

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HEALTH SCIENCES

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DEPARTMENT OF COMMUNITY HEALTH

DETERMINANTS OF APPROPRIATE INSECTICIDE TREATED NETS (ITNs) USE
IN MALARIA CONTROL IN CHILDREN UNDER FIVE YEARS IN PERI – URBAN
AREAS OF KUMASI (A CASE OF ASOKWA SUB-METROPOLITAN AREA)

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DECLARATION

I hereby declare that apart from specific references which have been duly acknowledged, this submission is a result of my own field research and has not been submitted to in part or whole for any other degree elsewhere.

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ABSTRACT

Background

Malaria remains the number one public health problem. Insecticide Treated Nets (ITNs) is one of the established methods of malaria control. However, inappropriate ITNs usage reduces their effectiveness in malaria control. Ample evidence of this is farfetched through very integral policy input. This study sought to provide empirical evidence on determinants of appropriate ITNs use to inform policy.

Methods

A cross sectional study was designed and conducted in five communities in the Asokwa Sub-Metropolitan Area, Kumasi, Ghana, with randomly selected 500 mothers and caregivers for interview with the aid of questionnaire from May – September 2010. Logistic regressions were used to examine the predictors of appropriate ITNs use at 95% confidence interval.

Results

The study found that 50% of the participants owned ITNs, and of this only 67% used it the night before the study. While 39% of the total population did not own any ITN at all, 21% of those who owned the nets did not use them appropriately. The key predictors of appropriate use were found to be income levels, health seeking behaviours of caregivers and the room structure of participants.

Conclusions

Appropriate ITN use in the study area is determined by a group of factors; background characteristics of household, socio-economic status and environmental factors. Strengthening

health education on the benefits and importance of appropriate ITN use and improving socio-economic status of mothers and caregivers is likely to improve appropriate ITNs use.

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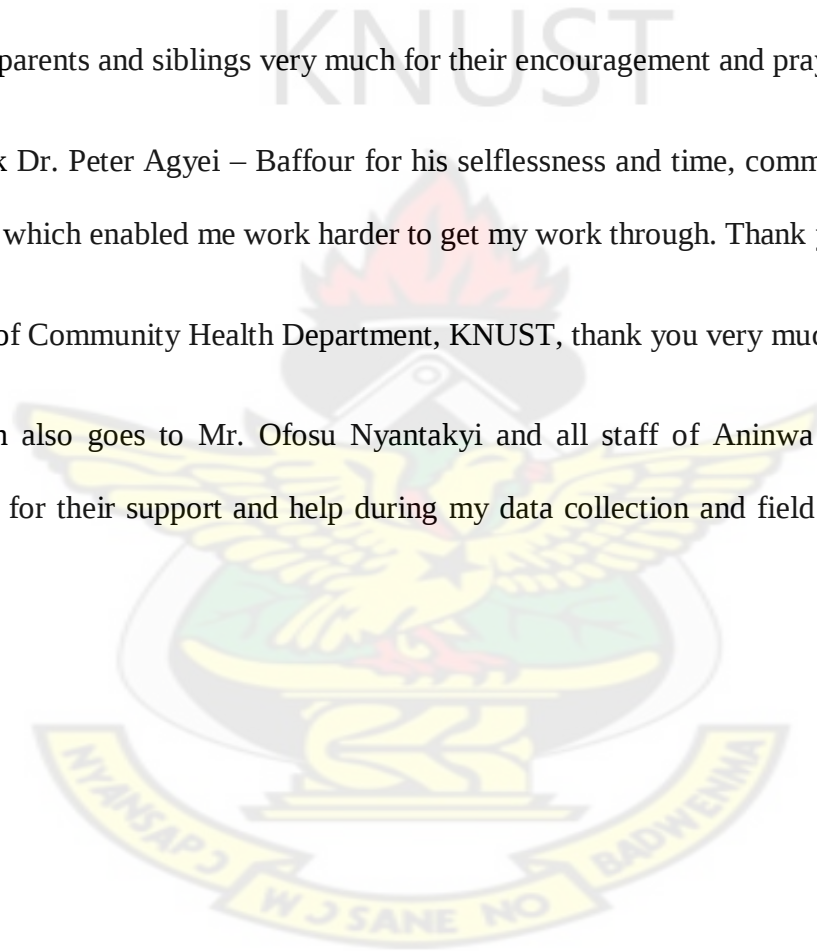
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DEDICATION

To Papa Kwasi Amaning Adjei and Kwaku Amaning Adjei

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ACRONYMS

ANC	Anti- Natal Clinic
CDC	Centre for Disease Control and Prevention
CWC	Child Welfare Clinic
DHMT	District Health Management Team
DV	Dependent Variable
HMM	Home Management of Malaria
ITN	Insecticide Treated Nets
IV	Independent variable
LG	Logistic Regression
MCP	Malaria Control Programme
MHDAR	Metropolitan Health Directorate Annual Report
PNC	Post- Natal Clinic
RBM	Roll Back Malaria
SES	Socio-economic status
SSA	Sub- Saharan Africa
UNICEF	United Nations Children's Funds

WHO

World Health Organisation

KNUST



CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

This chapter presents the current state of knowledge, the problem, justification, study objectives and the research questions guiding the study. It also describes the framework within which this study was conducted. The distinct features of the study and how the final report is organized are also presented in this chapter.

1.2 Current State of Knowledge

1.2.1 Burden of Malaria

Malaria is a major cause of death and illness in both children and adults in the south Saharan African countries (WHO, 2010) and Ghana is no exception. The disease continues to place an unacceptable burden on the most vulnerable populations such as children under the age of five years in sub-Saharan Africa, where around 90% of all malaria-related mortality is observed (MCP, 2006). Malaria is a mosquito-borne disease caused by a parasite. Each year 350-500 million cases of malaria occur worldwide, and over one million people die, most of them young children in sub-Saharan Africa (CDC, 2006). The control of malaria remains one of the most important issues discussed by everybody who is directly or indirectly affected by the disease. This is due to its ability to kill, result in low birth-weight and leave other permanent disabilities such as epilepsy and neurological problems in people and especially in children under five years (RBM, 2002). The WHO reported in 2000 that a child dies out of malaria every thirty seconds. The disease still kills an unacceptable number of African children each year, and blights the life

of many millions more (RBM, 2002). Research has shown that about 75% of the total number of deaths of children as a result of malaria is recorded in Africa (RBM, 2002;WHO, 2000; UNICEF, 2006). The disease contributes greatly to anaemia and accounts for about one in five of all childhood deaths (UNICEF, 2006).

The wealth of every nation is inherent in the health of its people. The Roll Back Malaria strategy in its 2008 Annual Report indicated that in Africa, malaria is considered both a disease of the poor and the cause poverty.

Millions of dollars are spent by governments and donor agencies to reduce malaria in Africa in children and pregnant women especially. The direct costs include public and government spending in prevention and treatment while the indirect takes the form of loss of man hours, productivity and even death.

Effective malaria control measures such as early diagnosis, use of anti malarial drugs, insecticides to kill the mosquitoes and use of Insecticide Treated Nets (ITNs), are mostly used to contain malaria epidemics, prevent death and disability (mortality and morbidity), and to reduce socioeconomic loss (Mboera et al, 2007).

The momentum to scale up ITN use in controlling malaria in the vulnerable groups especially children under age five may have increased due to all the programmes by bodies that project the use of ITNs such as the RBM strategy and WHO. According to the WHO Malaria Report for 2010, the number of ITNs that were distributed at antenatal clinics (ANCs) and through mass distribution increased from 5.4 million in 2004 to 88 million in 2009 (WHO, 2010). With increased funding from international donors, efforts are currently underway to roll-out ITNs to

vulnerable populations at risk of malaria across sub-Saharan Africa (SSA), particularly children younger than 5 years old and pregnant women (Eisele et al, 2009). Insecticide-treated nets (ITNs) are the most effective malaria control tool to be developed since the advent of indoor residual spraying (IRS) and chloroquine in the 1940s (Hills et al, 2006). Despite its efficacy, Hill et al wrote in 2006 that only 3% of African children sleep under these treated nets while only about 20% sleep under any other kind of nets. This however may account for the high rate of mortality amongst children due to malaria and its related problems.

The global consensus around a strategic framework for scaling up the usage of ITN usage in Africa is laudable. However, the involvement of the public and private sectors is required at targeting vulnerable groups and sustaining supply of the nets for use.

Different strategies and tools, national and international malaria control programmes to help control the disease, have either worked partially or not been effective at all due to ineffective strategies and insufficient resources. Although, there are still protective measures and effective treatment, malaria is still a major concern especially for governments in Africa and international bodies.

Some of the established interventions to reduce mortality among children include the consistent use of ITNs to save six child lives per year for every one thousand children. Several studies have shown that bed nets treated with insecticide is an effective method of reducing man–vector contact and child morbidity and mortality (Bermejo &Veeken 1992; Alonso et al. 1993; D’Alessandro et al. 1995; Binka et al. 1996; Nevill et al. 1996; Habluezel et al. 1997).

With the desire of every developing country, especially those plagued with malaria to achieve the millennium development goals (MDGs) of a two-thirds reduction in children under five mortality and halt and reverse malaria by the year 2015, the United Nations and its development partners – WHO/UNDP and World Bank launched a malaria control programme, the Roll Back Malaria Partnership in 1998 to muster resources, build partnerships and spur global support to reduce the burden of malaria in Africa(UNICEF, 2004). The programme was also supposed to make cost effective interventions including ITNs to people at risk.

The necessary measures have been put in place and the right structures have been constructed to adequately in malaria related trauma. ITNs have been distributed freely in some instances while the cost of the nets have been reduced to enable all persons have access to a net to help in the control of malaria. All the tools for making the difference have been made available for the consumption of all but it is realised that there are certain challenges that do not make the utilization of these tools realise what they should. According to a UNICEF report, a widespread use of the nets can considerably reduce child mortality as a result of malaria by 20% (UNICEF, 2004).

The WHO reported in 2003 that mortality and morbidity are concentrated in children in areas of intense malaria transmission. The use of ITNS by children under five has been demonstrated considerably to reduce malaria disease incidence, malaria-related anaemia and all cause under 5 mortality (WHO, 2003). Its usage is however low in Africa. Only 3% of children in Africa sleep in such nets.

1.3 Problem Statement

Malaria is the leading cause of death in children under age five years and is able to cause impairment, low birth weight, epilepsy and difficulty in learning (RBM, 2002). Consequently, the disease can cause neurological problems and compromise the health and development of the child throughout the life span life. There are currently established preventive measures and interventions for the control of malaria especially in children under five years. For example the Ghana National Malaria Control Programme and other local and international organizations have been promoting and distributing insecticide treated nets (ITNs) since 1998 (NetMark, 2004). The government reduced taxes and tariffs on nets in 2002 and waived them completely in 2004 (NetMark, 2004). However, children continue to suffer from malaria everyday despite these interventions.

All of WHO's 106 endemic territories had huge number of deliveries of ITNs. About 1.9 million ITNs were delivered to areas in Indonesia, United Arab Emirates, Afghanistan, Papua New Guinea and Pakistan (WHO, 2010).

Studies conducted by Korenromp et al in 2003 stated that a previous multi-country assessment in SSA using national and sub-national household surveys between 1991 and 2001 found a considerable gap between use and possession among children. The analysis showed that household possession of ITNs ranged from 0.1% to 29%, whereas use by children younger than 5 years old ranged from 0% to 16%. Within households possessing at least one ITN, only 55% of children were found to have slept under an ITN the previous night. In another study using data from sub-national NetMark surveys conducted between 2000 and 2004, the researchers showed that bednet use among children younger than 5 years, within households with at least one bed

net, ranged from 48% to 73%, while use among pregnant women ranged from 18% to 69% (Buame et al, 2007)

Eisele et al, 2009, study showed that access to ITNs was still a major limitation within most of the countries analyzed; only three countries were found to have achieved > 25% coverage of ITN household possession among households with a child younger than 5 years of age. This is not good enough in achieving the set target of reducing under five mortality rate by two thirds and attempting to halt and begin to reverse the incidence of malaria and other major diseases, by 2015.

Ghana's situation is no exception. However NetMark during its work in Ghana increased the ownership and usage of bed nets through mass distribution and price reduction. The percentage of children all year round usage increased from 41% to 58% (netmarkafrica.org/countries/Ghana accessed on Feb 15, 2011.) Nonetheless, a larger percentage of nets owned went unused as three out of four nets had been used the prior night in 2004, but as net ownership increased, the percent of nets used decreased to 59% in 2008. Nets that were acquired free of charge were used less (55%) than nets that had been paid for (68%) (NetMark, 2004). The World Malaria Report, 2010 revealed that only 28% of children less than age five slept under an ITN in 2008 in sub Saharan Africa. (WHO, 2010).

Today ITNs are used in several communities in Kumasi. Although the efficacy and cost effectiveness of treated bed nets has been widely reported, little is known about the range, strength, or interaction between different factors that influence their appropriate use at the

household level. This study sought to investigate into factors influencing appropriate ITNs use in children under five years.

