

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

**THE USE OF INSECTICIDE TREATED BED NETS AMONG PREGNANT
WOMEN ATTENDING ANTENATAL CLINIC AT LEKMA HOSPITAL**

BY

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD
OF MASTER OF PUBLIC HEALTH (MPH) DEGREE**

INTEGRI PROCEDAMUS

JULY 2015

DECLARATION

I, Rita Attoh-Okine, hereby, do declare that except for other peoples work which have been duly acknowledged, this work is the result of my original research and that this dissertation ,either in whole or in part has not been presented anywhere for another degree.

I also declare that this dissertation has been reviewed by my supervisor and has been submitted for evaluation in partial fulfillment of the award of master of public health degree in accordance to the examination regulation of the University of Ghana.

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DATE

DEDICATION

I am particularly grateful to God for his divine direction and enablement throughout this course.

To my husband and the entire family for their prayers, encouragement and unflinching support during the time I was away from home.

To my daughter Darlene Ewura Efua .Arhinfuah Sagoe, you are a blessing.



ACKNOWLEDGEMENT

I wish to acknowledge my supervisor Dr Ayaga Bawah for his profound patience, support, encouragement, academic input and constructive criticisms during the writing of the dissertation and also Professor Ankomah for his support, encouragement and academic input.

I must mention with gratitude the willingness of respondents, health care providers whose participation made this study possible.

I also recognize with appreciation the tiring and dedicated effort of the research assistants especially Christabel Shirley Quaye for their role in collecting quality data.

I also recognize with much appreciation the help of Mr Prince Heywood Attoh – Okine for his relentless efforts in helping to type and edit this work.

Finally I am grateful to every individual whose contribution helped me in one way or the other to make my MPH programme and this work successful.

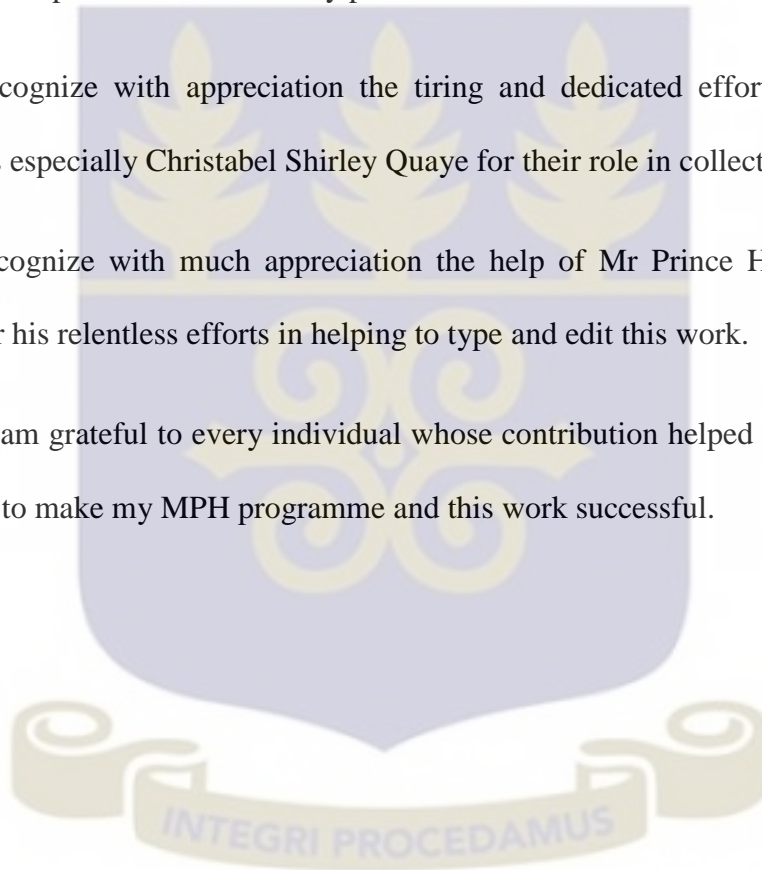


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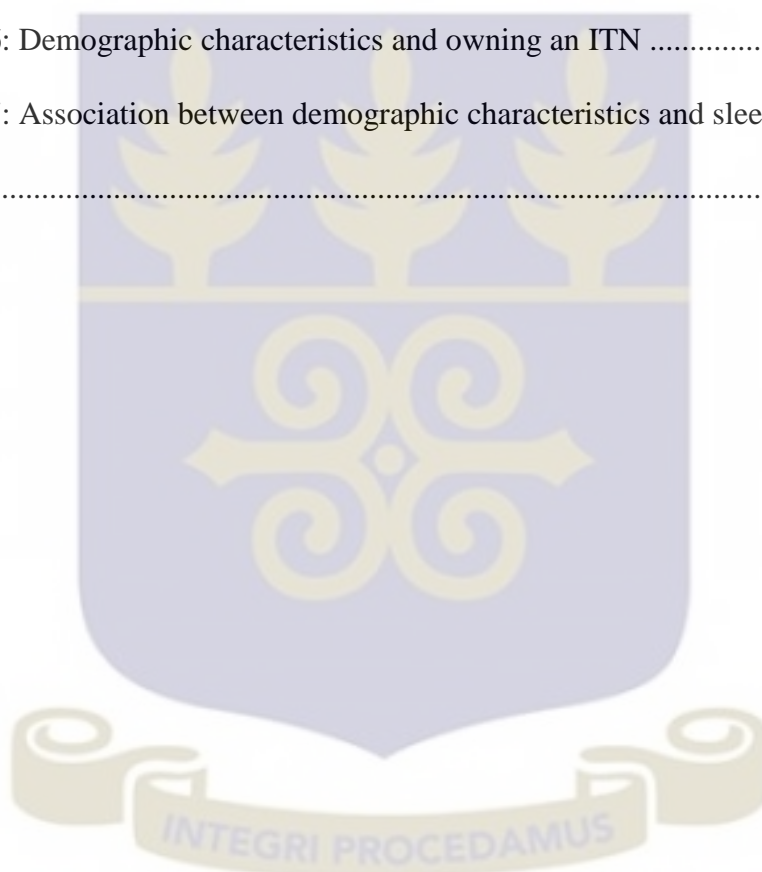
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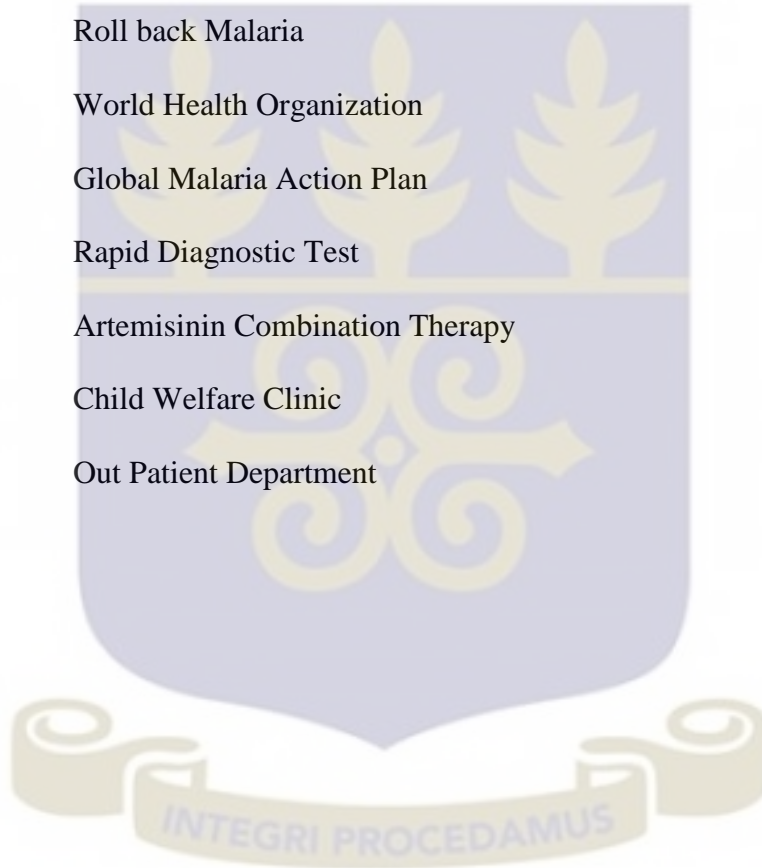
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LIST OF ABBREVIATIONS

ANC	Antenatal clinic
IRS	Indoor residual spraying
ITNs	Insecticide Treated Nets
LEKMA	Ledzokuku- Krowor Municipal Assembly
LLINs	Long lasting insecticide treated nets
NMCP	National Malaria Control Program
RBM	Roll back Malaria
WHO	World Health Organization
GMAP	Global Malaria Action Plan
RDT	Rapid Diagnostic Test
ACT	Artemisinin Combination Therapy
CWC	Child Welfare Clinic
OPD	Out Patient Department



DEFINITION OF TERMS

Insecticide treated nets- nets that are dip treated using a synthetic Pyrethroid insecticide such as Deltamethrin or Permethrin which will double the protection over a non-treated net by killing and repelling mosquitoes for maximum effectiveness.

Pregnancy associated malaria (PAM) or placental malaria- a presentation of the common illness that is primarily life threatening to both mother and the developing fetus.

Long lasting insecticidal net: It is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibers. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and three years of recommended use under field conditions.

Knowledge of malaria: The ability of a person to have correct understanding of malaria in terms of causative agents, mode of transmission, signs and symptoms, treatment and prevention.

