and mother[2] Visitors[3] Children under five years[4] Everybody[5] Mother and child [6]	
26	Does your child usually sleep under bed net?	Yes [1] No [2]	IF NO SKIP TO QUESTION 29
27	Did your child sleep under bed net last night?	Yes[1] No [2]	
28	Which period of the year do you mostly use the net	All year round[1] During rainy season[2] During dry season[3]	

	QUESTION	RESPONSE	REMARK
29	If no to question 26 why?	It is uncomfortable[1] Nets are too hot [2] No space for hanging it [3] Afraid of using it on my child[4]My child reacts to it [5] Nets do not allow enough air circulation[6] It is difficult to get out of net[7]	
30	What are the benefits of sleeping under a bed net	Keep mosquitos away[1] Protects from malaria[2] Allows enough sleep[3] It is warmer[4] Keep flies and other insects away[5] Useful for fishing and farming[6]	MULTIPLE ANSWERS REQUIRED
31	What are the problems with ITN	Nets are too expensive [1] Nets generate too much heat[2] Mosquitos can still bite[3] Nets have adverse effects[4] There is no problem associated with nets[5]	
32	What in your view can be done to improve ITN use among children?	Free distribution of ITN[1] Modification of shape and size of net[2] Intensive education on ITN usage[3] Others(specify).....[4]	

APPENDIX III: FOCUS GROUP DISCUSSION AND IN-DEPTH INTERVIEW GUIDE

Assessment of factors influencing utilization of insecticide treated nets among children under five years in Kpone-On-Sea Township Katamanso District Greater Accra Region of Ghana.

Hello, I am Rebecca Amara, a student of University of Ghana. In the department of Biological, Environmental and Occupational Health Sciences. We are conducting a survey on the use of insecticide treated mosquito nets among children under five years. Malaria is a disease caused by the bite of a mosquito. Every year several millions of people become ill and several lives lost to malaria. About 90% of cases and deaths occur in sub-Saharan Africa with children and pregnant women being affected mostly due to their lowered immune status.

In Ghana malaria is the number one cause of hospital attendance and admissions. A number of strategic Interventions are available for the prevention of malaria and one of such interventions is the use of insecticide treated nets. This survey is to determine the factors that influence the use of ITNs among children specifically those with age five years and below. The information we collect will help address future issues on ITNs use among children.

This discussion would be audio taped, but I am assuring you that all the information you give will be kept confidential and tapes kept as long as possible but well secured with me the principal investigator the only one with access. Furthermore, privacy will be up held and there will be no mention of name should the results of the study be published or at any health care meetings.

If you wish to have farther clarifications regarding this study, do not hesitate to contact me on phone number 0277461391.

If there are no questions, then can we start?

FOCUS GROUP DISCUSSION GUIDE

-Background Information of participants:

-Questions for discussions

- What are the causes of malaria?
- What are the complications/consequences of malaria in children?
- Is malaria preventable?
- How can malaria be prevented?
- How serious is malaria disease in this community?
- who are more vulnerable to malaria?
- Have you heard of insecticide treated nets?
- How did you get to know about it? (source of information)
- What are the uses of insecticide treated nets?
- What are the benefits of insecticide treated nets?
- What are the problems/disadvantages of insecticide treated nets?
- Is it important for children under five years to sleep under ITN? if yes why?
- Who makes decision that a child under five years sleeps under ITN in your household?
- How can ITNs be acquired?
- What are the barriers to utilization of ITN among children under five year in this community?
- What can be done to maximize the use of ITNs among children under five in this community?

IN-DEPTH INTERVIEW GUIDE

-Background information

-Questions

- What are the causes of malaria?
- What are the complications/consequences of malaria in children?
- How serious is malaria in this community/Ghana?
- Who are most vulnerable to malaria?
- How can malaria be prevented?
- What are insecticide treated nets?
- What are the uses of ITNs?
- Why is it important that ITNs be used by children under five?
- How can ITNs be acquired?
- What are the benefits of ITNs?
- What are the problems of ITNs?
- What are the barriers to ITN utilization among children under five years in this community?
- What can be done to maximize utilization of ITNs among children under five years?

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE



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*Reply the
 and date of this
 should be quoted.*

GHS/RDD/ERC/Admin/App/495
 No.

Rebecca
 Director
 Ghana Health Service
 Ministry of Public Health
 Accra

Health Service Ethics Review Committee has reviewed and given approval for the implementation of Protocol.

Number	GHS-ERC: 58/02/17
Title	Assessment of Factors influencing Utilization of Insecticide Treated Nets among Children Under Five Years of Age in Kpone-on-sea Township of the Greater Accra Region of Ghana
Approval Date	10 th May, 2017
Effective Date	9 th May, 2018
ERC Decision	Approved

Approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Note that any modification of the study without ERC approval of the amendment is invalid.
- ERC may observe or cause to be observed procedures and records of the study during and after implementation.
- quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
 DR. CYNTHIA BANNERMAN
 (GHS-ERC CHAIRPERSON)

The Director, Research & Development Division, Ghana Health Service, Accra