1.4 Rationale for the Study

The use of ITNs as a control tool in malaria cannot be underestimated. The debilitating effects of malaria on adult victims are very much disturbing and in the case of children, it could be fatal. In addition to time and money spent on preventing and treating malaria, it causes considerable pain and weakness among its victims. This can reduce people's working abilities (Asenso-Okyere et al, 2003). The adverse impact of the disease on household production and gross domestic product can be substantial.

The disease is also the leading cause of anaemia, epilepsy and neurological problems amongst children under age five (RBM, 2002). Malaria leads to loss of substantial amount of the scarce resources; human capital, materials and a setback in development yet its mortality is increasing despite established measures such as prompt case management and use of ITNS. Perhaps these interventions are being used inappropriately. Therefore there is the need to investigate factors that influence the appropriate use of IT, hence this study.

1.5 Research Questions

1. Do people in the peri- urban areas appropriately use ITNs for children under age five years?
2. What factors determine appropriate use of ITNs?
3. How do caregivers and parents perceive ITN use?
4. What factors predict the appropriate use of ITNs in children under five years?

1.6 Study Hypotheses

H_0 : Appropriate use of ITNs in children under five years is not a function of many factors.

H_a : Appropriate use of ITNs in children under five depends on the socio-economic, environmental factors and background characteristics of mothers or caregivers

1.7 General Objective

To examine the factors that predict appropriate use of ITNs among children under five years and recommend policy strategies to improve the current situation.

1.7.1 Specific

1. To estimate the prevalence and assess the influence of background characteristics on appropriate use of ITNs
2. To assess the influence of ITN use on health seeking behaviour of mothers or caregivers of children under age five
3. To determine the influence of socio economic factors on appropriate use of ITNs
4. To assess the influence of environmental factors on ITNs use.

1.8 Conceptual Framework

The conceptual framework, Fig 1.0, represents a relationship between factors that influence the use of ITNs for children under five years in peri- urban areas in Kumasi and malaria control.

The Figure 1.1 shows the determinants of ITN use and the possible variables that affect it.

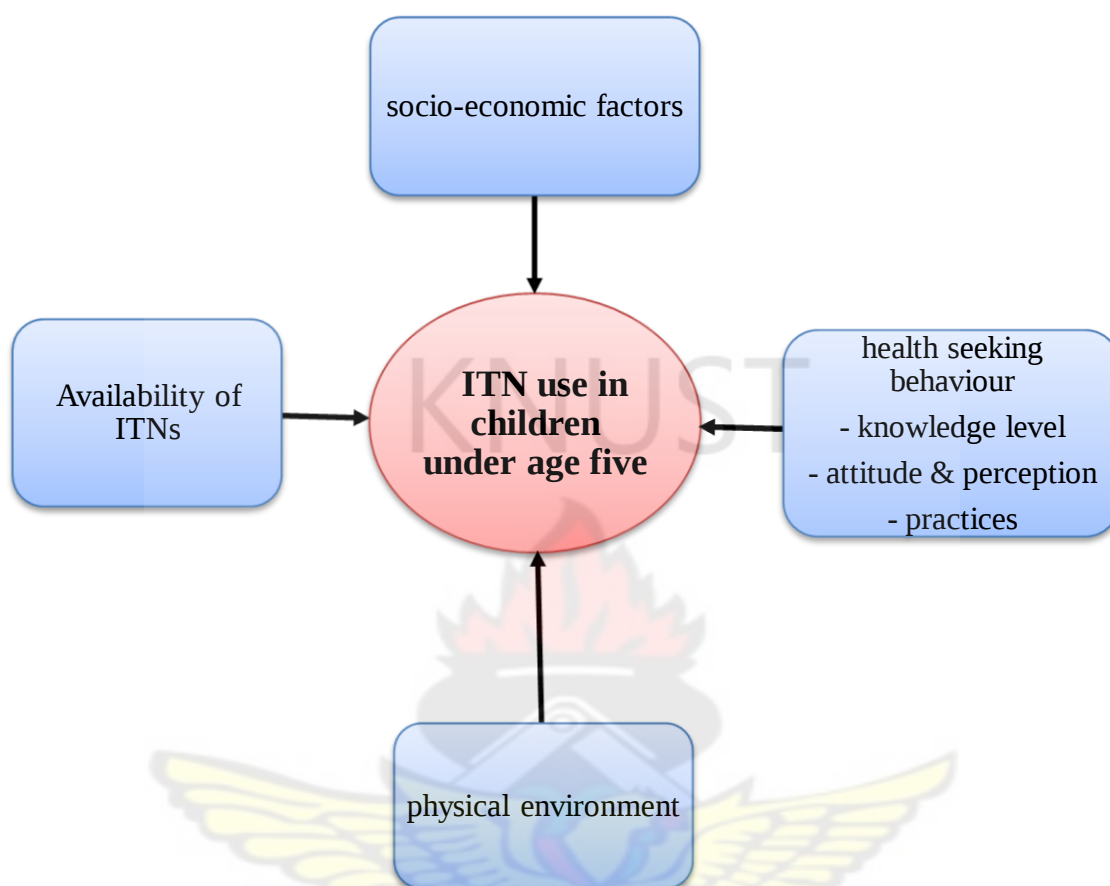


Figure 1.1: Construct of Conceptual Framework

Source: author's, 2010

This study examined the factors that influence the appropriate use of ITNs. These factors are grouped as background characteristics of mothers or caregivers, socio-economic factors, health seeking behaviours of mothers/caregivers, availability of ITNs, availability of subsidies, maintenance of the ITNs and the physical environment.

The level of health education, measured by awareness of mothers and caregivers refers to availability of information and knowledge on the benefits of the appropriate use of the nets for children, the burden of malaria will be reduced but if there is enough education, but the reverse

will be the case if education of the key stakeholders are not intensified. Socio-economic factors are very essential in the use of ITNs in that the nets should be re-treated with the insecticides after a period of use and if mothers and caregivers are not in the position to buy the tablets or treatment for this purpose malaria cannot be controlled amongst children under five years. Also in homes where there is only one net or the nets are not enough for all the children in the homes what will be the result? Health seeking behaviours of mothers/caregivers are critical for this study. If the nets are not used appropriately, what other measures are taken in order to control malaria? Do mothers and caregivers put their hopes on the nets to totally control malaria without taking into consideration their health seeking patterns? It is assumed that careful healthy behaviours and practices will affect the level of malaria control in children under age five. Making available the nets means that knowledge and benefits on the use of ITNs should be readily available and where possible subsidies should be given to expectant mothers during antenatal clinics and children under age five. The availability of the ITNs at the health centres and hospitals has much influence on use. The nets availability and non-availability will affect malaria control in children under age five years. Availability of subsidies: mothers or children who do not get the ITNs from the hospitals and decide to buy them from the pharmacies are entitled to an amount of subsidy. The availability of these subsidies will affect the appropriate use of the nets and help in the control of malaria amongst children. The users of the nets have the responsibility of ensuring that the nets are well maintained; no holes and well maintained through proper washing and retreatment. The physical environment refers to the housing structure, sleeping styles arrangement of things in the sleeping room and how the ITNs are hanged. Children who sleep in multiples and those who sleep on the floors can also make do with the nets, all these affect the appropriateness of the nets use.

1.9 Uniqueness of the Study

The study is unique in its own right. Several studies have been conducted in malaria endemic areas on ITNs but none has addressed the predictors of appropriate use of ITNs. This is but perhaps one of the studies that sought to examine the predictors of appropriate use of ITNs. The study area is also distinctive. Peri-urban areas as it is known are places that are in the cities but have characteristics of rural settings. This made the responses and outcome different from what other studies that were done strictly in the cities and typical rural settings.

1.10 Expected Outputs

The outputs from the research are an MSc Thesis and scientific papers for publication in peer reviewed journals, presentations and policy briefs.

1.11 Scope of the Study

The study was done specifically in the peri-areas in the Asokwa Sub-Metropolitan areas in the Ashanti Region. The study typically considered the predictors of the appropriate use of ITNs in controlling malaria in children under five years.

Appropriateness here means compromising on certain factors as defined by this study without any hindrances or impediments and the realization of what ITNs intend to achieve.

1.12 Organization of Study

The Thesis is organised into six chapters. The first chapter presents the general introduction of the study. Chapter two reviews existing literature on the issues relating to the topic under

discussion. In chapter three the study designs, methods used and data collection tools and sample size are discussed. The chapter also describes the study area and how relevant the study is to the study area. Data analysis is also described in this chapter. The forth chapter shows the results of the study. Chapter five discusses the policy and scientific implications of the results. The last chapter, chapter six, concludes the study and presents recommendations to stakeholders based on the conclusions.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter takes a look at works and writings that have been conducted in the field of the study. It goes ahead to bring to light the ideas that others share with regards to the subject and identifies the knowledge gaps in these studies.

2.2 Overview

The use of ITNs has been known for the past ten years to reduce child mortality by 17% (Lengeler, 2004), and this is very impressive for the development of the African continent. A Roll Back Malaria Programme in 2002 reported that about three quarters of the world's malaria deaths occur in under-five children living in malaria endemic countries in sub-Saharan Africa (SSA) (RBM, 2002). For children who are able to survive the severity of the disease, more than 15% suffer neurological deficits (Samba, 2001; Murphy, 2001), which include weakness, spasticity, blindness, speech problems and epilepsy. In cases where such children are poorly managed and do not have access to specialized educational facilities, these deficits may interfere with future learning and development (Oresanya et al, 2008). Research completed by the African Medical and Research showed that malaria remains a major problem in peri-urban areas of most African cities, where, very often, the climate and the environment allows vector densities associated with intense transmission.

An evidence of the impact of ITNs on morbidity from malaria and mortality from all causes in children has been growing over the past 10-20 years (Choi et al, 1995 & Lengeler, 2000). A

series of clinical trials conducted in some parts of Africa revealed that about 80% of all clinical cases and 90% of all malaria deaths on the continent are estimated to occur and these data provide strong evidence that insecticide treated materials can substantially reduce childhood mortality, at least in places where malaria is a major contributor to death.

A properly used ITN can cut malaria transmission by at least 50 per cent and child deaths by 20 percent (UNICEF, 2004). When ITNs are used during pregnancy, there is a significant protection against maternal anaemia and low birth weight, the major contributors to neonatal mortality. Additionally, infants who sleep under these nets benefit by experiencing a lesser exposure to malaria infection and subsequent severe disease. However, UNICEF in 2004 reported that by 2002 only fewer than 5 per cent of children in sub-Saharan African slept under ITNs, nonetheless 15 per cent did not sleep under any net at all.

A conference held in Abuja in 2001 set a target for all African countries to allocate an appreciable percentage of their budgets to help increase the proportion of people who use ITN to 60% by the year 2005. Yet considering the present rate of progress, Oresanya (2008) has indicated in his study that Africa will fail to reach the Abuja malaria targets. The prime problem used to be with the gap between the costs of the net and how families with vulnerable groups could access the nets for their consumption but currently the nets are subsidized for the general populace and freely distributed at ante-natal clinics to pregnant women and nursing mothers.

2.2.1 Insecticides Treated Nets (ITNs) use in malaria control

Insecticide treated nets have the ability to reduce human contact with mosquitoes and is an effective malaria control intervention (Pettifor et al, 2008). The nets are able to reduce severe cases of malaria in severely endemic regions and reduce mortality by 20% (Dept. for Health and

Human Services, 2004). Jones et al wrote in 2003 that a universal usage of the nets can prevent 7% of the total under five deaths globally. These statistics show how efficacious the ITN can be when used appropriately.

Research has shown that a proper use of the ITN can reduce morbidity and mortality but its use is restricted in many households in Ghana and beyond despite the level of knowledge. Socio-economic status, perception, education and household income are some of the determinants of ITN use. Further studies by Wiseman et al (2007) have revealed that those with a higher level of education and people with higher more malaria knowledge are likely to own an ITN, however knowledge of its benefits and its ownership does not imply its appropriate use.

The barriers to its use vary from inadequate education, to socio –economic issues. The current WHO Global Malaria Programme (GMP) on ITN position statement recommends that all pregnant and children under five should have access to an ITN free of charge from ANCs and during EPI. However, the trend of usage of ITNs among children under five has not had a remarkable performance. Webster et al in a research conducted for the DFID in 2008 found out that only 0.3% of children under five in Guinea use ITNs while The Gambia recorded 49%. This shows a negative response to the use of the nets for controlling malaria in some parts of Africa. This should not have been the case considering the fact that the disease has been called the ‘disease of the poor’ because of its predominance in Africa where a chunk of the world poorest people live, thus the use of ITNs should take over homes of people and advantage should be taken of the distribution of the nets.

Several studies have been conducted on ITN use in children under age five in Africa. Different findings showed either an increase or a decrease in the use of the nets depending on the situation.

A study to assess the utilization of ITNs in children under five was conducted in Nigeria and it was to measure if the Abuja target was being met. It was realised that the disease was the main cause of infant mortality and under five deaths. It was a major contributor to absenteeism in school going children which impeded their social and educational development. The study revealed that there was no association between ownership of the nets and its utilization. The level of education was significantly associated with utilization among the study population. The utilization of ITNs also increased with level of education.

This research also found out that the usage of the nets increased with seasons either dry or wet. According to Oresanya et al, (2000) about 90% of people they interviewed during the study revealed that they use the nets during the wet season and the remainder used them during the dry season.