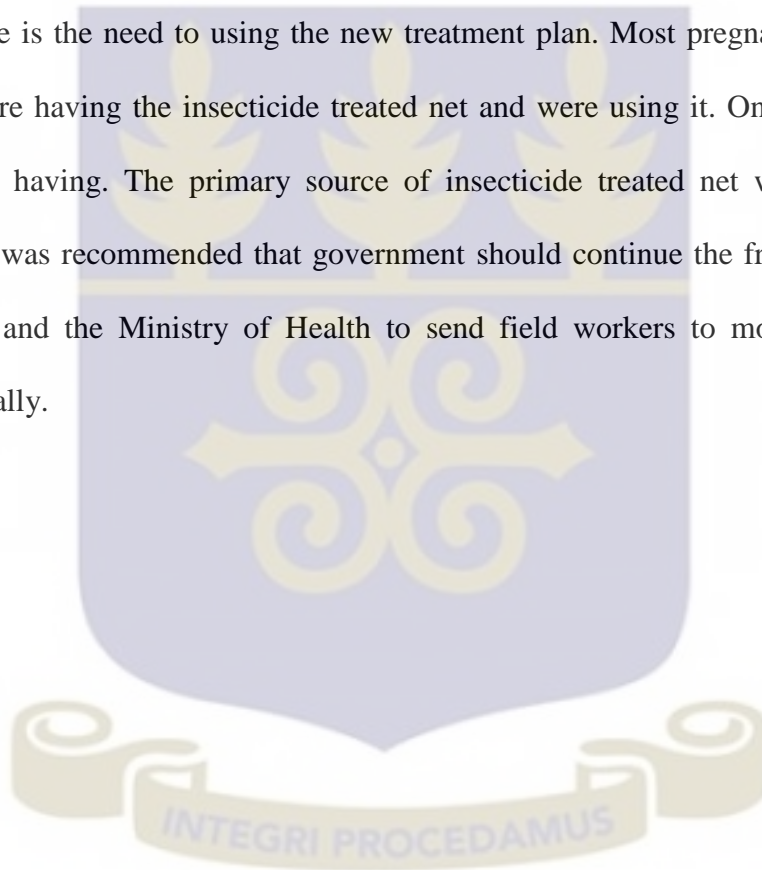
Practice of malaria prevention: Routine activities of malaria and actions of individuals or group for prevention of malaria. These include the use of insecticide treated mosquito nets, using insecticide spray to control and clear mosquito breeding places.

ABSTRACT

Malaria was described by **WHO (2009a)** as a major public health and developmental challenge. Nevertheless, the burden is not only felt in the health sector but in every aspect of social and economic life. (**WHO, 2011**) indicated that malaria prevention is essential and the most cost effective measure in its prevention is by adopting the use of insecticide treated nets (ITNs). ITNs have been shown to reduce malaria mortality by 17% in children below the age of 5years (Baume et al 2011). The overall goal of current strategic plan of the National Malaria Control Program (NMCP) is to reduce malaria specific morbidity and mortality by 75% in 2015. The aim of the study is to ascertain factors that influence the use of insecticide treated net among pregnant women. Generally, the study intends to assess the factors that influence bed ownership and usage. Additionally, this study specifically sought to achieve the following objectives: to assess the proportion of women who own and use insecticide treated nets, to evaluate the factors associated with accessibility and use of insecticide treated nets, to determine the knowledge the pregnant women have on the causes of malaria.

Cross-Sectional study design was employed to assess the ITN usage and Ownership among pregnant women visiting the LEKMA hospital through a quantitative approach of data collection. The results of this study showed a significant association between having attended school and owning an ITN at home. Pregnant women who have attended school had a 6 times probability of owning an ITN. All other demographic

characteristics were not significantly associated with owning an ITN. Also, significant association was found between having attended school and sleeping under an ITN at home. Pregnant women who have attended school had a 9 times probability of sleeping under an ITN. All other demographic characteristics were not significantly associated with sleeping under an ITN. Pregnant women in this study were knowledgeable in malaria and its causes as well as its new treatment plans. Pregnant women in the study could identify some symptoms and causes of malaria as well as why there is the need to using the new treatment plan. Most pregnant women in the study were having the insecticide treated net and were using it. Only a few of them were not having. The primary source of insecticide treated net was the antenatal clinic. It was recommended that government should continue the free distribution of the ITN and the Ministry of Health to send field workers to monitor ITN usage occasionally.



CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Malaria has been indicated to threaten the lives of 3.2 billion people globally and exerts a great toll on vulnerable pregnant women and children (WHO, 2011). The World Health Organization (WHO) World Malaria Report (2011) demonstrates the enormity of the burden of malaria, with 216 million cases and 655,000 deaths attributable to this mosquito-transmitted parasite in the year 2010 alone. The burden was largely borne by Africa where 91% of deaths occurred, with pregnant women and children under five years of age most at risk of infection and adverse outcomes (World Malaria Report, 2011).

Additionally, there are an estimated 25 million pregnancies in sub-Saharan Africa at risk of malaria each year (WHO 2009a). Consequences of which can be serious for both mother and fetus in terms of morbidity and mortality (Kileen et al., 2007). Besides, Kileen et al., (2007) further indicated that adverse effects of malaria in pregnancy include maternal anemia and stillbirths. Malaria in pregnancy leads to delivery of premature infants and low birth weights due to intrauterine growth retardation (IUGR) resulting from placental parasitisation. Hence, its enormous physical, emotional, social and economic impacts on the clients, families and the nation at large cannot be quantified (Van et al., 2011).

However, Dolon et al (1993) asserted that insecticide-treated nets (ITNs) have been shown to be the most cost effective measure in the prevention of malaria. Moreover,

ITNs have been shown to reduce malaria mortality by 17% in children below the age of five years (Baume et al., 2011). In view of the effectiveness of ITNs, the Roll Back Malaria (RBM) Partnership was targeted to protect 80% of children and pregnant women at risk of malaria with ITNs by 2015 (Alukwo et al., 2009). This RBM was adopted by Ghana as an established policy guideline for the implementation and scaling-up use of ITNs in accordance with the provision of the Abuja declaration and a national strategic plan was in existence. It was evidential from other studies that consistent use of these nets was important in the prevention of malaria (Baume et al., 2011). The WHO and Roll Back Malaria (RBM) partnership now recommend that distribution of LLINs be free or heavily subsidized to achieve greater equity of coverage, and that a variety of distribution systems be used to achieve universal access, including targeted campaigns to deliver nets to most-at-risk populations, which include pregnant women and children under five years of age (Alukwo et al., 2012). The evidence for the efficacy of ITNs in preventing malaria infection and its consequences in pregnancy is strong, as reported in a Cochrane review in 2009. The evidence showed a strong correlation between the use of ITNs and reduction in stillbirths, improvements in birth weights of babies and a reduction in the prevalence of parasitaemia and anemia in pregnant women. A communal protective effect of ITNs and reduction in overall vector density has also been observed in some settings (Kilelen et al., 2007).

Despite the widespread roll-out of policies and substantial financial investments in ITN distribution, coverage remains suboptimal in many regions, particularly with respect to pregnant women (Kioki, 2009). Recently published data from sub-Saharan Africa found that although 96% of countries surveyed had a policy for ITN coverage, reported coverage of pregnant women with ITNs was only 17% (Van et al., 2011).

The main delivery system for ITNs was through antenatal clinics (ANCs), using free distribution or a voucher system. Interestingly, attendance at an ANC was not found to be a major factor in limiting coverage. Supply has been identified by the WHO as the primary barrier to achieving optimal coverage, with the latest World Malaria Report suggesting that in the general population, there is a high correlation between ownership and use of ITNs (WHO, 2011).

The relationship between ITN ownership and use has been explored by not many authors, and largely neglected when concerning pregnant women. Given that pregnant women and their unborn children are particularly vulnerable group susceptible to malaria and its consequences. Therefore, a study to determine the factors influencing bed net ownership and use among these pregnant women is useful.

1.2 Statement of the Problem

Malaria remains a major public health and developmental challenge. The malaria burden was not only felt in the health sector but in every aspect of our social and economic life.

The overall goal of the current strategic plan of the National Malaria Control Program (NMCP) was to reduce malaria specific morbidity and mortality by 75% by 2015. This was to be achieved through multi-interventional strategies including:

1. The prevention through intermittent preventive treatment for pregnant women, the use of insecticide treated nets (ITNs) and indoor residual spraying.
2. Case management at health facilities and at community levels.

In 2013, of all the 25, 387,914 OPD attendances, suspected cases of malaria was, 11,114,832 thus 44% of OPD attendance, under five years mortality was 3,327,891 thus 44% and pregnant women were 217,259 making 20.2%. Total malaria deaths

were 21,985 out of 35,109 making 11.4% of all deaths. Mortality among pregnant women was 9%. At LEKMA, malaria still remains top on the list of all diseases reported at all health centers in the municipality. Malaria accounts for 43.6% (50,170) of all OPD cases, 28.8% of all admissions which occurred among pregnant women and 13.5% among children under than five years in 2012. Malaria in pregnancy remains a big challenge in the municipality. In 2013, 42% of pregnant women in Teshie Community Clinic at 36 weeks gestation, had hemoglobin level less than 11g/dl (Ledzokuku-Krowor Municipal Assembly Annual Report, 2012).

Partly, this situation is attributable to low usage of ITNs among the population of the municipality.

1.3 Research Questions

1. What proportion of pregnant women own ITNs?
2. What proportion of pregnant women use ITNs?
3. What do pregnant women know about the use of ITNs?
4. What do pregnant women know about the causes of malaria?