In a similar study conducted by Toe et al in 2009, motivation was the main factor or determinant in the use of ITNs in certain endemic areas. The study showed that after a year of mass distribution of the nets, its usage decreased. This was a combination of factors - the perception of its effectiveness and usefulness, inadequate motivation and the manner in which the household is arranged during the day and at night.

A parallel study done by Toe et al (2009), showed that the use of ITNs is effective in reducing man-vector contact and preventing malaria. On a larger scale, clinical episodes of malaria can be reduced by 48%. However, the study showed that several English speaking African countries had

a low patronage to ITNs due to factors such as the design of the rooms in the house and fear of suffocation and feeling of discomfort due to high temperatures.

This confirms that the factors that prevent people from utilizing ITNs effectively and appropriately are not abstract.

2.3 Prevalence of Appropriate Use of ITNs

In many countries, insecticide-treated nets have been distributed through a combination of delivery systems including routine health services, commercial sources, subsidized social marketing, and free mass campaigns (Thawani et al, 2009). This however has not improved the usage of the nets. Owning an ITN is not enough but having the ability to use it well is what matters. Mothers or caregivers may own ITNs but may not have the required knowledge on using it as it should be used.

This study seeks to estimate the prevalence of appropriate use of ITNs. Several factors affect the appropriate utilization of ITNs and in fact a key to making ITNs a long-term, sustainable solution to the spread of malaria is the ability to understand what drives their purchase and appropriate use (Chase et al, 2009).

A study conducted by Malusha et al (2006) revealed that caregivers were aware of ITNs. They admitted that there was the necessity to let their under-fives use ITNs but they were hindered by the fact they did not own any of the nets.

The use prevalence of ITN is typically low in Africa however knowing how beneficial it can be, several programmes regarding its appropriate use have been rolled to help users and also to help reduce and control malaria in sub Saharan Africa where the disease is endemic. The RBM

strategy sees the ITNs as a promising preventive measure which has the ability to reduce the under-five mortality by 20% in Africa, a Cochrane review has said. For instance Gambia upon discovering its usefulness and its contribution toward lowering child mortality after conducting a CCT initiated a national ITN programme which they called National Insecticide Impregnated Bednet Programme (NIBP) (D'Alessandro et al, 1995) to encourage the use of the nets in all its large villages and to embark on a distribution programme. This action increased the prevalence of ITNs in the country especially for children.

A lot more African countries have emulated this programme. For example a study done by Noor et al between 2004 and 2006 in Kenya on increasing coverage and decreasing inequity in insecticide bed net use among rural Kenyan children identified that the use of ITNs is one of the inexpensive but efficacious interventions that avert childhood deaths in sub Saharan Africa.

The Kenya's National Malaria Strategy which was launched in 2001 in addition to the PSI Coverage Plus helped averted the situation which made only a handful of national have access and could afford bed nets.

In this study a cohort of 3,700 children under age five years were involved. Meanwhile during this period bednets were highly subsidized in some clinics, while some were mass distributed for free. It was recorded that in 2004 the prevalence of the net use was 7.1% however there was a dramatic increase after a free mass distribution in 2006. The figure shot up to 67.3%. It was then realised that the two programmes helped improve the use of ITN in the communities where the study was undertaken.

Most Ethiopians until recently (2000) had not heard of ITNS (Buame et al, 2007) moreover malaria is endemic in about three quarters of the national territory (Schunk et al, 2006).

Concerted interventions to promote the education on ITN use began in 2004. Free mass distribution had been done two years earlier to impact the morbidity and mortality which resulted from malaria. At the end of the research it was found out that overall ownership had increase with a household owning at least one net.

Studies have also shown that ITNs have been promoted in Africa over the last ten or more years. The last five years has seen improvement in the ownership and use of ITNs amongst pregnant woman and children – the vulnerable group. (Buame and Marin, 2007), the study however revealed that an expanded promotion of net use will substantially reduce mortality and morbidity resulting from malaria. This nonetheless can be achieved when the nets are properly used and the vulnerable group are given priority.

2.4 The Influence of Health Seeking Behaviour of Mothers or Caregivers on ITN Use

Several children continue to die due to negligence and delay in seeking health care or treatment in Africa. A study by Tsion et al, (2008) revealed that about 10.6 million children die every year before their fifth birthday globally. This figure is outrageous considering the depth of researches that have gone into child survival issues. Only a handful of this number occurs in the European and American countries (WHO, 2006). A majority occur in Africa – seven times higher in European region (WHO, 2006). Tsion et al (2008) continue to assert that most of the diseases children die from are very preventable which include malaria.

However the health of people continues to be of utmost importance to them and they go to all extents to get treatments for their ailments depending on their developed health seeking behaviours. Health seeking behaviour in this context refers to a mother or caregiver's prompt response to the management of childhood illness, attitude to sanitation, use of other protective

measures and frequency of visits to hospital or health centre. Healthcare is an ongoing process determined by choices and constraints and the decision taken towards achieving good health is dependent on an individual. Research in SSA on healthcare behaviour has revealed the mother as a reference in the household when the child is sick (Frankel and Lalou, 2009). According to the health belief model, for people to take care of their health they first must believe that their susceptibility to the disease is high and the perceived benefits they will derive from the preventive measure they are being asked to take. People who think they had low risks of a particular disease had difficulties in implementing preventive measures. It is the same with the ITNs usage. Poor knowledge about the benefits of the nets results in its inappropriate use. Some people did not use the nets as often as they needed to be used, while others put it around themselves as a sleeping cloth and others did not tuck them in the beds as they should. (Verbal interaction with some of the participants in Kokoben, July 2010) .

Understanding mothers' health-seeking behaviours is important because they (mothers and caregivers) are an important factor in the outcome of malaria infection and control in children (Cropley, 2000). There are certain factors according to Green and Kreuter's framework (Green et al, 1999) that influence a mother's treatment-seeking behaviours for her child. These are predisposing, enabling and reinforcing factors. Predisposing factors include knowledge, beliefs and perceptions of an illness and its manifestations, including severity of symptoms, episode duration, susceptibility, treatment sources, disease seasonality and causation. Examples of enabling factors are access to and cost of health services while reinforcing factors to a mother's treatment-seeking include perceived success of the treatment and receipt of medicine or treatment (Cropley, 2000).

In Amuyunzu-Nyamongo et al, 2006 research on ‘Health Seeking Behaviour of Mothers of Under-Five-Year-Old Children in the Slum Communities of Nairobi, Kenya’, mothers and caregivers classified childhood illnesses into four categories – not serious, sudden and serious, serious but not life threatening and chronic therefore does not require immediate attention. Surprisingly, the article places malaria under ‘serious but not life threatening’ category. This shows how mothers perceived malaria in the slum communities of Nairobi Kenya, which have similar characteristics of a peri-urban area which this study seeks to research into. Besides, Kenya is one of WHO’s endemic regions and for mothers to perceive malaria as non- life threatening is itself very life threatening. Mothers lack of or inadequate education on the consequences and outcomes of malaria in children under age five years may not have been enough to make them attach a certain importance to it. Mothers need to be enlightened to recognise a potentially-life threatening situations and act accordingly.

Sanitation is one area that cannot go unconsidered when dealing with malaria control. Mothers take initiatives toward getting control tools for their children such as the ITN but the argument here is that are there also initiatives to properly dispose off refuse, store water and environment cleanliness? In the government bid to fight malaria, other areas such as these mentioned above should be considered.

The factors combine to determine how a caregiver will rather want to control the disease than wait for it to happen.

2.5 The Influence of Socio Economic Factors on Appropriate Use of ITNs

There is a strong link between malaria and a country’s economic growth, a WHO report had said and it also indicated that countries most severely affected by malaria are also among the poorest

in the world. The disease has been labelled as a disease of the poor and patrons cannot be wrong about this pronouncement because a cursory look at the distribution of global distribution is enough to accept the claim. The burden of malaria is greatest among the world's poorest countries (Worrall et al, 2004).

Determining socio economic status (SES) in Africa is really difficult. This is because the informal sector forms a greater chunk of the working population. The estimation of their incomes thus becomes difficult. Other factors therefore have been used in determining the SES of people.

In many countries, insecticide-treated nets and/or long-lasting insecticidal nets (LLINs) have been distributed through a combination of delivery systems including routine health services, commercial sources, subsidized social marketing, and free mass campaigns (Thawani et al, 2009)

Malaria has been labelled as a disease of the poor and patrons cannot be wrong about this pronouncement because a cursory look at the distribution of global distribution is enough to accept the claim. The disease burdens the world's poorest nations more than any other. That is why all efforts are being made by the governments of Africa (Abuja Declaration) and other international agencies (Roll Back malaria strategy) to get the disease under control.

Studies have shown that ITNs are more cost effective compared to house spraying but levels of incomes can make owning ITNs costly and restricting their ownership. Most of the households in Africa depend on free distribution rather than on purchase at a result of their low income levels. Conversely, Baume and Marin (2007) showed that nets distributed free were less used than nets purchased.

Tourist and foreigners may also want to avoid countries with malaria because of its debilitating effects. Through this income may be lost to the nation and consequently to the people.

2.6 The Influence of Environmental Factors on ITNs Use

Several studies and particularly a report by Stewart and Marchand, (2001) found out that ITN use has not failed because of a any country's geography or location. There are however many examples where the use of ITN was less during the hottest season because the restricted air flow makes sleeping under a net inconvenient. For example, in northern Ghana, ITNs were perceived to be of benefit for protection from seasonally abundant nuisance mosquitoes (Alaii et al, 2003), however the use decreased to 20% in the dry season when temperatures were hot and the mosquito population decreased. Winch et al, (1994) described that the changing patterns of ITN use by season, and difficulties in encouraging community-sustainable approaches to ITN use were also described in Tanzania.

Alaii et al(2003) and Gyapong et al(1996) studies found out that despite the health education that was associated with the research, 30% of the nets that were distributed for free were still unused after the study. This shows how difficult it is to impact on human behavior, and supports the idea that a careful and sustained health education program must accompany any ITN intervention. The leading reasons that associated this action was the "too hot" weather. Children considered the vulnerable group were also not found using the nets due to this reason and more including distortion of sleeping arrangements, inability to spread the nets over mats and no room to hang bed nets as a result to house construction.

In other instance where the physical environment determines appropriate ITN use, Toe et al, (2009) found out in their study that the perception that a limited space in the house cannot contain the nets, the obvious problem of having a bulky product suspended in the middle of a room, having to perform some routine functions of hanging and removing nets every morning

and evening because some people sleep in kitchens, halls and living area. Besides people cannot be allocated sleep space together just because some vulnerable children must sleep under bed nets. This becomes a hindrance to appropriate ITN use.

2.7 Knowledge Gaps

From the discussion and literature read, most of the studies done on ITNs use have been done either in typically rural or urban settings. The uniqueness of this study is its concentration in a peri-urban area. In addition studies done on ITNs have very little emphasis on appropriate use which this study extensively addressed. The method of analysis used was very exceptional and really explains the details issues under consideration.

This study carefully addressed the need for ITNs to be used as they ought to and the benefits of appropriately using them in order to properly control malaria in children under age five years.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The chapter describes the methods used in the research, the data collection tools employed and the study design used. It further describes how the data were handled and analysed.

3.2 Study Design

The study was descriptive with cross-sectional design. This was used to assess the predictors of appropriate ITN use in malaria control in children under age five in peri-urban areas in the Asokwa sub-metro.

This design was used because of its ability to provide a snapshot of the frequency of health related characteristics (such as appropriate ITN use) in a defined population at a given point. In addition it is able to make room for planning and allocation of resources.

Descriptive cross-sectional design is relatively quicker and easier to conduct since data on all variables are collected only once. It is also good for descriptive analysis and is able to measure the prevalence of all the factors under investigations which is very relevant in every public health setting because it assesses the burden of the health situation in the specified population while helping in planning and allocation of health resources.

3.3 Study Area

Asokwa is one of the ten sub-metropolitan areas in Kumasi. It is the largest of sub metropolitan areas in Kumasi and has a total population of 463,333 according to the socio-economic survey conducted in 2008 (Metropolitan Annual Report, 2008). This represents 30.3% of the total population in the metropolitan.

The study population - children under age five years forms 15.2% of the total population of the sub-metro.

The sub-metropolitan health services are organised around a government, a mission clinic, 26 private hospitals/ clinics, 18 maternity homes, a laboratory and 3 homeopathic clinics. There are several pharmacy and chemical sellers in the area which complement the work of the health facilities. These facilities have continually promoted malaria prevention and control by encouraging the use of ITNs as a malaria control tool and administration of intermittent preventive treatment in pregnancy (IPTp) throughout the sub-metro area.

Home management of malaria (HMM) cases is also dominant in the area. HMM is based on the evidence that well-trained community health workers can provide prompt and adequate care to patients close to their homes. It is one of the key strategies to reduce the burden of malaria for vulnerable populations in endemic countries. The strategy is a means of improving access to prompt and effective treatment, by making it available as near the home as possible through the RBM action at community level (RBM/WHO, 2004).

The area is a combination of urban and peri-urban areas dominated by trading activities and subsistence farming. The climate in the area is typically wet equatorial with the major rainy season running from late February to early July and minor from mid-September to early

November. The dry season lasts for four months; December to April with its peak in February. The vegetation can be described as mostly semi-deciduous forest with several valuable trees. Besides the members of the community who are involved in 'white collar jobs', the income of the residents tend to be unstable thus they are unable to meet certain needs as ITNs and mosquito sprays.

The public health nurses and other volunteers organise outreaches to educate the populace on emerging diseases and how to prevent them (Ghanaweb.com, 2010).

3.4 Study Population

The study was done among a total population of 463,333. The study population consisted of mothers and caregivers of children under age five. Each of the participants consented to be part of the study. They each read the participant information leaflet and signed a consent form. The researcher explained in local dialect, Twi, the content of the research to those who could not read in the presence of a witness (es).

3.5 Sample Size

The results of the study were obtained from mothers and /or caregivers of children under five years. Each of the participants was visited in their homes. The prevalence of appropriate ITN use in the study area was not known as a result a prevalence figure of 50% was assumed and used to calculate the sample size. With 95% confidence level, 5% significance level, the sample size which was 384.16, was approximated to 500. This was done to cater for errors and sample variability in the study population.

The sample size was estimated using the formula,

$$n = Z^2 p(1 - p)/d^2 \dots\dots\dots 1$$

where Z= (1.96),

p=sample proportion, that is, the proportion of the sample that is assumed to be using ITNs,

d = error margin.

3.6 Sampling Methods

A total of 500 participants were involved in the study. They were selected from five communities in the Asokwa sub Metropolitan area. These communities were randomly selected after reviewing literature and finding out the prevalence of malaria amongst children in the area. The participants were selected using the snowball approach where respondent mothers and caregivers of children under five years gave referrals to the research team that led to other mothers and caregivers. The essence of this strategy was to easily get access to the target population, identify people with the particular characteristics needed and minimise sampling error.

3.7 Data Collection Techniques

Data on determinants or predictors of appropriate ITN use in malaria control in children under age five were collected using a structured questionnaire. The questionnaire was developed based on the sub-metro profile and the set of study objectives (O). Questions were developed on each of the objectives.

O1: In order to estimate the prevalence of appropriate use of ITNs: data on this issue was collected from mothers and caregivers of children under age five. A structured questionnaire was used for this. Those who were unable to read were interviewed in the local dialect.

O2: In assessing the influence of health seeking behaviour of mothers or caregivers on ITN use information was obtained from mothers and caregivers of children under age five. Questionnaires were administered with one-on-one interviews to solicit for information from the target groups.

O3: To determine the influence of socio economic factors on appropriate use of ITNs: the source of income and how they use their monies was enquired using a structured questionnaire.

O4: On the influence of environmental factors on ITNs use, questions pertaining to room arrangement, sleeping arrangement and the weather were with the aid of questionnaires administration.

3.8 Study Variables

The Table 3.1a,b summarises the objectives of the study, the dependent and independent variables, the tools used in collecting data on a particular variable, the type of statistic that was run on it, the sources of data and the indicators or outcomes that shows that a particular objective or variable is achieved.

Table 3.1a: Logical Framework of the Study

Objective	Dependent Variable	Independent variable	Source of data	Data collection tool(s)	Statistical analysis	Expected Outcome/ indicators
(1) to estimate the prevalence of appropriate ITN use	ITN use	Owner-ship of the ITNs, cost,	Parents, Caregivers , literature	Questionnaires	Descriptive tables, graphs, logistic regression analysis	% of household with children under five who use ITNs
(2) to assess the influence of ITN use on health seeking behaviours of mothers and caregivers	Health seeking behaviour	Lifestyles, physical environment, sanitation conditions	Parents, Caregivers , literature	Questionnaires	Descriptive tables, graphs, logistic regression analysis	Improved sanitation conditions, Change in lifestyle
(3)to determine the influence of socio-economic factors on appropriate ITN use	Socio-economic factors	Amount of income spent on healthcare, cost of the ITN,	Parents, Caregivers , literature	Questionnaires	Descriptive tables, graphs , logistic regression analysis	% of income spent on healthcare, no. of persons employed

Source: author's construct, 2010

Table 3.1b: Logical Framework of the Study

Objective	Dependent Variable	Independent variable	Source of data	Data collection tool(s)	Statistical analysis	Expected Outcome/ indicators
(4) to assess the influence of environmental factors on ITN use	Environmental factors	Housing structure, weather conditions, sleeping space	Parents, Caregivers, literature	Questionnaires	Descriptive tables, graphs, logistic regression analysis	% of people who live in houses that allow the use of ITNs % of people who use ITNs

Source: author's construct, 2010

3.9 Data Handling and Management

Completed questionnaires were kept under lock. Each questionnaire was numbered during the entry process, the entries were double checked for any inconsistencies, duplication and errors.

3.10 Data Analysis

Data from the interviews conducted and completed questionnaires was analysed with the help of SPSS. Descriptive statistics were used to summarise data into frequencies tables, cross tabulations, percentages, clustered bar graphs and pie charts. Non parametric tests (chi-square and p-values determination to be precise), were performed to enable inferences to be drawn and to test the significance of some of the variables. These were done to test the goodness of fit and the independence of two categorical variables to evaluate the statistical significance of differences between the various groups in data set.

Some bivariate and multivariate logistic regression analyses were done on the data set. The bivariate logistic regression analysis was used to predict a categorical variable from a set of predictor variables. The equation 1 was used in generating the odds that the subject say of a given gender will affect the appropriate use of ITNs. SPSS was used to generate the odds ratio and the confidence intervals.

$$ODDS = e^{a+bx} \dots\dots\dots 2$$

Multivariate analysis was performed to predict which among the three sets of factors; background characteristics(age, marital status, educational level, number of children under age five and gender); socio-economic (employment status and expected income) and socio environmental (structure of rooms, refuse disposal, water storage, climatic conditions, and mode of water storage), could predict appropriate ITN use among respondents.

There was a statistically significant relationship between the combination of independent variables (IV) and dependent variable (DV). There were no evidence of numerical problems in the solution because there was no multicollinearity(a situation where there is a high level of correlation between variables) among the IV, an alpha of 0.05 was used for the logistic regression.

The Pseudo R² was used to determine the strength of the relationship that existed between the DV and the IV. Nagelkerke measure of strength indicated that the higher the value the stronger the relationship, with a range of 0 to 1.

There was no evidence of numerical problems in this analysis. Numerical problems occurred when standard errors were greater than 2.

The likelihood ratio tests are a hypothesis test that the variable contributes to the reduction in error measured by the $-2 \log$ likelihood statistic. The parameter estimates table showed which of the variables made a significant contribution to the model.

3.11 Ethical Consideration

Permission was sought at all levels during community entry, which is from the metropolitan health directorate and sub metro offices down to the communities and households. Letters were sent to and approved by these offices to ask for their consent and permission to conduct the study in the area.

Verbal and written informed consent for the study was obtained from parents and caregivers. The consent form was translated into the local language for those who could not read in English. The potential risks and benefits of the survey were explained to the participants and they were given the option to opt out anytime they did not feel like being part of the study. In addition the contact addresses and phone numbers of both the Principal and co- investigators were given behind the participant information leaflet and participants were asked to call in case they did not understand anything regarding the survey. All information collected remained confidential under lock and key and were used for research purposes only. An Institutional Review Board (IRB), the Committee for Human Research, Publications and Ethics (CHRPE) of the KNUST/ KATH, provided ethical clearance for the study.

3.12 Quality Control

Quality control measures to ensure the quality, reliability, validity and confidentiality of information were undertaken. First, the questionnaires were numbered before they were stored in

order to easily know if some were missing or not. After the data entry, backups were made on external hard drives and compact discs (CD) to ensure that in case of any eventualities data would not be lost.

3.13 Dissemination of Findings of the Study

Findings from the study have been generated into an MPH thesis. Reports have also been sent to the metropolitan and sub-metro offices to guide health service planning for future health activities on malaria control and ITN use.

Work is ongoing to generate the findings into scientific papers and articles which will be published in some journals.

3.14 Assumptions

The researcher assumed that:

- the respondents were truthful with their response
- the entire methodological rigor was strictly adhered to by the interviewers and other research assistants.

During the analysis, it was assumed that:

- Each observation was independent of the other
- The population was a normally distributed.

Some logistic regression (LG) analyses were performed and the following assumptions were made:

- The independent variables need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group.
- The dependent variable must be a dichotomy (2 categories).
- LG does not assume a linear relationship between the dependent and independent variables.

3.15 Limitations of the Study

The study had its own limitations. Some respondents did not give the true picture of the situation on the ground because they kept conflicting themselves. More time had to be spent with these participants to ensure that they understood the importance of their responses and the authenticity of the final report.

While some caregivers were unwilling to take part in the study other participants were also busy about their daily activities and businesses even though they had consented to participate in the survey.

To avoid the validity and reliability of results and conclusions from being compromised, the researcher had to book appointments with such people and go back on another day to have them interviewed, while a lot of exposition was given to participants who did not understand the purposes of giving the right answers for the research.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the results of the research in order of the specific objectives. It ends with test for associations of predictors and appropriate use of ITNs

4.2 Univariate Analysis

A total of 500 households were interviewed during the study. Results of researches of this nature are usually influenced by demographic information such age, marital status, number of children, number of children aged 0-5, employment status, occupation and level of education. These pieces of information are presented in Table 4.1.

The total participants involved in the research were 500. Of these 21% were men while the remaining 79% were women, indicating the dominance of females in the study. There is no empirical meaning to this situation, but the only explanation that can be given is that women are mostly the custodians of children at this age.

The ages of the participants were from 15 years to 60 years with a mean of 1.70 and standard deviation, 0.717. The youth were the majority. They constituted 45% of the total participants, while those in the 30-44 category were 42%. The participants were mostly married couples, with approximately 27% of them being single parents while the separated and divorced were 5% and 3% approximately.

The target group, caregivers with children under age five years were fairly represented amongst the participants; 71% had a child under age five years, while 25% and 4% represented those who had two and three children under age five years respectively. The data collected showed that the highest number of children a family had was 8, but that was just 1% of the participants. The majority of them had between 1 and 2 children.

Table 4.1 presents the background characteristics of the participants.



Table 4.1a: A Univariate Analysis of Background Characteristics of Participants.

Covariates	Frequency, n=500	Percentages, %
SEX		
Male	104	21
Female	396	79
AGE		
15-29	222	45
30-44	209	42
45-59	63	12
60-74	4	1
Mean, 1.70 standard deviation 0.717		
MARITAL STATUS		
Single	134	27
Married	324	65
Divorced	25	5
Separated	1	3
Mean 1.85 Standard Deviation 0.658		
NO OF CHILDREN		
1	142	28
2	125	25
3	128	26
4	56	11
5	29	6
6	9	2
7	4	1
8	6	1
Mean 2.56 standard deviation 1.489		

Source: author's construct, 2010

Table 4.1b: A Univariate Analysis of Background Characteristics of Participants.

Covariates	Frequency, n=500	Percentages
CHILDREN AGED 0-5		
1	354	71
2	127	25
3	17	4
Mean, 1.36 standard deviation 0.701		
EMPLOYMENT STATUS		
Employed	377	76
Unemployed	118	24
Mean 1.24 Standard deviation 0.427		
OCCUPATION		
Commerce	288	64
Service	79	18
Manufacturing	21	5
Other activities	59	13
Mean 1.67 Standard deviation 1.054		
LEVEL OF EDUCATION		
Tertiary	64	13
Senior High	135	27
Junior High	136	27
MSLC	82	16
Primary	81	16
No formal education	2	1
Mean 2.97 Standard Deviation 1.279		

Source: author's construct, 2010

Table 4.1c: A Univariate Analysis of Background Characteristics of Participants.

Covariates	Frequency, n=500	Percentages
ITN USAGE		
KNOWLEDGE ON ITNS		
Yes	466	94
No	31	6
DID YOU USE IT LAST NIGHT?		
Yes	155	67
No	76	33
NO OF ITNS PER HOUSEHOLD		
1	164	40
2	64	16
3	13	3
4	7	2
None	158	39
Mean:2.90 standard deviation: 2.101		
ADVANTAGES OF ITN USE *		
Reduce the burden of malaria on them	370	74
Help save money for other purposes	130	26
Child sleeps better	173	52
Saves time from visiting the hospital	161	48

Source: author's construct, 2010 *Note*: Percentages do not add up to 100 due to multiple responses.

About 76% of the participants were gainfully employed. These respondents were either engaged in trading activities, manufacturing or in the service sector. These findings tally very well with the responses received from the question on the level of education of the participants. The data collected indicated that only 13% of the participants had had tertiary education. A small fraction of the participant's responded not having had any formal education. Only 27% of the participants had senior high and junior high education only. About 16% had had education up to middle school or primary school.

Table 4.2 shows the relationship between background characteristics and ITN ownership and use. This analysis was run to test the statistical significance or relationships between these variables in the research. There was a strong relationship between the ITN ownership and educational level $p = 0.005$. However the results further revealed that those with lower levels of education owned more ITNs than persons with higher education. Comparing the usage of ITNs and educational also showed that more persons with lower education used the nets than persons with higher education, $p = 0.046$. Those who owned ITN and use, also believe that children risk of getting malaria if they do not sleep under ITNs, $p = 0.001$. ITN ownership and use of other products to control mosquito bites was also significant to the study with a p-value of 0.004. There is the conclusion that there is an association between owning an ITN and use of other products to control malaria.