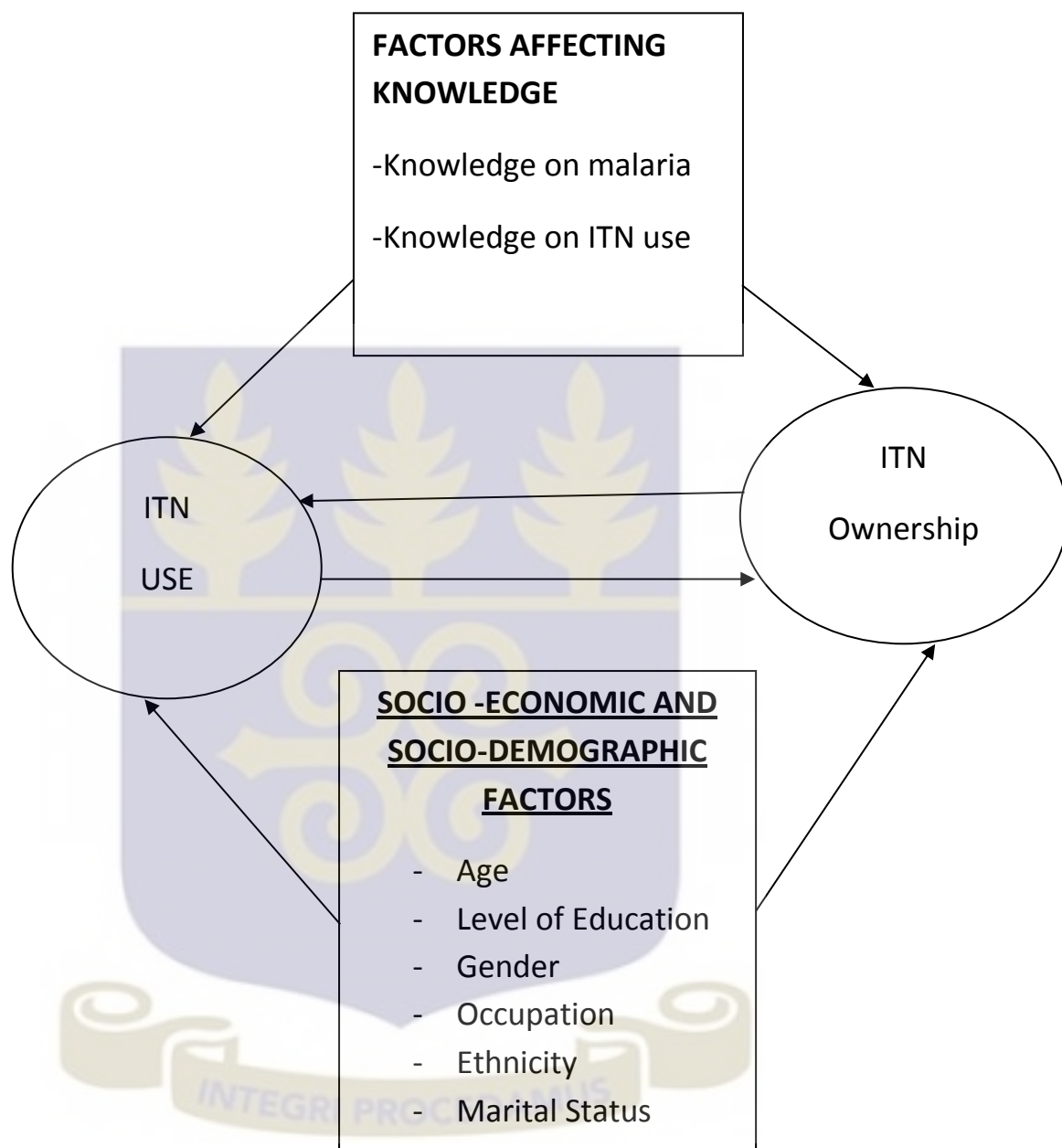
1.4 Justification

Insecticide treated nets have been shown to be the most cost effective measure in the prevention of malaria (Dolon et al., 1993). In view of the effectiveness of ITNs, the Roll back malaria (RBM) partnership aims to protect 80% of children and pregnant women at risk of malaria with ITNs by 2015. The evidence for the efficacy of ITNs in preventing malaria infection and its consequences in pregnancy is strong as reported by the Cochrane review in 2009. Despite the widespread roll out of policies and substantial financial investments in ITN distribution, recently published data from Sub-Saharan Africa found that although 96% of countries surveyed had a policy for ITN coverage, reported coverage of pregnant women with ITN was only 17%.

The information on insecticide treated nets used in combating malaria in pregnancy is important to the Millennium Development Authority and National Malaria Control Program to improve their various strategies that will be geared towards improving maternal health by three- quarters(MDG 5) and combat infectious diseases including malaria by the year 2015 (US Census Bureau, 2010).



Figure 1 Conceptual Framework



1.5. Description of Conceptual Framework

The dependent variables are ITN usage and ITN ownership. These two factors affect each other in that ITN ownership is a precursor to ITN usage. Socioeconomic and Socio demographic factors have an effect on both ITN ownership and usage. Where

an individual lives, be it rural or urban, determines whether one owns an ITN or use one.

Knowledge on causes of malaria and ITN use determines whether one owns a bed net or she sleeps in one.

1.6 Objectives

Generally,

To assess the factors that influence bed net ownership and use among pregnant women in the LEKMA municipality.

Specifically,

1. To determine the proportion of pregnant women who own insecticide treated bed nets.
2. To determine the proportion of pregnant women who use insecticide treated bed nets.
3. To ascertain the knowledge that pregnant women have on about ITN use and malaria.
4. To examine the determinants of ITN use among pregnant women.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Epidemiology of malaria in Ghana

Malaria occurs throughout Ghana all year round and affects people of all ages in the country. The malaria burden is not felt only in the health sector, but in every aspect of our social and economic life. The Parasite *Plasmodium falciparum* account for about 90% of the illness in the country with the principal vectors (mosquitoes) being *Anopheles gambiae* and *An. funestus*. Initiatives towards controlling malaria started in Ghana as far back as 1950s and it is ongoing. Current malaria control efforts are based on the principles of the Roll back Malaria (RBM) Initiative and the Global Malaria Action Plan (GMAP). The overall goal of the current strategic plan of the National Malaria Control Programme (NMCP) is to reduce malaria specific morbidity and mortality by 75% by 2015. This is to be achieved through multi-interventional strategies including:

- a. Prevention through Intermittent preventive treatment for pregnant women, the use of insecticide treated nets (ITNs) and indoor residual spraying (IRS),
- b. Case management at both health facilities and community levels.

The Ghana national malaria control program continued the implementation of case management as a major intervention and made available diagnostic tools and effective and efficacious ACTs. In 2013, a total of 11,114,832 (43.7%) OPD cases were suspected to be malaria. Of the cases 83% patients were treated with ACTs. During the period under review, the Program procured and distributed about 6,840,000 RDT kits in addition to an opening balance of 499,980 throughout the country to complement microscopy examination. In 2013 a total 4,908,844 (45%) cases of OPD malaria were tested out of which 3,675,912 (75%) were positive.

2.1.1 Protecting pregnant women from malaria through the use of SP as IPT

During the year, 593,124 pregnant women, constituting 61.40% received IPT1, 494,444 (51.2.0%) received IPT2, whilst 360,246 (37.2%) took IPT3.

2.1.2 Sustaining Universal Coverage with Long-Lasting Insecticide Treated Bed nets (LLINs)

As part of measures to sustain the gains made with the mass LLIN distribution campaigns, the NMCP in collaboration with its partners has adopted multiple channels through which nets will get to households i.e. Schools, Child Welfare Clinics (CWC), Antenatal Clinic (ANC) and Commercial Partners. In 2013, a total of 1,480,324 LLINs were distributed through these channels. In 2013, the country recorded about 11.3 million cases of OPD malaria with average of approximately 30,300 seen each day in the country's health facilities. Among the general population, for every one thousand (1,000) about 417 malaria cases would be recorded. The distribution of the cases is higher in the northern part of the country where OPD malaria cases per 1,000 are about 600. Also, the rural areas recorded more cases than

the urban centres as shown in the OPD malaria cases, malaria admissions. Admissions for malaria decreased from 428,000 in 2012 to 404,898 in 2013. In 2013, malaria admissions were approximately 1,110 a day, while malaria admissions per 1,000 populations was 17 cases.

However malaria attributed deaths had been declining in the last four years from 3900 in 2010 to 35,109 in 2013. Thus some progress had been made in the past four years but more needs to be done as we moved from 15 inpatients malaria deaths each day in 2010 to approximately 9 malaria deaths per day in 2013 (National Malaria Control Programme Annual Report 2013).

Malaria infection is caused by a protozoan parasite of the genus *Plasmodium* (Nordberg, 1999). There are five different species of *Plasmodium* that cause malaria. They include *Plasmodium falciparum*, *P vivax*, *P ovale*, *P malariae*, and *P knowlesi* (WHO 2009a; Nordberg, 1999). Transmission of malaria infection is caused by the bite from an infected female *Anopheles* mosquito, which injects sporozoites into the blood stream of the human host. The patient experiences clinical symptoms which include headaches, pain in the joints, chills and fever, vomiting and mild diarrhea. Treatment requires timely administration of an effective antimalarial drug regimen that clears the acute symptoms and prevents the reappearance of the parasites (Nordberg, 1999; MOH, 2006).

People who are especially at risk from malaria and its consequences are; children under five years of age, women in their first pregnancy, travelers from non-malarious areas, splenectomised patients and those not protected (Nordberg, 1999) due to their low immunity.

2.2 Malaria Control

The malaria control methods recommended by the Global Malaria Programme (WHO/GMP) include; use of insecticide treated nets, indoor residual spraying and diagnosis and prompt treatment of the cases with effective medicines. Early diagnosis and prompt treatment of malaria remains a cornerstone of the global malaria control strategy (WHO, 1993), but, this depends on correct recognition of malaria signs and symptoms, presentation at a medical establishment with trained staff. Malaria control is economically beneficial to the agricultural output by increasing the quantity and quality of labor (Kioko, 2009). Poverty reduction programmes geared at improving incomes of people living in malaria prone areas will reduce the economic burden of malaria and enable them to reach a higher standard of living. The WHO (2008a) Global Malaria Programme (WHO/GMP) recommends the following three primary interventions for effective malaria control:

- a) Diagnosis of malaria cases and treatment with effective medicines
- b) Distribution of insecticide-treated nets (ITNs), more specifically long-lasting insecticidal nets (LLINs), to achieve full coverage of populations at risk of malaria
- c) Indoor residual spraying (IRS) to reduce and eliminate malaria transmission.