An association also existed between ITN ownership and ITN usage from the cross tabulations from SPSS. A p-value of 0.001 indicates the significance and so we reject the null hypothesis. There was however no significance in the employment status of participants and the number of ITNs owned. With regards to this we fail to reject the null hypothesis because of a p-value of

0.174. we conclude that the appropriate use of ITN is a function of many factors other than depends on socio economic status alone of mothers and caregivers.

KNUST



Table 4.2a: The relationship between background characteristics, owning ITN and ITN use

Background characteristic	TOTAL		P-VALUES
<i>Educational Level</i>	<i>ITN Ownership</i>		
	Yes	No	
Tertiary	41	21	62
Senior high	59	75	134
Junior high	72	64	136
MSLC	45	37	82
Primary	30	50	80
No formal education	0	2	2
<i>Educational Level</i>	<i>ITN Usage</i>		
	Yes	No	
Tertiary	32	27	59
Senior high	48	65	113
Junior high	56	66	122
MSLC	32	35	67
Primary	18	46	64
No formal education	0	2	2
<i>ITN ownership</i>	<i>ITN usage</i>		
yes	Yes	No	
	186	59	245
			0.001

Source: author's construct, 2010 N=500

Table 4.2b: The relationship between background characteristics, owning ITN and ITN use

Background characteristic			P-VALUES
<i>No of nets owned</i>		<i>Employment status</i>	
	<i>Employed</i>	<i>unemployed</i>	
1	124	40	
2	54	10	
3	13	0	
4	6	1	
none	112	44	
total	309	95	0.174
<i>Other products used to control mosquito bites</i>		<i>ITN Ownership</i>	
	<i>Yes</i>	<i>No</i>	
Coil	83	112	0.004
Aerosols	111	73	
Repellant creams	19	21	
None	3	43	
Total	246	249	
<i>ITN usage</i>		<i>Risk of children getting malaria</i>	
	<i>Yes(%)</i>	<i>No(%)</i>	
Yes	84(46)	100(54)	0.001
No	184(78)	53(22)	

N=500

Source: author's construct, 2010

4.3 Bi-variate analysis

A bi-variate analysis was conducted to predict the probability of ITN usage when other variables were introduced (see table 4.3). Selected cases such as background data, socio-economic information and some social environmental issues as well as climate were used as the predictors.

Table 4.3 Bivariate Analysis predicting Appropriate ITN Use From background data, socio-economic data and environmental factors N=500

Background	Crude Odds Ratio	95% CI
Gender	0.699	(0.425, 1.149)
Marital status	1.680	(0.771, 3.660)
No. of Children aged 0-5	0.694	(0.467,1.032)
Socio-economic		
Employment Status	1.531	(0.963, 2.434)
Educational status	2.321	(1.300, 4.145)
Expected monthly income	1.501	(1.013, 2.223)
Environmental		
Structure of rooms	7.990	(2.790, 22.881)
Climatic conditions	7.378	(3.083, 17.660)
Size of sleep space	5.249	(2.411,11.425)
Structure of rooms	7.990	(2.790, 22.881)

Source: author's construct, 2011

A test of the full model against a constant model was statistically significant in all the individual cases. The predictors as a set reliably distinguished between appropriate and inappropriate users of the nets.

4.3.1 Background characteristics and appropriate ITN use

The overall prediction for ITN use with gender as a predictor was 56.4%. The model test of coefficients gave a chi-square value of 2.003 and made and predicted that gender did not make any significant contribution to the appropriate use of nets ($p < 1.54$). Using the model, we are able to predict the odds of women to be 0.825 while that of men was 0.699. This implies that men were 30% less likely to appropriately use nets compared with women.

In the case of marital status the prediction success without the covariate was 56.4%. The model test indicated that chi square was 1.785 with a $p > 0.182$ indicating weak relationship with appropriate ITN use. Participants were grouped into two - either married or not married, however Exp (B) value explains that when the number of married caregivers is raised by 1 unit (1 couple), the odds is 1.6 times and so such households are 1.6 times more likely to appropriately use treated bed nets and the likelihood that a married couple will use ITNs is increased by 68%.

The number of children in our target group in a single family was used to check if that could determine the appropriateness of bed net use. The model predicted a 56.6% appropriate use and with a chi square of 3.674 with a $p = 0.055$. There was significant statistical contribution to the model. A household with more than one child under age five were 31% less likely to appropriately use bed nets.

4.3.2 Socio economic factors and appropriate ITN use

Employment status, level of education and expected monthly incomes were used to predict if mothers and caregivers use of ITNs could be predicted by these. The results showed that employment status of caregivers did not significantly contribute to the model, $p=0.069$. The odds ratio of 1.531 explains that, should there be an increase in the number of employed people, the likelihood of appropriate use of bed nets would increase by 53%.

The test with educational level of participants yielded statistically significant relationship with the appropriate ITN use. A chi square = 8.778 and a $p= 0.003$ shows the relationship. The odds ratio (2.321) doubled the likelihood that an educated person will appropriately use an ITN compared with an uneducated person.

The test for association between the expected monthly income (categorised as less than GHC 50 and more than GHC50) and appropriately use an ITN indicated strong relationship with chi square = 4.112, $p= 0.043$. The odds ratio showed that if incomes increased by a unit, if one more participant earned more than GHC50, he will 1.5 times more likely to use ITN appropriately.

4.3.3 Environmental factors and appropriate use of ITNs

The factors that were used in this analysis were the room structure, climatic conditions and size of sleep area. From the analysis, all the factors here significantly affected the appropriate use of nets. The structure of rooms showed a significant relationship s Chi-square = 23.709, $p= 0.001$. This means that the rooms in the area do not allow for proper use of the nets. There are either no spaces enough to hang the nets for children or that more children sleep on one mat/bed such that

putting up a bed net is almost impossible. The Exp (B) value of 7.990 means a strong importance. It implies that if structures/houses are spaciouly constructed and things in the room are arranged properly there will be enough room for ITNs to be appropriately used. As the odd ratio indicate, if a unit improvement in the structure is likely to result to appropriate use by 7.9 times and more likely to increase in children under age five years.

The weather in the study area is an important predictor. It is sometimes very hot this making it almost impossible to sleep indoors at night. Such was the situation of most of the participants for this study. During the dry seasons where there is no rain, the weather becomes so hot that people spend their night outdoors for fresh air. During such times, the use of the nets is out of the question. The analysis indicated a a strong relationship between weather and appropriate ITN use, chi-square = 30.125, $p = 0.001$. This implies colder weather is likely to improve appropriate ITN use by 7.378. Sleep space size was also significant predictor of ITNs use, $p = 0.001$. If the size of the sleep space of children increased by just a unit, the appropriate ITN use is more likely to increase by 5.2 times.

4.3.4 Prevalence of ownership and appropriate Use of ITNs

The level of appropriate use of the nets was assessed with questions ranging from the knowledge level of mothers and caregivers, number of net owned per household to the frequency of net usage. From the data collected, 94% (Table 4.1) of the participants had heard and knew about ITNs and its related importance. Even though 94% representing 466 had knowledge on ITNs only 247(50%) owned one. It was further realised that only155 (67%) of the 247 used it the night before the survey. Of the same population who owned the ITNs 21% said they used their nets occasionally. A cross tabulation, Table 4.2, showed that, of those who owned the ITNs and slept

in them the night before the survey 67% actually slept in them the night before the survey, $p < 0.001$. This results show that people's ownership of the ITNs is not full proof that they will use them. This means any education on ITN use should not only be directed to those who do not own but also to those who own in order to improve use.

From the sample of the participants, the number who owned ITNs were almost the same as those who did not own one, 50% of the population interviewed had at least one net in their household meanwhile from Table 4.2, there is an indication that people who claimed to own the nets do not frequently use them. Out of the 245 participants who owned the nets only 186 used them the night before the survey. This could be attributed to the health seeking behaviours of mothers and caregivers as well as the climatic conditions as expressed by some of the participants. During interactions with the participants, they revealed that it was difficult to sleep in the nets during the dry season when the weather was warmer, however, even though this data was collected during the rainy season where owners of ITNs were expected to be using them, a 33% of the respondents who owned the nets did not use them the night before this survey. This suggests that there is more to non-usage of ITNs than the weather.

The data also showed that 39% representing 158 persons did not have a single ITN in their households. The remaining 61% owned between 1 and 4 nets in their homes. These people were either involved in trading or manufacturing, Table 4.1.

One of the interesting findings of this research was that, a total of 112 (22%) of the respondents who were employed did not own a single net in their homes, $p = 0.174$. The reasons given during interaction with the respondents were that buying an ITN was not a priority but they also expressed that they would be bothered if their children had malaria, Table 4.2.

Mothers and caregivers were asked about the advantages they had derived from the usage of the nets. In each of the instances, each of the groups either mothers or caregivers had had some benefits from using the nets. From Table 4 .1, as much as 74% believed that using an ITN helps reduce disease burden on their children while 26% said it saved them money for other purposes. The low percentage for ‘saving money’ can be explained for by the introduction and usage of National Health Insurance Scheme (NHIS), where premiums are paid at the beginning of the year to cover medical bills throughout the year. Since most mothers and caregivers accessed health care with the NHIS, they found the reduction of the disease burden to be more important to them than the monetary aspect. Nonetheless those who were for the monetary gains were those who had no health insurance and so paid for services at the facility. Other participants also agreed that the use of the nets made sleeping better and more comfortable for their children while 48% said that time which would otherwise have been spent as waiting time at the hospital is spent doing other and profitable things

Ownership and frequency of ITN use

Agreeing that ITNs are a major control tool for malaria control, it is expected that children under age five years use the nets daily for full protection against malaria, knowing how vulnerable and weak their immune systems are. Figure 4.1 shows the frequency with which the children slept in the nets.

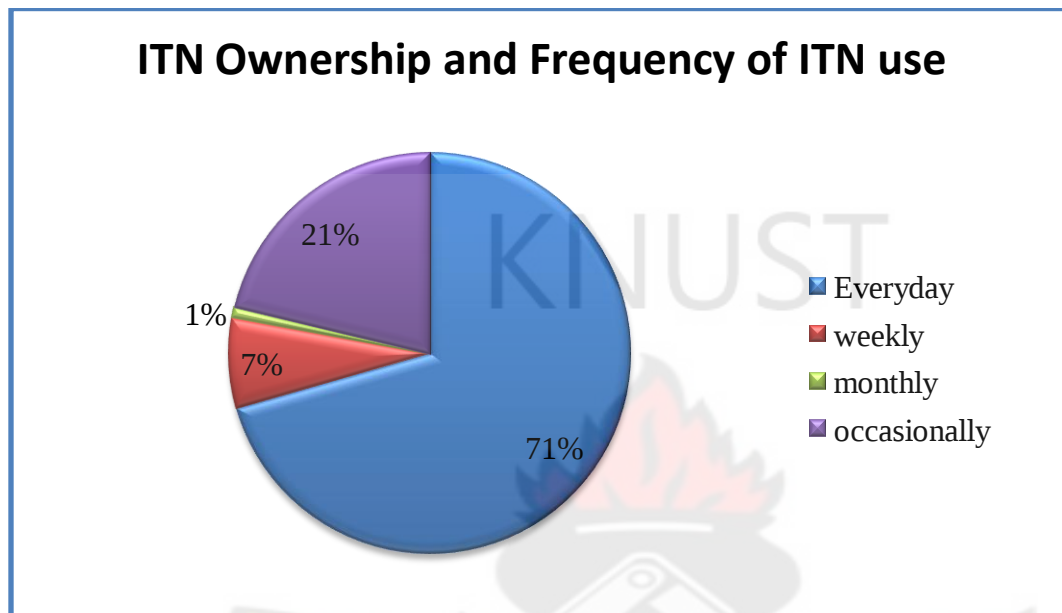


Figure 4.1 Prevalence of ITN Use - Frequency of usage in children under age five (for those who owned the nets)

Source: author's construct, 2010

A cross tabulation of people who owned an ITN and the frequency with which their children sleep in them indicated that, of those who owned ITNs, 71% used them daily which shows a positive attitude towards the efforts to control malaria, $p < 0.001$.

Relationship between ITN ownership and level of education

The number of respondents was normalized as percentage values and as can be seen from Figure 4.2, a clear trend could not be established between all the levels of education and the possibility

that one would owe an ITN. However what could be said is that, the chances were that one with a post secondary education owning an ITN is high compared to those with lower levels of education.

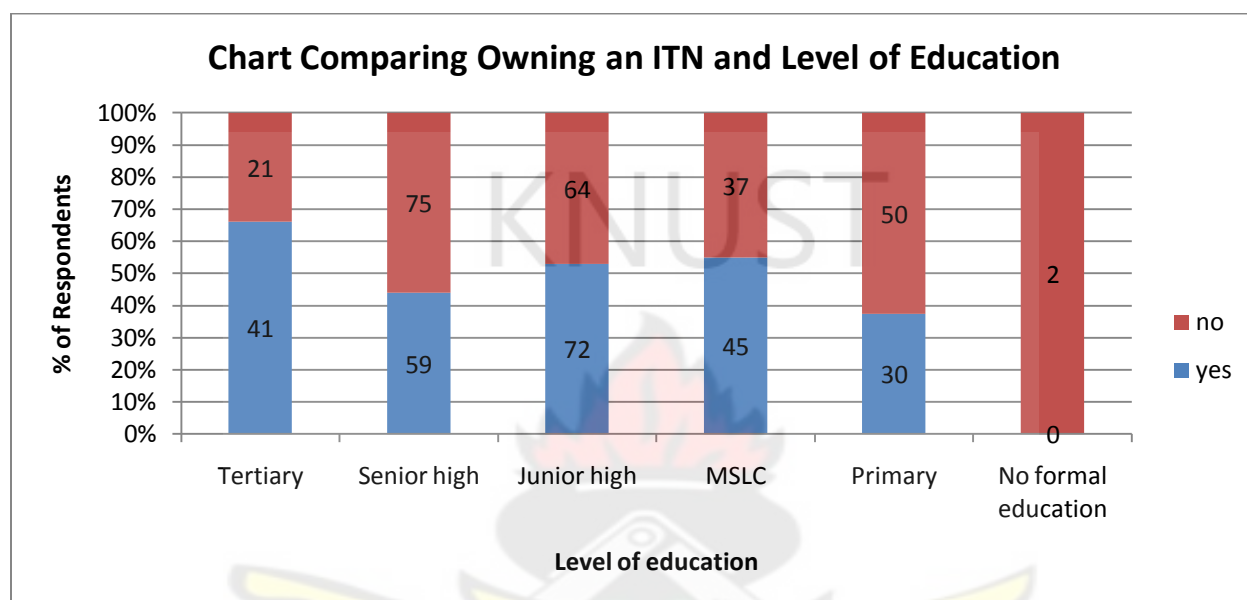


Figure 4.2 Normalized chart comparing the relation between owning an ITN and the respondents level of education

Source: author's own construct, 2010

There is a slight decreasing trend in the level of education and use of ITN's, starting from SHS to the primary level as indicated, Table 4.2. This trend can be used to conclude that the level of education and the use of ITN when a person owns is slightly linked.

4.3.5 The Influence of ITN Use on Health Seeking Behaviour of Mothers/Caregivers

The usage of the nets is not all there is to malaria control. Malaria can also be caused by improper sanitation practises, water storage facilities and keeping stagnant waters for long

periods without getting rid of them. The argument for this objective was to find out if mothers after providing nets to prevent mosquito bites practise a good sanitation to give their children a good foundation for malaria control, and also if they did other things to prevent mosquito bites before bedtime when children go into the nets. Table 4.2 shows that ownership of ITN influenced the use of other products to prevent mosquito bites and malaria infection, $p= 0.004$.

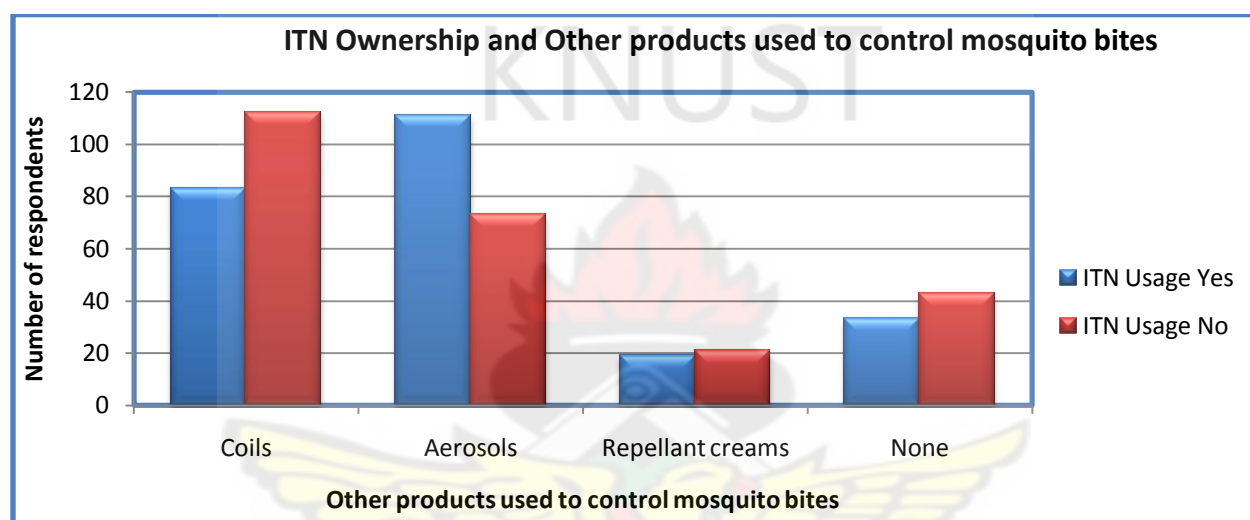


Figure 4.3 A bar graph showing the relationship between persons who use/do not use ITNs and their use of other control products.

Source: author's own construct, 2010

Figure 4.3 show that both users and non users of the nets use complementary measures and other products to prevent malaria. However as can be seen from the figure the usage of other products for the control of malaria was higher for those who did not use the nets in all cases except in the use of aerosols than those who did. This was expected as people who did not have ITN's will resort to other ways of controlling malaria. Even among caregivers who had ITNs not all of

them used them and that partly explains why some other products were used in protecting them from mosquito bites.

In addition to the health seeking behaviours activities, good water storage with covers can deprive mosquitoes of breeding places. Mothers and caregivers who used the nets also kept a good water storage practice. They kept their water covered in order not to create breeding places for mosquitoes.

Mosquitoes can also breed in places where refuse is not properly disposed. Those who used ITNs also kept their refuse well enough and disposed them safely to prevent any other sources of infection. Of the population who use the nets, 67% ensured that their refuse were kept in covered containers and disposed them off properly when they were full while 32% burned them.

Other products such as the mosquito coils and sprays were other methods or control products used by caregivers to prevent malaria b. Table 4.2 shows the number of participants who had the ITNs and yet still used other products against the usage of those who did not have the nets. In all the cases, those who did not own ITNs used other protective products more than those who owned nets except in the case of aerosols use. Participants who owed ITNs still used sprays to complement the net use.

The study sought to find out how often people who used ITNs also visited the health facility 1.6% of the participants who owned nets said that their visits had increased. This may have resulted from its inappropriate use. However 89% of the participants agreed that the nets were really a good a control measure for malaria amongst children and had reduced their visits to the health facility. The remaining 9% responded that their visits were still same and the explanation may be the same as that for the 2%.

Figure 4.4 is a pictorial representation of the relationship that exists between mothers and care givers who used the nets and their hospital visits.

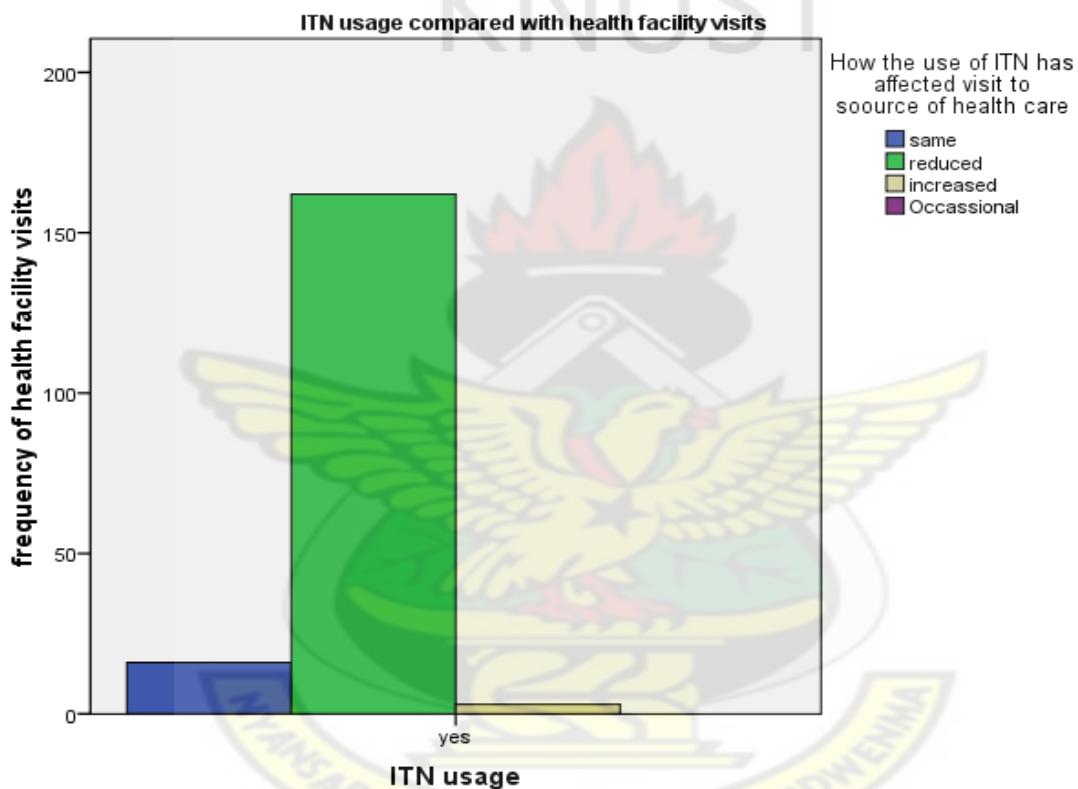


Figure 4.4: a clustered bar graph showing ITN usage and frequency of health facility visits

Source: author's construct, 2010

4.3.6 The Influence of Socio Economic Factors on Appropriate use of ITNs

The study took place in a peri-urban area where cost of living is very low and where taking out money to buy a bed net is difficult considering their type of occupation and incomes. A

comparison of the ownership of nets, Figure 4.5, and income levels showed an increasing trend with the people whose income are high tending to have a high chance of owning an ITN as compared to those with low income levels.

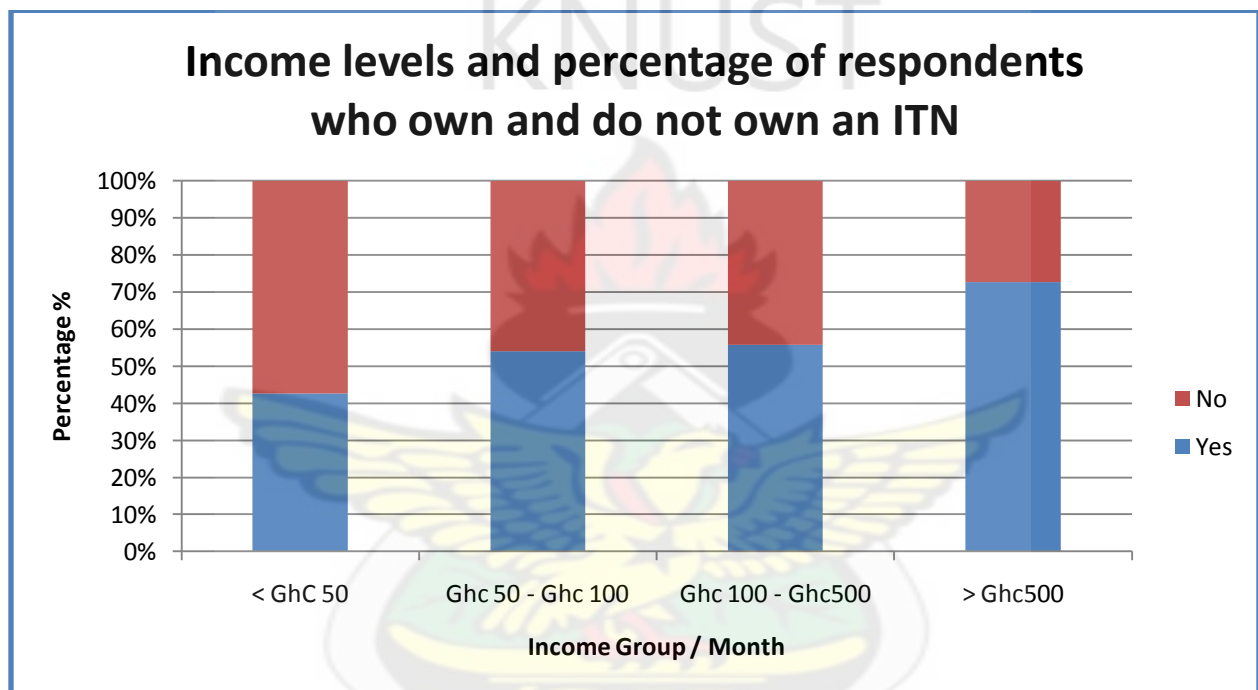


Figure 4.5 Normalized income levels and the percentage of respondents who own an ITN.

Source: author's construct, 2010

ITNs are not the only control instruments for malaria. Other supported lifestyles or behaviours change can influence malaria control in children under age five. The study sought to investigate how much of caregivers' incomes went into sanitation, hospital bills and drugs (self medication).

Table 4.5 shows the percentage of their incomes spent on each of the variables. In all the three health related issues, more people spent less than 10% of their incomes accessing these services which are positive in relation to health seeking behaviours.

Further, comparing the ownership of ITNs to the percentages of income spent on these supported health issues, there is not much difference between those who do not have ITNs and the percentage of their incomes spent on hospital bills, self- medication and sanitation and those who have ITNs and their incomes spent on the same services as seen in Table 4.2.