2.3 Insecticide-Treated Nets

The development of the technology of insecticide-treated mosquito nets (ITNs) is one of the major innovations in the field of malariology (Lengeler, 2004; Takken, 2002; Curtis and Mnzava, 2000b). With the inception of the global partnership to Roll Back Malaria (RBM) in October 1998 (Nahlen et al., 2003), ITNs were adopted as one of

the key tools for reducing the burden of malaria in areas of stable malaria transmission in Africa. Before then, people in many countries were already using conventional nets, mainly to protect themselves against biting insects (MacCormack and Snow, 1986; Robert & Carnevale, 1991; Alkins et al., 1994). The use of ITNs has been established as an effective intervention against malaria (Lengeler, 2004), especially in areas where parasites have become increasingly resistant to anti-malarial drugs, such as chloroquine and where access to health services is limited and medication often inappropriate (Vijayakumar et al., 2009). ITNs protect individuals either by diverting host-seeking vectors to search for a blood meal elsewhere or by killing those that attempt to feed on that person (Killeen and Smith, 2007b). This means that treated nets not only prevent malaria in a protected individual but can also reduce malaria risk in unprotected individuals by suppressing the density, survival human blood indices and feeding frequency of vector populations (Hawley et al., 2006). Lengeler, (2004) indicated that several randomized and non-randomized controlled trials of bed nets efficaciousness in Africa and Asia have demonstrated more than 50% protective efficacy in reducing malaria episodes, 29% protection against severe malaria disease and substantial protection against malaria. Also, controlled trials on the use of ITNs by pregnant women in malaria endemic areas demonstrated that ITNs are associated with an increased mean birth weight, reduced low birth weight and reduced miscarriages and stillbirths in the first four pregnancies (Gamble et al., 2006).

Additionally, ITNs have also been shown to have a mass effect on malaria morbidity and child mortality in villages neighboring areas with high ITN coverage (Hawley et al., 2003). This community-wide effect has been observed in Ghana, Coastal and

Western Kenya, Papua New Guinea and the United Republic of Tanzania (Binka et al., 2002; Diallo et al., 2004; Lindblade et al., 2004). Such studies suggest that community-wide distribution of ITNs will be a cost-effective way of controlling malaria in an area. Increasing ITN coverage is seen as a valuable means of achieving the Millennium Development Goal number 6 which aims at reducing child mortality by 2015 (Noor et al., 2008 and Hanson et al., 2008). African governments at Abuja committed to increase ITN coverage among vulnerable groups to 60%. By preventing malaria, ITNs reduce the need for treatment and the pressure on health services (Onwujekwe et al., 2005). There remains considerable debate about how best to deliver nets and target subsidies, in order to achieve an appropriate balance among the objectives of equity, efficiency and sustainability (Hanson et al., 2008).

Some of the major concerns regarding ITN use include, fear of the insecticide that is thought by some people to be a toxic family planning aid (Alaii et al., 2003a). Other concerns involve the effects of ITNs on acquisition and maintenance of immunity to malaria, which develops slowly and requires frequent contact with parasites in order to be maintained (Eisele, 2009). It has been hypothesized that transmission reduction due to the use of ITNs could lead to a delay on the development of immunity, which would in turn lead to a shift in morbidity and mortality to older age groups in high transmission areas (Snow et al., 1997). However several epidemiological studies conducted in Ghana (Binka et al., 2002), United Republic of Tanzania (Maxwell et al., 2006), Burkina Faso (Diallo et al., 2004) and Western Kenya (Lindblade et al., 2004) on the long term effects of ITNs on morbidity and mortality patterns in young children have demonstrated that there is no shift in malaria morbidity and mortality patterns to older age groups.

2.4 Knowledge on the causes of malaria

The community's socio-cultural context can play a critical role in the prevention and control of malaria. Mbonye et al. (2006) conducted a multi-method study to assess women's perceptions on malaria during pregnancy in the Mukono District of Uganda and discovered that most women could not differentiate symptoms of malaria from those of early pregnancy. Given the socio – cultural expectations for married women to get pregnant, the study found that many of them concealed symptoms like fever , nausea, general weakness, loss of appetite and vomiting.” until they were pregnant. Many women erroneously believe that malaria was a sign of pregnancy and most resorted to using traditional herbs as remedy for both malaria and for pregnancy ailments. This study highlights the contextual nature of beliefs and practices and the need to understand them before one can design interventions meant to address malaria prevention and control at the community level. The study used focus group discussions and key informant interview (Obol et al., 2011).

Hlongwona et al., (2009) reported on knowledge attitude and practices household survey with 320 respondents in Northern Swaziland. It was the premier studies in Swaziland and was meant to provide baseline data before the implementation of malaria elimination strategy at community level. About 99.7% of respondents associated malaria with mosquito bites. 95% reported they would seek treatment within 24 hours of seeing the first symptom of malaria. Indoor residual spraying (IRS) was reported as 87.2% while bed net ownership was reported at 38.8%. Despite the high level of knowledge about malaria within the surveyed communities, there was little information coming to people via their preferred source information: traditional community district meetings.

The importance of availability of information through proper rural community channels is echoed by another study in Northwestern Tanzania which highlights the need to address the challenge of illiteracy amongst local residents (Maziyo et al., 2010). Both studies highlighted that hearing about malaria is a good foundation onto which other activities like prevention and control can be built. There was also a study in an urban setting in Bangladesh which showed mixed results in connection between educational level and knowledge about malaria to the cost of treatment as a fraction of household income (Ahmed, et al., 2009).

2.5 Determinants of ITN use

A research by Ankomah (2014), on the effectiveness of mass campaign on the use of insecticide treated nets among pregnant women concluded that pregnant women who listened to mass media campaign are most likely to adopt strategies to protect themselves from malaria. Behavior change communications that are aimed at promoting net use and antenatal attendance are necessary in combating malaria.

In a population based prevalence survey conducted between by Ahmed (2009), in 13 endemic districts in Bangladesh, the overall prevalence rate in the 13 endemic districts was found to be 3.1% by the rapid diagnostic Test “falcivax’ (P falciparum 2.73%, vivax 0.16% and mixed infections 0.19%) with the highest in concentration the three districts. Findings revealed that poverty and level of schooling was found as important determinants of malaria knowledge and practices. Allopathic treatment was advocated but the majority of villagers went to village doctors and drug store sale around 40%.

Ricotta (2014), carried out a survey in 10 African countries, from 2009 – 2013, proportion of pregnant women who slept under an ITN the previous night and 95% confidence intervals were calculated and compared between countries. A median of 58% of households reported owning at least an ITN, on the average across all 10 countries, 35% pregnant women in households with at least an ITN used a net, and 79% of pregnant women, on the average used a net in such households. In all of the countries the predicted probability of ITN use by pregnant women was significantly higher than the probability of net use by other household mothers (Ricotta, 2014).

In a related study by Akaba (2013) at a booking clinic of the University of Abuja Teaching Hospital among 403 consenting pregnant women found that the knowledge of malaria and its preventive measures in pregnancy was 71.5% and there was a significant association between knowledge on malaria and educational status. Intermittent preventive treatment was used by 15.9% of the respondents, insecticide treated net ownership was 42.8%, however its use declined from 28.5% to 24.6% during pregnancy. The study concluded that there was adequate knowledge about malaria and its preventive measures in pregnancy but utilization of these measures were poor. There is the need for concerted efforts at addressing the barriers to utilization of these effective measures.

In a related study carried out at Ekiti State, Nigeria among 209 pregnant women attending antenatal clinic, it was observed that about 165 respondents had good knowledge on malaria, 109 women had heard about intermittent preventive treatment, 7.3% scored very good on knowledge while 53 (48.6%) and 48 (44.1%) scored average and poor of the 144 (68.9%) respondents who heard about insecticide treated

nets 95 (66.0%) scored good on knowledge, while 49 (34.0%) scored poor. It was identified that factors that influenced knowledge about malaria were occupation, level of education, months at first appearance at antenatal clinic and transportation cost. It was concluded that there are needs to intensify education on malaria and preventive measures as well as to encourage preventive practices among pregnant women (Akinleye, 2011). A research by Ankomah (2014), on the effectiveness of mass campaign on the use of insecticide treated nets among pregnant women concluded that pregnant women who listened to mass media campaign are most likely to adopt strategies to protect themselves from malaria. Behavior change communications that are aimed at promoting net use and antenatal attendance are necessary in combating malaria.

In a related study on attitudes to malaria and traditional practices by Aikins (1994), five West African countries were visited to assess the knowledge on the cause of malaria and traditional ways of treating and preventing the infection. Knowledge was low in the five communities: Indigenes considered mosquitoes as a nuisance to it causing malaria. Various herbs were used as mosquito repellents; malaria was also treated by herbal remedies. Beds net were used to a varying extent from 44% in Ghana to 86% in Gambia by residents of each country to protect against mosquito bites. They also used the bed nets not only to protect them from mosquito bites but for other purposes such as privacy, decoration and protection from debris from the roof dropping on the bed. (Aikins, 1994).

2.6 Knowledge on malaria in pregnancy

According to Agbohorma (2014), the current management and prevention of malaria in pregnancy is that in malaria endemic regions acquired partial immunity is not

effective during pregnancy. Pregnant women are too susceptible to malaria infection but it is severe or asymptomatic but it is accompanied by placental parasitization. Malaria contributes to about 2-15% maternal anemia, 13-70% intrauterine growth restriction, 8-14% low birth weight and 8-36% prematurity, 3.8% infant deaths and 2.9-17.6% maternal mortality.

The control of malaria during pregnancy should be a paramount feature in efforts to reduce maternal and perinatal morbidity and mortality in Africa.

In a population based prevalence survey conducted between July to November 2007 by Ahmed (2009) in 13 endemic districts in Bangladesh, the overall prevalence rate in the 13 endemic districts was found to be 3.1% by the rapid diagnostic Test “falcivax” (P falciparum 2.73%, vivax 0.16% and mixed infections 0.19%) with the highest in concentration the three districts. Findings revealed that poverty and level of schooling was found as important determinants of malaria knowledge and practices. Allopathic treatment was advocated but the majority of villagers went to village doctors and drug store sale around 40%.