The willingness of people to buy the nets is based on affordability. Looking at the income levels of the participants and their priorities in addition to the data collected, from Table 4.2 as much as 70% of those who responded no to ITN ownership were willing to buy the nets for their children's use even though their incomes were not so much. This is a result of having learnt and heard how deadly the malaria could be especially for children under age five years.

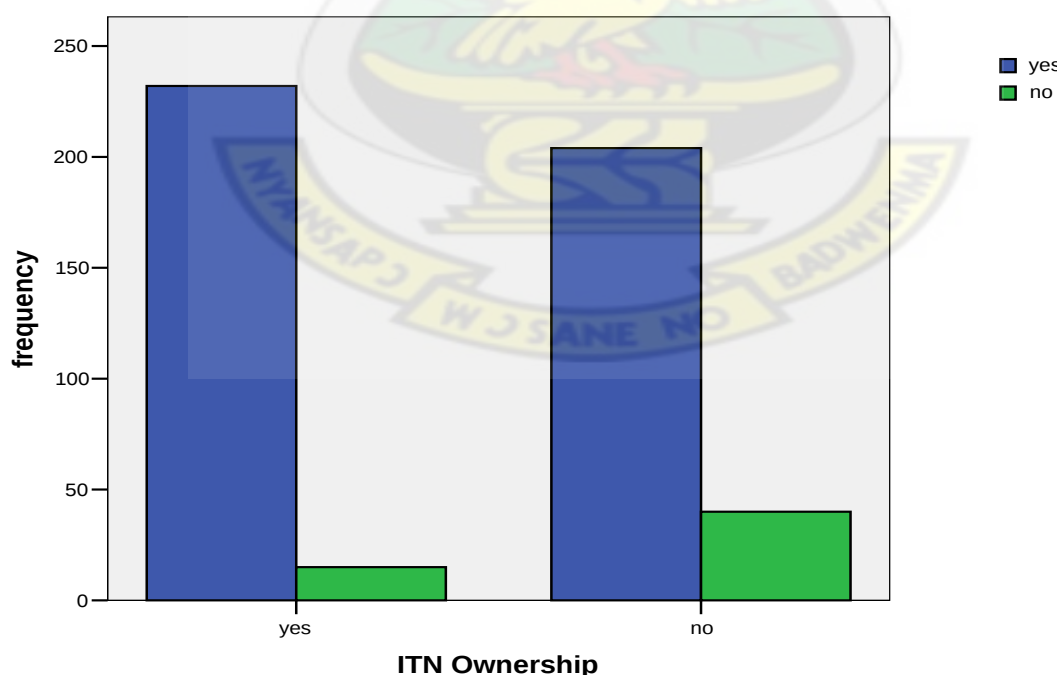


Figure 4.6 A bar graph showing the relationship between persons who use/do not use ITNs
Willingness to buy ITN

Source: author's construct, 2010

4.3.7 The Influence of Climatic and Environmental Factors on ITNs Use

During the survey, respondents were asked if the weather permitted the use of the nets. From Figure 4.10, about 94% of participants who had the nets responded in the affirmative. However there might have been a bias since the data was collected in the rainy season when the weather was colder.

When participant were asked if their rooms were spacious enough to accommodate the nets, those who had responded that they owned nets answered yes. In fact 93% of the total population who owned ITNs answered yes. However mothers and caregivers who did not own ITNs said that one of the reasons they did not use or own the nets was because of their rooms. As high as 85% of such mothers said there was hardly any space in their rooms to allow for the hanging of the nets during the night, Table 4.2,) in addition to some of their children sleeping on mats on the floor, $p= 0.008$.

4.4 Multivariate Analysis

This section explores the strengths of predictors (independent variables –IV) of appropriate ITN use (dependent variables-DV) among the three main sets of variables; background characteristic, socio-economic and environmental. Table 4.4 presents the summary result from a multiple logistic regression analysis that was performed.

4.4.1 Model 1: The Strengths of Background Characteristics in predicting Appropriate ITN Use

This model (model 1) tested for the strength of age, gender, level of education, employment status and marital status in the use of ITNs appropriately (Table 4.4a, b). Overall the model showed a statistical significance ($p=0.001$) of these variables in the appropriate use of ITNS. Those participants who were aged 30 years and above were more likely to appropriately use ITN ($OR=1.095$, 95% CI: 0.821 - 1.461). Similarly, participants with more than one child under age five were 84% less likely to use their ITNs appropriately compared with those with just one under age five child. Interestingly, married people were less likely to use ITN appropriately than unmarried participants ($OR=0.929$, 95%CI: 0.682-1.266). Another significant finding was that being a male increased the likelihood of using an ITN appropriately by 1.4 times. The educated participants were significantly more likely to use ITNs appropriately than the uneducated participants ($OR=1.281$, 95%CI: 1.063-1.542). The model used the Pseudo R^2 table to show if there existed a better relationship between the IV and the DV. Among them was Nagelkerke, it indicated a better relationship between the IV and DV with $p= 0.020$. This is however a weak relationship, considering that the fact that the range being used is 0-1. The whole Model 1 shows a strong significance ($p=0.001$) to the appropriate ITN use in the communities.

Table 4.4a: Results for Multivariate Analysis for Perceived Predictors of Appropriate ITN Use

	Model 1, N=500		Model 2, N=500		Model 3, N=500	
Covariates	OR	CI	OR	CI	OR	CI
Background						
<i>Age</i>						
15-29	1.0		1.0		1.0	
30 and above	1.095	(0.821, 1.461)	1.104	(0.809, 1.507)	1.135	(0.803, 1.604)
<i>Marital status</i>						
Not married	1.0		1.0		1.0	
Married	0.929	(0.682, 1.266)	0.655	(0.283, 1.518)	0.899	(0.345, 1.361)
<i>No. of children aged 5</i>						
1	1.0		1.0		1.0	
More than 1	0.848	(0.645, 1.116)	1.569	(1.026, 2.398)	1.574	(1.000, 2.477)
<i>Gender</i>						
Female	1.0		1.0		1.0	
Male	1.429	(0.857, 2.383)	1.848	(1.086, 3.145)	1.770	(0.993, 3.155)
<i>Educational level</i>						
Not educated	1.0		1.0		1.0	
Educated	1.281	(1.063, 1.542)	0.343	(0.184, 0.639)	0.373	(0.227, 0.626)
Socioeconomic						
<i>Expected monthly income</i>	-	-				
> GH 50	-	-	1.0		1.0	
More than 50	-	-	0.536	(0.336, 0.823)	0.377	(0.227, 0.626)
<i>Employment status</i>						
Unemployed	-	-	1.0		1.0	
Employed	-	-	0.720	(0.435, 1.193)	0.598	(0.348, 1.361)

Source author's construct, 2010

(Note: Table 4 is continued below)

Table 4.4b: Results for Multivariate Analysis for Perceived Predictors of Appropriate ITN Use

Covariates	Model 1, N=500		Model 2, N=500		Model 3, N=500	
	OR	CI	OR	CI	OR	CI
Socio environmental	-	-	-	-		
<i>Does the weather permit the use of the nets</i>	-	-	-	-		
No	-	-	-	-	1.00	
Yes	-	-	-	-	0.241	(0.101, 0.575)
<i>Structure of rooms</i>						
No	-	-	-	-	1.00	
Yes	-	-	-	-	0.275	(0.083, 0.917)
<i>Does sleeping area of children allow for use of nets</i>						
No	-	-	-	-	1.00	
Yes	-	-	-	-	1.69	(0.57, 0.503)
<i>Mode of water storage</i>						
Stored in covered containers	-	-	-	-	1.00	
Not stored in covered containers	-	-	-	-	0.409	(0.222, 0.753)
<i>Mode of refuse disposal</i>						
Dispose them off properly	-	-	-	-	1.00	
Throw them in the backyard for nature to take its course	-	-	-	-	1.127	(0.869, 1.462)
<i>Protective measures used to prevent children from getting malaria</i>	-	-	-	-		
Coils, repellants & aerosols	-	-	-	-	1.00	
None					0.685	(0.345, 1.361)
Likelihood Ratio χ^2, (p-value)	06.381(0.001)		28.964 (0.001)		90.793 (0.001)	
Pseudo R-Square						
Cox and Snell	0.015		0.067		0.197	
Nagelkerke	0.020		0.090		0.264	
McFadden	0.011		0.050		0.160	

Source author's construct, 2010

Model 1; -2 log likelihood = 48.547

Model 2; -2 log likelihood = 198.360

Model 3; -2 log likelihood = 345.874

4.4.2 Model 2: The Strengths of Background Characteristics and Socio Economic Factors in predicting Appropriate ITN Use

Model 2 was generated by including socio economic factors into the first model. This was to find out the effects and significance of the inclusion of other factors in the model. IVs that were involved in the model were employment status and expected monthly income. The log likelihood ratio test indicated that model 2 showed a significant relationship, $p=0.001$. The inclusion of the socio economic factors in the model revealed that likelihood of male participants using ITNs appropriately, increased. While those who were educate decreased drastically (OR=0.34395% CI: 0.184 - 0.639). Participants who were employed were 0.7 times less likely to use ITNs appropriately than those who were unemployed (OR=0.720, 95%CI: 1.063, 1.542). Also participants who earned more than GHC 50 were less likely to use ITNs appropriately. A Pseudo R^2 table was used to indicate the relationship between the IV and the DV. Nagelkerke, indicated a better relationship between the IV and DV with $p= 0.090$ than the others. This relationship however was a weak one, considering that the range usually used is 0-1. Overall model 2 shows a strong significance ($p=0.001$) to the appropriate ITN use when run with socio economic factors.

4.4.3 Model 3: Strengths of Background Characteristics, Socio Economic Factors and Socio Environmental Factors in predicting Appropriate ITN Use

The model examined socio economic factors, background characteristics and socio environmental factors of the participants as shown on table 4.4 with the DV. The question on whether the climate allowed for the use of ITNs contributed significantly to the choices people made about using ITN appropriately, OR= 0.241. Participants were 0.2 times less likely to use the ITNs appropriate due to unfavourable climatic conditions. Model 3 showed a better

likelihood for those aged above 30 to use ITNs appropriately compared with those aged 15-29. Nagelkerke's Pseudo R^2 value of 0.246 indicated a relationship between the IV and the DV. All the models showed how the IV contributed to the DV. Those that statistically contributed the various responses according to the likelihood ratio tests were male, expected incomes, room structure and climatic conditions. We could conclude with caution though that being male, expected monthly incomes, the room structure and the climatic conditions were significant predictors of appropriate ITN use in malaria prevention in children under age five years in the Asokwa metropolitan area.



CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter discusses the findings of the study on the determinants of appropriate ITN use in malaria prevention in children under age five, in the peri-urban areas of the Asokwa sub-metropolitan area.

5.2 Background Characteristics

The target population were children under age five. Five hundred mothers and caregivers were interviewed on the subject. The results showed that 79% of the participants were women. This explains how involved women are when it comes to taking care of children. As much as 45% of the participants were youths and 65% of the participants were married, and 75% of the participants were gainfully employed and were engaged in occupations such trading, manufacturing and service rendering. In all about 1% of the participants had had at least some basic education with a 13% having had tertiary education. This slightly influenced net ownership in the communities. There was a decreasing trend in the level of education and ITN ownership and usage. As the level of education decreased so did the ownership of the nets.

The caregivers and mothers had knowledge on the nets and its usage. As much as 94% of the participants had heard of ITNs and 67% of such people owned and used them. This is very significant for achieving MDG 4, 5 and 6 which are reducing child mortality rate, improving maternal health and combating HIV/AIDS, malaria and other diseases respectively (www.undp.org/mdg/basics.shtml, accessed February 16 2011).

5.3 Prevalence of Appropriate Use of ITNs

A significant number of participants had knowledge on the nets and their usage. Though some of the people who had the knowledge and knew the importance of using the nets used them occasionally, overall the appropriate use prevalence was highly significant. Similar studies conducted by Frey et al in (2006) also depicted similar findings and wrote that children in Burkina Faso also complied with sleeping in ITNs but exhibited similar use patterns as revealed by this research.

The study resulted in an interesting tie between those who owned and those who did not. Half, 50%, of respondents owned while the same number did not own any nets at all. With the percentage who owned, the motivation to use them decrease as the weather changes and the inconveniences that came with using the nets – having to remove them and put them back every day especially with people whose rooms served multi-purpose functions. Toe et al (2009), also found out during their studies in Burkina Faso that bed net usage which used to be high just around the time the bed nets were distributed to the community decreased with time due to functional organisation of the houses, their use in small houses and the fact that mosquitoes were considered to be just one of several factors that cause malaria.

It was found out that 61% of the participants owned ITNs. It was also established that educational level had a bearing on the ownership and usage of the nets. Those with no education did not own let alone use any nets. Studies by Nahlen et al, (2003), showed that a proper routine usage by a wider population can to an extent be augmented by a high level of coverage in a population, since this may provide benefit even for individuals who do not use ITNs by area-

wide reductions in malaria vector populations, this is also brilliant and can be copied for Ghanaian setting.