In a related study on attitudes to malaria and traditional practices by Aikins (1994), five West African countries were visited to assess the knowledge on the cause of malaria and traditional ways of treating and preventing the infection. Knowledge was low in the five communities: Indigenes considered mosquitoes as a nuisance to it causing malaria. Various herbs were used as mosquito repellents; malaria was also treated by herbal remedies. Beds net were used to a varying extent from 44% in Ghana to 86% in Gambia by residents of each country to protect against mosquitoes bites. They also used the bed nets not only to protect them from mosquito bites but for other purposes such as privacy, decoration and protection from debris from the roof dropping on the bed. In an article by Rumisha (2014), where 297 women were used,

70% of them had primary school education, about a quarter had two children of less than 5 years of age while over 58% at least 3 children. 17.4% of the women had medium general knowledge on malaria while only eight percent of them had good knowledge on malaria in pregnancy. Knowledge of malaria in pregnancy had a significant association with levels of education ($p=0.024$) Ninety Nine parents had an ITN with most of them (87.1%) received free from the government.

In a related study by Onyeneho (2014), to identify key socio-demographic and knowledge factors associated with compliance of commodities for preventing malaria in pregnancy among 720 women, compliance with intermittent presumptive treatment in pregnancy was common in those who live in rural settings (26.9%) compared to their peri urban (20.3%) and urban (17.3%) those with good knowledge on the cause, effects and prevention of malaria during pregnancy complied more (23.7%) than those with poor knowledge (17.0%) with respect to sleeping under ITN. More of those with secondary education, good knowledge in malaria in pregnancy and currently living with a partner used ITN every night during the last pregnancy. Knowledge about the malaria in pregnancy and having a partner influence compliance with relevant preventives.

The attaining and sustaining high net coverage especially in pregnant women and children under 5 years of age has been a priority of most countries where malaria is of public health concern. Achieving high net coverage is currently vigorously being championed by three malaria initiatives, Millennium Development Goals (MDGs), the Roll Back Malaria Partnership, and the US President's Malaria Initiative (Millennium Project 2005; RBM, 2005; PMI, 2006). Scaling up coverage to at least

80% use by young children and pregnant women by 2010 was a consensus target of the three malaria initiatives.



CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter presents the various techniques and tools that were used to collect data from the participants. It also describes the type of study, study location, variables to be measured, sampling plan and analytical tools that were used to analyze data. Furthermore, it presents the ethical considerations and other methodological issues of this study.

3.2 Type of study

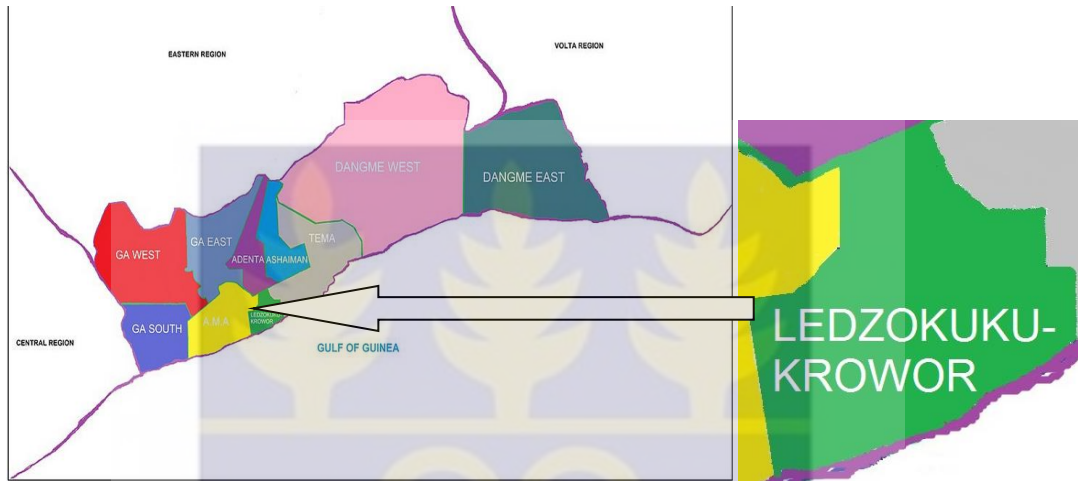
Cross-Sectional study design was employed to assess the ITN usage and ownership among pregnant women visiting the LEKMA hospital through a quantitative approach of data collection.

3.3 Study site

The Ledzokuku – Krowor Municipal Assembly (LEKMA) is one of the districts in the Greater Accra Region. It was inaugurated on 29th February 2008 under legislative instrument (LI) 1815. The municipality has a total land area of 50 square kilometers. The municipality is bounded on the south by the Gulf of Guinea, from the Kpeshie lagoon to the Mukwe lagoon near the Regional Maritime Academy. LEKMA lays in the Savannah Zone which experiences a double maximal rainy season. The population of the municipality is estimated at 249, 794, out of this 51% are females and 49% males. The population of the Municipality is youthful with 50.70% under the age of 24yrs.

Administratively, the Municipality is divided into three sub municipalities namely Teshie North, Teshie South and Nungua. The Gas who are the indigenous ethnic group of the municipality are the majority constituting 44.3% of the population, followed by Akans 34.8% and Ewes 12.4%. The predominance of a particular ethnic group varies based on the locality in question: Ga –Adangbe appears to be dominant in Nungua, Teshie South and Maatetsuru while a strong Akan presence is observable in migrant communities such as Teshie – Nungua Estates.

The Municipal Health Directorate oversees the services provided at the various health facilities. The Municipality currently has five key types of health facilities namely Hospitals, Health Centre, Community clinics, Community-based Health Planning and Services (CHPS) Compounds and Maternity Homes. These facilities are government owned, quasi government, mission or private. There are hospitals such as the Family Health, Manna Mission and Lister Hospitals which provide Obstetrics and Gynecological services among others. There are fifteen Doctors, two hundred and thirty one General Nurses, eight Medical Assistants, forty five Midwives, one hundred and fourteen Community Health Nurses and thirteen Community Health Officers working in public health facilities in the municipality. The private health facilities also have staff strength of eleven Doctors, thirty three General Nurses, five Medical Assistants and twenty one midwives.



Sourced from: <http://lekmagh.org/>

Figure 2 Map of Ledzokuku-krowor Municipal

3.4 Study Variables

The dependent variables of the study were Bed net Usage and Bed net ownership among pregnant women. The independent variable or exposure variable that can influence the outcome variable includes:

Table 1 Independent Variables

Variable	Description
Socio-Demographic factors	Age, Level of education, Gender, Marital status, Occupation
1) Individual/Personal Barriers	Knowledge on malaria Knowledge on ITN use ITN Ownership ITN USE

3.5 Study population

The study population was made up of pregnant women aged 18 years and above and visiting the LEKMA hospital for ANC during the period of the study.

3.6 Sampling

3.6.1 Sample Size

A minimum sample size was obtained using the sample size calculation formula,

$$\text{Thus } n = z^2 (p*q) e^2$$

n = sample size.

Z=percentile for 95% significance level of normal distribution (1.96)

P=prevalence of what is being studied

$$\text{ITN use} = 50\% = 0.50$$

$$Q = 1-p$$

e=margin of error.

Based on this formulae minimum sample size of 384 cases will be targeted. The number will be increased to 400 to compensate for non-responses and allow for generalization of result.

3.6.2 Sampling /Data collection method.

Systematic sampling was used. On arrival at the clinic, we often select the first client to arrive for antenatal. Subsequently we select every third client until sample size was achieved.

Data was collected through the use of a structured questionnaire through research assistants

3.7 Quality Control

The questionnaire which was used for this study was brief, easily understandable and self-explanatory. Pre-testing of the questionnaires was done at the korle bu Teaching Hospital which is also a teaching hospital in Accra. Any changes or alterations would be used in the real work. Two research assistants were trained and supervised to administer questionnaire effectively and also monitored to implement the tasks given them, appropriately. Daily debriefing was undertaken to assess progress of work as well as help solve any challenges that research assistants had encountered.

3.8 Data processing and Analysis

Data processing and analysis was done using STATA version 12 (STATA corporation college station, TX, USA) and Microsoft Office Excel. Responses to questions were coded before data entry. Data entry was done in Microsoft Office Excel before it was imported into STATA. The data was cleaned to prevent double entry. Frequencies and

percentages were run. Continuous measurements were presented as means, standard deviations, or medians. Categorical variables were presented as percentages with 95% confidence intervals (CI). Pearson's Chi-square was used to determine the association between the dependent variable and the independent variables. To determine the strength of association between the dependent and independent variables, a logistic regression was run and odds ratio estimated for the significant factors at 95% confidence interval.

3.9 Ethical Consideration

Ethical clearance for this study was sought from the Ghana Health Service Ethical Review Committee. The ethical clearance identification number of this study is GHS-ERC 76/02/15. Permission was sought from the Director of LEKMA Hospital. Informed consent was obtained from clients before the questionnaires were administered. Participants were allowed to withdraw at any time during the data collection process. Participants were informed about the right to refuse participation in the study without it affecting their further clinical care in the facility. Questionnaires were administered anonymously in order not to link it to the study participants. Interviews were conducted in a closed and separate area in the outpatient department without any interruptions.

3.10 Incentives/Compensation

Clients who participated in the study were appreciated and their concerns noted. There was no compensation for participating in this study.

3.10.1 Potential risks/benefits

This study was non-invasive and it did not cause any form of discomfort to participating clients. Clients would benefit from the results because it gave them the opportunity to express their concerns. The results would be used to inform policy on bed net usage and ownership.

3.10.2 Data Storage

Data collected was password protected to prevent unauthorized access. All the names of respondents were kept in confidence. Backup for the data was saved and kept in a secured place. The Principal Investigator would keep all data collected during the study for 5 years to allow for publication, after which it will be destroyed.