5.4 Advantages of ITN Usage

The study revealed that both mothers and caregivers knew and had benefitted from the use of the nets. While some admitted it had reduced their visits to the health facilities and reduced the burden of disease on their children, others said it had saved the money and time which otherwise could have been used for other resourceful things. Several studies have also researched into this area and found similar responses. For example Koudou et al (2010) research observed that after training, sensitization and rescheduling of some activities in addition to usage of longer lasting nets (LLN) in the highly endemic regions of La Cote D'Ivoire, decreases were observed in plasmodium prevalence rate. Clinically-confirmed malaria cases and proportion of high parasitaemia rates in children aged 6-59 months were also reduced.

The problem however now is getting everyone especially the vulnerable group to use the nets consistently to reduce child mortality and achieve the MDG goal 4. Maxwell et al in (2002), during their study on the effects of community wide use of ITNs for 3-4 years on malarial morbidity in Tanzania, found out that there was a reduction by 55 to 82% in bites of net users. Further in a highly significant reduction by 55 to 75% in malarial morbidity for children aged 6 months to 2 years were found in netted villages. The study by Maxwell et al, (2002) concluded that net usage was efficacious in malaria control and this is one of the things this study set to investigate. They concluded that nets should be distributed for free rather than relying on marketing. Free distribution and intensive public health education on the benefits impact on members of the community and the country's resources positively.

5.5 The influence of health seeking behaviour of mothers or caregivers on ITN use

Health seeking behaviour requires that certain manners be changed to guide us to achieving a particular health status and that is what this objective sought to do. Mothers and caregivers were interviewed on their behaviours that facilitated or decreased their risk of getting malaria. They found out that beside bednet use, other products which were capable of controlling mosquito bites and breeding were used by participants. This is a commendable behaviour which needs to be encouraged. People who do not have bednets should ensure to take measures which protect them and especially their children from getting the disease.

The study revealed that people who did not have or use ITNs were so much involved in using the other products to prevent themselves from mosquito bites and provide mental barriers for hungry mosquitoes (RBM, 1998). Results from a study conducted in Ethiopia by Karunamoorthi et al in 2009 to assess the knowledge and health seeking behaviour for malaria for rural inhabitants in Ethiopia, like this study, showed that a majority of the participants had good health seeking behaviours. In the Ethiopia study, the participants sought proper disease treatment behaviours and use of other protective products such as mosquito sprays, draining stagnant waters and spraying DDT. This study revealed that participants stored their water well in covered pots or containers which hindered mosquito breeding. They also kept good sanitation practises such as proper waste disposal and used other preventive measures to prevent mosquito bites. As much as 67% kept their waste in safe containers and disposed them off when they were full, while 32 burnt theirs.

5.6 The influence of socio economic factors on appropriate use of ITNS

Socio economic factors do count when dealing with issues of diseases and preventive measures, especially when the measures are cost tied. It was realised that several (65%) of the participants were traders and were engaged in petty trading which did not yield enough income for them and their families. The results showed that people with higher income levels tended to have ITNs than those with lower incomes. Socio economic status (SES) is difficult to measure looking at the kind of jobs people in this study area do and how irregular their incomes are. Chuma and Moluneux, (2008) revealed that the impact of SES on health care access and services is important for policy making, proper planning and allocation of resources. Nevertheless, this study realised that this cannot hold in this area.

The study sought to establish if people spent their income trying to prevent mosquito bites or protect themselves from getting malaria. Part of their incomes went into self medication, hospital bills and sanitation. However both; those who use the nets and those who did not almost spent the same percentage, between 10% and 20 % of their incomes on these services. For example those who owned the nets spent less than 10% of their income on buying drugs to cure malaria and the same applied to those who did not have the nets. This can be explained for by the fact that NHIS pays for hospital bills and drugs thereby making people spend less or nothing at all on medical bills. Though the incomes of the participants were not high compared to the standard of living now, they were willing to buy the nets and let their children sleep in them because of the benefits that can be derived from the nets. Actors have said that the nets are inexpensive considering their benefits and efficacy that is able to avert childhood deaths particularly in sub-Saharan Africa, an endemic area (Noor et al, 2007). The multivariate analysis that were performed indicated that income level was a determinant to using ITNs appropriately.

5.7 The influence of climatic and environmental factors on ITNs use

In the tropics the weather could be a discouragement to the appropriate use of ITNs. The structures in Africa and in peri-urban areas for that matter do not match up to the urban settings. These have small spaces and were usually crowded at night. In the dry seasons when the weather is so warm and people may wish to sleep outside their rooms for fresh air, nets use may possibly be out of the question. The settings of building infrastructure in the study areas were found to be too small, they hardly allow for space to do anything. Most children sleep on the floor at night. Sometimes there are several of them and one does not even know how to hang the nets to give them the needed protection. The study found out that participants rooms and their housing structures were a significant predictors of appropriate ITN use . They were not spacious enough to allow them use the nets even those who had responded that they did not have nets. The outcome then was that the housing structure, arrangement of a room and space available did hinder the use of ITNs in the communities.

The data collection started just at the time of onset the rains and it is believed that participants responses may have been influenced by this but a high as 89% of responses was that the nets were alright to sleep in. Meanwhile other responses revealed that in the dry seasons it was much difficult to use the nets because the weather gets so warm and uncomfortable.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The research was conducted to ascertain the determinants of appropriate ITN use in the Asokwa sub metropolitan. This chapter summarises the findings and suggests recommendations to stakeholders and areas for further research.

6.1 Conclusions

The results showed that participants' knowledge on ITNs use and its benefits were very high.

6.1.1 Background characteristics of study participants

Of the total participants of 500, mostly women, about 94% had knowledge on ITNs and their usage despite their low education level and income levels. However their room structure did not allow them to use the nets as should be.

6.1.2 Prevalence of Appropriate Use of ITNs

About 50% of the participants owned ITNs however only 67% of this population used the nets the night before the survey. Participants however expressed that the usage of the nets could increase if those who did not have were given freely. The appropriate use of the nets is strongly linked with the availability of the nets.

6.1.3 The influence of health seeking behaviour of mothers or caregivers on ITN use

The participants used other products such as mosquito coils, mosquito sprays, and repellents to prevent mosquito bites in their homes. They also burned their refuses or took them to the incinerator to prevent mosquitoes from having breeding places. Participants who religiously used their nets experienced a reduction in hospital visits for the treatment of malaria compared with those who did not use the nets.

6.1.4 The influence of socio economic factors on appropriate use of ITNS

The study found out that income levels was a determinant to owning a net nonetheless the study found that despite this, participants were willing to buy nets for their children from their meagre income.

6.1.5 The influence of climatic and environmental factors on ITNs use

It was observed that the structure and design of the rooms of participants was not conducive for ITN use. Also hot weather conditions were a hindrance to ITN use in the study area.

6.2 Recommendations

In the long term

6.4.1 Ministry of Health

- Seek assistance and funding to enable a free mass distribution of ITNs to increase access in the communities
- Stimulate local ITN industries and social marketing schemes so that nets are available at a price people can afford

In the medium term

6.4.2 The District Health Management Team

- Improve upon their public education programmes in the communities
- Lobby for further reduction or waiver of taxes on mosquito nets, netting materials and insecticides to enable mothers and caregivers purchase them for use

In the short term

6.4.3 The local health facilities

- Organize mass campaign and education on the importance of using ITNs
- Include ITN use issues during antenatal and post natal clinic sessions
- Encourage mothers and caregivers to use ITN for children under five years

6.4.4 The community

- Organise durbars and invite persons with requisite knowledge to talk to the community and educate them on the use of treated bed nets
- Make bylaws that insist that mothers and caregivers should put their under-fives in an ITN each night
- Assist health personnel in their community education by providing the needed logistics

6.4.5 The school

- Teach children from the early stages about ITN use and its benefits

6.4.6 The household

- They need to be responsible for their own health and that of their families
- Get the right tools that fight malaria
- Keep proper sanitation habits and prevent breeding of mosquitoes by weeding all bushes that hold stagnant water
- Properly dispose off refuse

6.3 Concluding Remarks

Appropriate ITN use in the study area is determined by a group of factors, background characteristics of household, socio-economic status and environmental factors. Of all these the strengths of incomes of participants, their room structures, health seeking behaviours and the weather stand tall. Interventions aimed at improving these parameters will improve appropriate ITN use and hence effective malaria control in the Metropolis.

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KNUST



APPENDICES

Appendix 1 Questionnaires

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF COMMUNITY HEALTH

RESEARCH TITLE: DETERMINANTS OF APPROPRIATE ITN USE IN MALARIA CONTROL IN CHILDREN UNDER FIVE YEARS IN PERI-URBAN AREAS: A CASE OF ASOKWA SUB- METROPOLITAN AREA, KUMASI

Household Survey Questionnaire

Name of Interviewer: _____

Date of Interview: Day _____ Month _____ / _____ / 2010

Start time of interview: _____ / _____ **End time:** _____ / _____

INTRODUCTION

I want to thank you for allowing me have this conversation with you. My name is _____ and I would like to ask you a few questions about the above topic / research title. The interview should take less than an hour. All responses will be kept confidential meaning that your responses will only be shared with research team we will ensure that any information we include in our report does not identify you as the respondent. Please remember that if you do not have to talk about anything you don't want to and you may end the interview at any time.

While this information serves as an MPH thesis it will contribute to knowledge and pave way for further studies in the field. Your contribution will be greatly appreciated though you are not under any obligation to participate

Are there any questions about what I have just explained? Are you willing to participate in this interview?

1.0 SECTION A -DEMOGRAPHIC DATA

1.1 Sex: male ☐ female ☐

1.2 Age:

1.3 Marital status: single ☐ married ☐ divorced ☐ separated ☐

1.4 Nationality Ghanaian ☐ non Ghanaian ☐

1.5 Religion Christianity ☐ Islamic ☐ Traditional ☐ Other ☐

1.6 Ethnicity Akan ☐ Ga ☐ Ewe ☐ other ☐

1.7 Place of birth.....

1.8 No. of children 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

1.9 No of children aged 0-5 1 ☐ 2 ☐ 3 ☐ 4 ☐.

1.10 Employment status employed ☐ unemployed ☐

1.11 Occupation commerce ☐ service ☐ manufacturing ☐

1.12 Level of education tertiary ☐ senior high ☐ junior high ☐ MSLC ☐ primary ☐
Tertiary ☐

2.0 SECTIONB: THE PREVALENCE OF APPROPRIATE USE OF ITNS

2.1 Have you ever seen or heard of mosquito nets treated with insecticide YES ☐ NO ☐

2.2 Do you own one? YES ☐ NO ☐

2.3 Do you use it? YES ☐ NO ☐

2.4 Did you use it last night? YES ☐ NO ☐

2.5 How many do you have in the household? 1 ☐ 2 ☐ 3 ☐ 4 ☐

2.6 Have you any idea how to acquire one? YES ☐ NO ☐

2.7 Have you any idea how to use it? YES ☐ NO ☐

2.8 Is your child/ren at a risk of getting malaria Yes ☐ No ☐

2.9 Do they sleep in ITNs? Yes ☐ No ☐

2.5 How often does your child/ren use it? Everyday ☐ weekly ☐ monthly ☐ other ☐ 2.6

2.6 What do you think are the advantages of children sleeping in the nets?

- reduce the burden of malaria on them ☐
- help save money for other purposes ☐

- child sleeps better []
- saves time from visiting the hospital []

3.0 SECTION C: THE INFLUENCE OF SOCIO ECONOMIC FACTORS ON APPROPRIATE USE OF ITNS

3.1 What is your expected income per month? 1000-30000[] 3000-5000[] 5000-10000[]

3.2 What percentage of your income do you spend on

- Hospital bills []
- Sanitation []
- Drugs (self medication) []

3.3 In case you did not receive an ITN from the hospital, can you afford one? Yes [] No []

3.4 Will you be willing to buy it? Yes [] No []

4.0 SECTION D: ASSESSING THE INFLUENCE OF ITNS ON THE HEALTH SEEKING BEHAVIOURS OF CAREGIVERS / MOTHERS

4.1 What other products do you use to control mosquito bites(which lead to malaria)? Coils [] aerosols [] repellent creams [] none []

4.2 How do you treat these in relation to controlling malaria

- Water storage

Stored in covered pots [] stored in pots without covers []

- Refuse disposal

Burn [] keep in a container covered till it is full before disposing it off at the dump site []
keep in a container without a cover till it is full before disposing off at the dump site [] throw
them in the backyard for nature process to take care of it []

4.3 What protective measures have you put in place to prevent/protect the child/ren from getting
the disease? Burning mosquito coils [] using aerosols [] smearing repellants on the skin[]

4.4 How has the use of ITNs affected your visit to source of health care? Same [] reduced [] increased [] Other (Specify)

4.5 In what other ways has the use of ITNs affected your health seeking behaviour?.....

.....

5.0 THE INFLUENCE OF ENVIRONMENTAL FACTORS ON ITN USE

5.1 What is the structure of the room? such that bottoms can be put up for hanging the nets[] such that there is no space for putting up bottoms for hanging the nets[] such that the rooms are so small there is hardly any space []

5.2 Do your children sleep area allow for the use of the nets? Yes[] No[]

5.3 Does the weather permit the use of the nets Yes [] no []

Thank you for your time