3.10.3 Conflict of Interest

This research was self – financed. As the principal investigator of the study and a clinician, I worked closely with the two research assistants. I however, did have any other personal interest in this study except for its academic and public health importance.



CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This section presents results of the study. The results are presented in charts and tables and summarized as frequencies and percentages.

4.2 Demographic characteristics

The study surveyed 400 pregnant women to illicit their knowledge and usage of insecticide treated bed nets. The demographic characteristics are presented in Table 1. The minimum age of the women was 22 years while the maximum age was 34 years. The average age of the pregnant women was 25.84 ± 5.95 years. The median age of pregnant women in the study was 26 years. Majority of the pregnant women (69%) were in age group 25-34 years, 28.3% were in age group 15-24 while 0.5% were in age group 45-54 years. More than half of the pregnant women (74.3%) were Christians. Majority of the pregnant women (87.5%) reported having attended school before. Pregnant women were of varying educational levels. Only 10% each, of the pregnant women had no formal education and tertiary level education. One third of the pregnant women (34.8%) were Gas while 24.8% were Akan. More than half of the pregnant women (65.3%) were married while 22.8% were single. Most of the pregnant women (42.8%) in the study were Traders while 11.8% were Civil/Public Servants. However, 22.8% reported other types of occupations (Table 4.1).

Table 4.1: Demographic characteristics of respondents

Demographic characteristics	Frequency (n)	Percent (%)
Age group		
15-24	113	28.3
25-34	276	69.0
35-44	9	2.3
45-54	2	0.5
Total	400	100
Religion		
Christian	297	74.3
Muslim	79	19.8
Traditional	7	1.8
Others	17	4.3
Total	400	100
Ever attended school		
Yes	350	87.5
No	50	12.5
Total	400	100
Highest educational level		
None	41	10.3
Primary	68	17.0
Middle/JSS	116	29.0
Secondary/SHS	88	22.0
Voc/Tec/Post Sec	47	11.8
Tertiary	40	10.0
Total	400	100
Ethnic group		
Akan	99	24.8
Ga	139	34.8
Ewe	108	27.0
Non Ghanaian	12	3.0
Others	41	10.6
Total	400	100
Marital Status		
Married	261	65.3
Divorced	6	1.5
Single	91	22.8
Separated	11	2.8
Cohabitation	31	7.8
Occupation		
Fishmonger	29	7.3
Housewife	62	15.5
Civil/Public Servant	47	11.8
Traders	171	42.8
Others	91	22.8

4.3 History of pregnancy

Most of the pregnant women (76.3%) have ever given birth. Some of the pregnant women (0.25%) have not had any previous births. Most of the pregnant women (36.3%) have had two children previously. Only 6% of the respondents have never gotten pregnant. However, more than half of the pregnant women 55.8% have had 2 previous pregnancies. Majority of the pregnant women 74% are 3 or more months into their pregnancies (Table 4.2).

Table 4. 2: History of pregnancy

History of pregnancy	Frequency (n=400)	Percent (%)
Ever given birth		
Yes	305	76.3
No	95	23.8
Previous number of children		
None	84	21.0
1	140	35.0
Two	145	36.3
≥ 3	31	7.8
Number of pregnancies ever had		
0	24	6.0
1	71	17.8
2	223	55.8
3	82	20.5
Age of pregnancy		
< 3	104	26.0
≥ 3	296	74.0

4.4 Pregnant women's knowledge on effects of Malaria in pregnancy

Most pregnant women in this study 72.5% have heard of malaria and majority of these women 78.3% knew the causes of malaria. However, 4% of these pregnant did not know the causes of malaria. In spite of the fact that pregnant women mentioned more than one symptom of malaria, the most prevalent symptom of malaria was fever as reported by 84.8% of the respondents after being prompted. However, 2.5% of the

pregnant women could not state any of the symptoms of malaria. Majority of the pregnant women (88.8%) agreed that untreated malaria affects the unborn baby. Almost all pregnant women agreed that untreated malaria can lead to number of complications. The most prevalent among these complications was abortion as reported by 47% of them and anemia 17.3% 10.5% reported that they did not know any of the effect of malaria on pregnancy (Table 4.3).

Table 4. 3: Knowledge of pregnant women on the effect of malaria in pregnancy

	Frequency (n=400)	Percent (%)
Heard of malaria		
Yes	290	72.5
No	110	27.6
Causes of malaria		
Correct	228	78.3
Partly correct	52	17.8
Incorrect	10	4.0
Symptoms		
Fever	339	84.8
Headache	24	6.0
Abdominal pains	1	0.3
Bodily pains	8	2.0
More than one	18	4.5
Don't Know	10	2.5
Untreated malaria affects baby		
Yes	355	88.8
No	11	2.8
Don't know	34	8.5
Malaria causes		
Abortion	188	47.0
Still birth	47	11.8
Premature delivery	8	2.0
Infant low birth	9	2.3
Weight	14	3.5
Anemia	69	17.3
Death	23	5.8
Don't know	42	10.5

4.5 Pregnant women's knowledge about new treatment plan for malaria

Majority of the pregnant women 89.5% reported that they have heard of the new treatment plan and their primary source of information from the antenatal clinic as reported by 86.5% of them. Only a small proportion of them (2.8%) reported that their source of information is the radio. Most pregnant women were fully aware of the treatment plan as 70% of them reported that it involves taking fansidar once a month three times after 20 weeks of pregnancy. Only 19.3% of these women have suffered malaria during their current pregnancy. Almost all of those who have suffered malaria 97% go to the hospital when they have malaria. This is shown in Table 4.4

Table 4.4: Knowledge of pregnant women on new treatment plan for malaria

Knowledge on new treatment plan	Frequency (n)	Percent (%)
Heard of new treatment plan		
Yes	358	89.5
No	42	10.5
Source of information on treatment plan		
Antenatal	346	86.5
Radio	11	2.8
Drug store	1	0.3
Does not know	8	2.0
Tell me about the treatment		
Taking fansidar once a month for three times	280	70.0
Sleeping under a mosquito net	82	20.5
Going to the drug store to buy medicine when sick	6	1.5
Don't know	32	8.0
Suffered malaria		
Yes	77	19.3
No	323	80.8
What did you do		
Go to the hospital	75	18.8
Go to the drug store	7	1.8
Go to the herbalist	4	1.0
Others	314	78.5

4.6 Pregnant women's knowledge of insecticide treated nets

Majority of the pregnant women (82.5%) own a mosquito net that can be used and more than half of them (58.5%) have owned it for more than 3 months. Majority of the pregnant women (76%) obtained it from antenatal clinic while a few, 5.5% and 4% obtained it from drug stores and field workers respectively. However, 14.3% could not tell where they obtained it from. 56.3% of the pregnant women reported that their bed nets have been treated. About 61% of the pregnant women reported that their bed net have not been dipped in a liquid to kill mosquitoes. Only 9.8% of the pregnant women have dipped the ITN into the liquid in the last month. In spite of the fact that 70.3% of the pregnant women slept under mosquito nets, 90% reported that the ITN prevents malaria. About two-thirds of the pregnant women (76.5%) reported that they knew how the net prevents malaria. Most pregnant women reported that it prevents mosquito bites by preventing them from entering or killing them before they enter (Table 4.5).

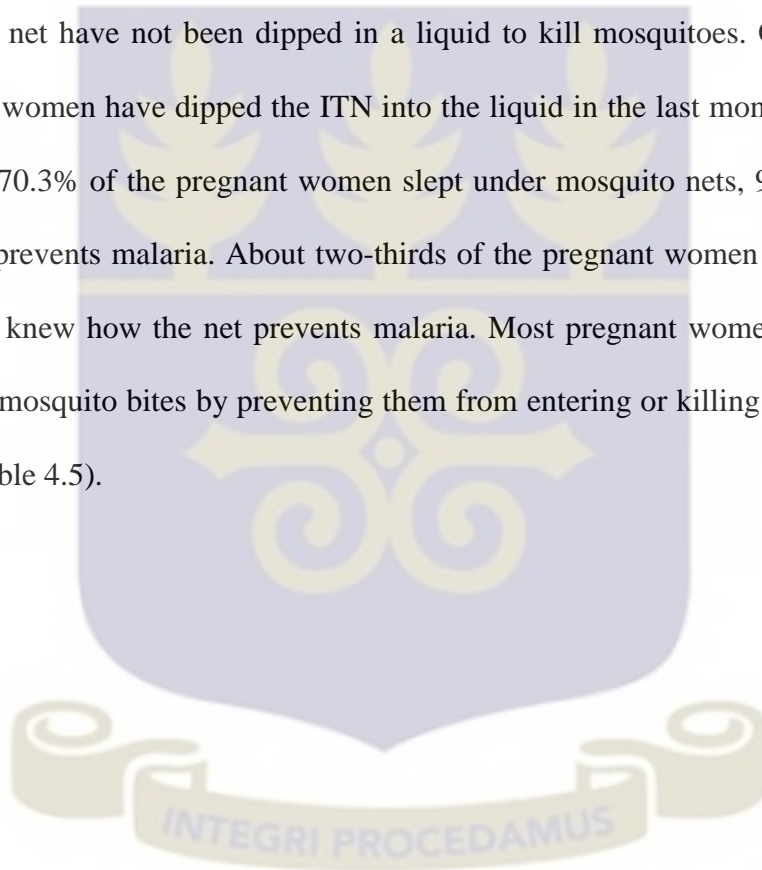


Table 4.5: Pregnant women knowledge on insecticide treated nets

Insecticide treated nets	Frequency	Percent
Household has mosquito Net		
Yes	330	82.5
No	70	17.5
Length of acquisition		
Less than 3 months ago	85	21.3
3 or more months ago	234	58.5
Not sure	101	20.3
Source of ITN		
Antenatal clinic	304	76.0
Field workers outreach	16	4.0
Drug store	22	5.5
Private hospital	1	0.3
Not sure	57	14.3
Net was treated		
Yes	225	56.3
No	106	26.5
Not sure	69	17.3
Net has been dipped in liquid		
Yes	47	11.8
No	244	61.0
Not sure	109	27.3
Length of net dipped into liquid		
Months ago	39	9.8
12 or more months ago	17	4.3
Not sure	344	86
Slept under mosquito net (Last night)		
Yes	281	70.3
No	119	29.8
Mosquito nets prevent malaria		
Yes	360	90.0
No	21	5.3
Not sure	19	4.8
Do you know how it prevents malaria		
Yes	306	76.5
No	34	8.5
Not sure	60	15.0

4.7 Logistic regression showing association between demographic characteristics and mosquito net ownership

Logistic regression showed that highest educational level, ethnicity, marital status and occupation were significant predictors of household owning an ITN. Pregnant women who have attended school had a 16 times the odds of owning an ITN compared with those with no formal education. All other demographic characteristics were not significantly associated with owning an ITN. Ewes have 9 times the odds to own an ITN compared to Akans while Non Ghanaians have 13 times the odds of likely owning ITN compared with Akans. Single mothers 3 times the odds of owning ITN compared with married mothers (Table 4.6).

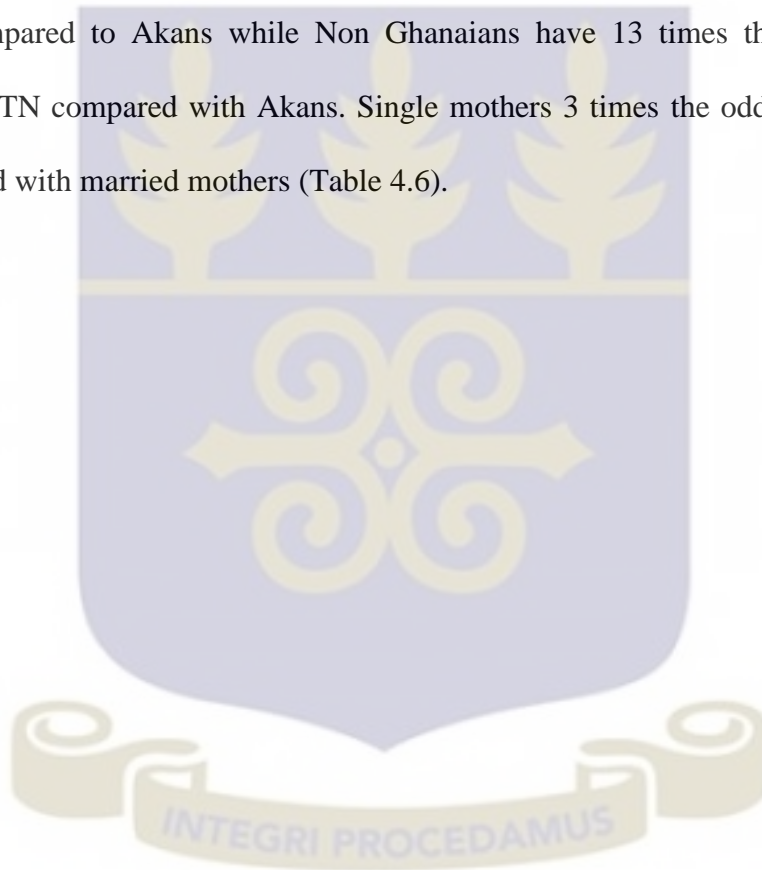


Table 4.6: Association between demographic characteristics and ITN ownership

Predictors	B	S.E.	Wald	p-value	OR	OR95% C.I	
Age group							
15-24	Ref		0.868	0.833			
25-34	0.197	0.479	0.169	0.681	1.218	0.477	3.112
35-44	-0.814	1.21	0.453	0.501	0.443	0.041	4.748
45-54	-20.341	244.447	0.001	0.999	0.043	0.029	1.273
Religion							
Christian	Ref		1.65	0.648			
Muslim	-0.997	0.796	1.571	0.216	0.369	0.078	1.754
Traditional	17.65	470.286	0.001	0.997	46.184	12.344	48.946
Others	-0.605	1.276	0.225	0.635	0.546	0.045	6.656
Use ITN							
Yes	Ref						
No	-19.85	104.988	0.001	0.998	0.113	0.102	1.925
Level of education							
Highest Education			16.777	0.001			
None	Ref						
Primary	-24.158	104.988	0.234	0.998	0.241	0.189	0.446
Middle/JSS	-23.227	104.988	0.342	0.998	0.542	0.158	1.382
Secondary/SHS	-23.372	104.988	0.683	0.998	0.236	0.212	0.492
Voc/Tec/Post Sec	-40.704	176.068	0.843	0.998	0.273	0.235	0.365
Tertiary	-22.043	104.988	0.564	0.998	0.106	0.216	0.243
Ethnicity							
Akan	Ref		12.437	0.014			
Ga	1.063	0.58	3.361	0.067	2.894	0.929	9.013
Ewe	2.21	0.687	10.341	0.001	9.118	2.37	35.069
Non Ghanaian	2.596	1.351	3.695	0.055	13.413	0.95	189.315
Others	2.324	0.836	7.721	0.005	10.214	1.983	52.609
Marital Status							
Married	Ref		7.269	0.122			
Divorced	-17.736	162.615	0.875	0.999	0.145	0.023	.
Single	1.291	0.479	7.269	0.007	3.638	1.423	9.301
Separated	-17.746	112.534	0.418	0.999	0.084	0.024	1.237
Cohabitation	-36.893	684.498	0.682	0.996	0.062	0.039	0.965
Occupation							
Fishmonger	Ref		26.695	0.001			
Housewife	0.473	1.002	0.223	0.637	1.605	0.225	11.451
Civil/Public Servant	-1.939	1.458	1.768	0.184	0.144	0.008	2.507
Trader	-1.191	0.969	1.513	0.219	0.304	0.046	2.028
Others	1.420	1.005	1.996	0.158	4.138	0.577	29.682
Constant	19.276	104.988	0.324	0.999	235.864		

4.8 Demographic characteristics and sleeping under an ITN

Logistic regression showed that ethnicity, marital status and occupation were significant predictors of sleeping under an ITN. Pregnant women who have attended school had a 7 times probability of sleeping under an ITN compared with those with no formal education. All other demographic characteristics were not significantly associated with owning an ITN. Ewes are have 3 times the odds of sleeping under an ITN compared to Akans. Separated mothers are have 2 times the odds of sleeping under an ITN compared with married mothers (Table 4.7).



Table 4. 7: Association between demographic characteristics and sleeping under ITN

Predictors	B	S.E.	Wald	p-value	OR	95% C.I. for OR	
Age group							
15-24	Ref		2.797	0.424			
25-34	-0.201	0.342	0.343	0.558	0.818	0.418	1.601
35-44	1.364	1.015	1.807	0.179	3.913	0.535	28.596
45-54	-0.28	1.754	0.025	0.873	0.756	0.024	23.5
Religion							
Christian	Ref		14.526	0.002			
Muslim	-2.453	0.692	12.56	0.001	0.086	0.022	0.334
Traditional	40.622	12.9	0	0.997	4.393	0.011	2.674
Others	0.794	0.762	1.085	0.298	2.211	0.497	9.845
Own ITN							
Yes	Ref						
No	2.071	0.83	6.232	0.013	7.936	1.561	40.359
Educational Level							
None	Ref		22.058	0.001			
Primary	-0.118	1.038	0.013	0.909	0.888	0.116	6.794
Middle/JSS	-2.024	0.977	4.288	0.038	0.132	0.019	0.897
Secondary/SHS	-1.957	1.03	3.612	0.057	0.141	0.019	1.063
Voc/Tec/Post							
Sec	-1.759	1.063	2.741	0.098	0.172	0.021	1.382
Tertiary	-1.563	1.569	0.992	0.319	0.210	0.01	4.536
Ethnicity							
Akan	Ref		14.638	0.006			
Ga	0.56	0.41	1.864	0.172	1.75	0.784	3.91
Ewe	0.954	0.494	3.73	0.053	2.596	0.986	6.836
Non Ghanaian	0.368	1.245	0.087	0.767	1.445	0.126	16.578
Others	2.374	0.629	14.233	0.001	10.737	3.128	36.851
Marital status							
Married	Ref		3.921	0.417			
Divorced	-17.432	15124.68	0.045	0.999	0.001	0.001	0.021
Single	0.643	0.349	3.395	0.065	1.901	0.96	3.767
Separated	0.9	0.958	0.882	0.348	2.459	0.376	16.082
Cohabitation	-23.029	5352.941	0.023	0.997	0.001	0.003	0.524.
Occupation							
Fishmonger	Ref		19.87	0.001			
Housewife	1.386	0.809	2.94	0.086	4.001	0.82	19.519
Civil/Public							
Servant	0.026	0.939	0.001	0.978	1.026	0.163	6.47
Trader	0.61	0.724	0.711	0.399	1.841	0.446	7.603
Others	1.963	0.79	6.176	0.013	7.118	1.514	33.467
Constant	-1.245	1.274	0.956	0.328	0.288		

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This section discusses the findings of the study in accordance with stated objectives and research questions. The findings are discussed using literature reviewed in the second section of the thesis.

5.2 Demographic characteristics

In this study, 400 pregnant women with an average age of 25.8 ± 5.9 years were surveyed to assess their knowledge and usage of insecticide treated nets. The median age of the pregnant women was 26 years and this falls within sexually active age group. The minimum age of the women was 22 years while the maximum age was 34 years. Majority of the pregnant women 69% were within the fertile age group of 25-34 years. More than half of the pregnant women 74.3% were Christians. This distribution is to be expected as majority of Ghanaians are Christians as reported in the 2010 population census (Ghana Statistical Service, 2010). Majority of the pregnant women 87.5% reported having attended school before. Pregnant women were of varying educational levels. Only 10% of the pregnant women have no formal education and tertiary level education. The educational level of respondents plays an important role in health behavior choices and knowledge on health issues. Having majority of the pregnant women educated will aid in understanding the questionnaire and also provision of appropriate responses. Most pregnant women 34.8% in the study were Ga while 24.8% were Akan. This is to be expected as the study site comprises predominantly of Ga. More than half of the pregnant women 65.3% were married

while 22.8% were single. This distribution is in agreement with religious and cultural beliefs of the study population. Society frowns on individuals who become pregnant before getting married. Most people will only get pregnant after marriage. Most of the pregnant women 42.8% in the study were Traders while 11.8% were Civil/Public Servants. However, 22.8% reported other types of occupations. The predominant employment of majority of the women in the population is trading. The distribution of the pregnant women in this study is therefore a reflection of what pertains in the general population.

5.3 History of pregnancy

In this study, majority of the pregnant women (76.3%) have given birth before. However, 23.8% had no previous birth history. This may probably be due to their current ages as most of them were in their mid-fertile periods. This is confirmed by the median age of 26 years for these women. Most of the pregnant women (36.3%) have had two children previously. This seems to suggest that respondents have enough experience in pregnancy and as such can provide the needed information required the current study. Only 6% of the respondents have never gotten pregnant. Majority of the pregnant women 74% are 3 or more months into their pregnancies. This is to be expected as most pregnant women start ANC clinics just before or after their first trimester.

5.4 Knowledge of pregnant women on effect of Malaria in pregnancy

Adequate knowledge was defined as having 70% and above knowledge on the various aspects of malaria. A correct answer attracted 1 point and a wrong answer attracted 0. In this study, pregnant women showed adequate knowledge on malaria and its causes. This was supported by 72.5% of them reporting that they have heard of malaria. A

look at the educational level of these women seems to be the source of this knowledge. Also, there are educational talks at the OPD and malaria is normally incorporated in such talks. The knowledge of malaria and its preventive measures in pregnancy was 71.5% and there was a significant association between knowledge on malaria and educational status.

In recent times, a few adverts have been shown on television on malaria and its prevention. This may have also impacted on the awareness of the disease. However, hearing of a disease condition does not necessary imply one has adequate knowledge on that condition. A research by Ankomah (2014) on the effectiveness of mass campaign on the use of insecticide treated nets among pregnant women concluded that pregnant women who listened to mass media campaign are most likely to adopt strategies to protect themselves from malaria. Behaviour change communications that are aimed at promoting net use and antenatal attendance are necessary in combating malaria. There was also a study in urban setting in Bangladesh which showed a mixed result in connection between educational level and knowledge about malaria to the cost of treatment as a fraction of household income (Ahmed, et al, 2009).

This study further assessed the depth of pregnant women's knowledge on causes of malaria. Majority of the pregnant women correctly knew the causes of malaria while a fifth had partial knowledge on this. Only 4% of the pregnant women did not know the causes of malaria. The pregnant women also mentioned most of the symptoms of malaria. However, the most predominant symptom was fever as reported by 84.4% of them. Pregnant women mentioned more than one symptom of malaria to emphasize their level of knowledge on malaria. A small proportion of the pregnant women 2.5% could not mention any symptom of malaria. According to Akinleye, (2011), about 165 respondents had good knowledge on malaria, 109 women had heard about intermittent

preventive treatment, 7.3% scored very good on knowledge while 53 (48.6%) and 48 (44.1%) scored average and poor of the 144 (68.9%) respondents who heard about insecticide treated nets 95 (66.0%) scored good on knowledge, while 49 (34.0%) scored poor. It was identified that factors that influenced knowledge about malaria were occupation, level of education, months at first appearance at antenatal clinic and transportation cost. It was concluded that there are needs to intensify education on malaria and preventive measures as well as to encourage preventive practices among pregnant women.

Pregnant women in this study agree that untreated malaria affect the unborn baby as reported by 88.8% of them and almost all of them agree that this can lead to complications. They reported on abortion, anemia, still births and premature delivery. The above findings seem to suggest that pregnant women in this study have adequate knowledge on malaria. This could mean that knowledge on a disease condition may impact the attitude of that person towards any intervention available to control, manage or treat such disease. Finally, it influences the practice of such interventions by the respondent. In a related study on attitudes to malaria and traditional practices by Aikins (1994), five West African countries were visited to assess the knowledge on the cause of malaria and traditional ways of treating and preventing the infection. Knowledge was low in the five communities: Indigenes considered mosquitoes as a nuisance to it causing malaria. Various herbs were used as mosquito repellents; malaria was also treated by herbal remedies. Beds net were used to a varying extent from 44% in Ghana to 86% in Gambia by residents of each country to protect against mosquitoes bites. They also used the bed nets not only to protect them from mosquito bites but for other purposes such as privacy, decoration and protection from debris from the roof dropping on the bed.

5.5 Knowledge of pregnant women on new treatment plan

In this study, majority of the women 89.5% have heard of the new treatment plan for pregnant women. This is good for reducing complications of pregnancy as malaria is one of the main causes of maternal and child mortality in the current population. Respondents reported that their source of information on the treatment plan was antenatal clinics. This is to be expected as the study was hospital based and the women have been attending ANCs. At most ANC meetings, pregnant women are educated on various aspects of birth preparedness, danger signs and safe delivery. As reported earlier, in recent time the radio has been used as a media to educate the public the new treatment plan. A small proportion of the pregnant women reported the radio as their source of information. Pregnant women in this study were knowledgeable in the new treatment plan as 70% were fully aware of what it entails (taking fansidar once a month three times and sleeping under the mosquito net. Most pregnant women were fully aware of the treatment plan as 70% of them reported that it involves taking fansidar once a month three times. Only 19.3% of the respondents have suffered malaria during their current pregnancy. Almost all of those who have suffered malaria 97% go to the hospital when they have malaria. This finding is to be expected as these women have adequate knowledge on both malaria and the new treatment plan. Since these women have already started ANC visits, the most likely place they will go for treatment will be the hospital.

5.6 Knowledge of pregnant women on insecticide treated nets

Majority of the pregnant women 82.5% own a mosquito net that can be used and more than half of them 58.5% have owned it for more than a 3 months. Sharing of insecticide treated nets at ANC visits is common nationwide. The high proportion

recorded here may be as a result of the fact that the study was carried out in a health facility. It was therefore not surprising that majority of the pregnant women 76% reported that they obtained theirs from antenatal clinics. A few 5.5% and 4% obtained it from drug stores and field workers.

However, 14.3% could not tell where they obtained it from. Public health nurses also go round during immunization and distribute treated insecticide nets. In support of the findings of this study Alukwo et al (2012), reports that consistent use of these nets is important in the prevention of malaria. The WHO and Roll Back Malaria (RBM) partnership now recommend that distribution of LLINs be free or heavily subsidized to achieve greater equity of coverage, and that a variety of distribution systems be used to achieve universal access, including targeted campaigns to deliver nets to most-at-risk populations, which include pregnant women and children under five years of age.

This may account for the 4% who reported receiving it from the field workers. A little over half of the pregnant women, 56.3% reported that the net has been treated. More than half of the pregnant women 61% reported that the net has not been dipped in a liquid used to kill mosquitoes. This may be due to the fact that they have not had the insecticide treated net for too long or they may not be using it at all. In spite of the fact that 70.3% of the pregnant women slept under mosquito nets 90% reported that the ITN prevents malaria. More than half of the pregnant women 76.5% reported that they knew how the net prevents malaria. Most pregnant women reported that it prevents mosquito bites by preventing them from entering or killing them before they enter. The evidence for the efficacy of ITNs in preventing malaria infection and its consequences in pregnancy is strong, as reported in a Cochrane review in 2009. The evidence showed a strong correlation between the use of ITNs and reduction in

stillbirths, improvements in birth weights of babies and a reduction in the prevalence of parasitaemia and anemia in pregnant women. A communal protective effect of ITNs and reduction in overall vector density has also been observed in some settings (Kileen et al, 2007).

Having adequate knowledge on the use and effect of the treated nets on mosquito makes it easier for them to obtain and use it. Lack of accurate knowledge on treated net has prevented pregnant women from even accessing it and those who are given do not use it. Similarly, insecticide-treated nets (ITNs) have been shown to be the most cost effective measure in the prevention of malaria (Dolonet ,al 1993). ITNs have been shown to reduce malaria mortality by 17% in children below the age of five(Baume et al 20011). In view of the effectiveness of ITNs, the Roll Back Malaria (RBM) Partnership was targeted to protect 80% of children and pregnant women at risk for malaria with ITNs by 2015 (Alukwo et al, 2009).

In this study, significant association was observed between having attended school and owning an ITN at home as shown in Table 4.6. Pregnant women who have attended school had a 6 time probability of owning an ITN. All other demographic characteristics were not significantly associated with owning an ITN. Also, significant association was shown between having attended school and sleeping under an ITN at home Pregnant women who have attended school had a 9 times probability of sleeping under an ITN. All other demographic characteristics were not significantly associated with sleeping under an ITN.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Introduction

This section summarizes the key findings of the study and presents a conclusion to the research. The section also provides recommendations realized from the study and finally states how the study was limited.

6.2 Conclusion

This study sought to determine the level of knowledge of pregnant women on malaria, new treatment plan and insecticide treated nets. Pregnant women in this study were knowledgeable in malaria and it causes as well as its new treatment plans. Pregnant women in the study could identify some symptoms and causes of malaria as well why there is the need to using the new treatment plan. Most pregnant women in the study were having the insecticide treated net and were using it. Only a few of them were not having. The primary source of insecticide treated net was the antenatal clinic. The study was carried out in a hospital certain which positively impacted on the knowledge, attitude and practice of these women who were already attending ANCs.

6.3 Recommendation

1. Pregnant women must be encouraged to attend ANCs regularly and participate fully in its activities. This can be done through community engagement and educational talks. This will provide them with adequate information on various aspects of birth preparedness, safe delivery and knowledge on danger signs.

2. Pregnant women must be encouraged to access insecticide treated nets and use them regularly to prevent malaria and reduce complications in pregnancy. Public health nurses can be asked to identify pregnant women in their communities and educate them on the benefits of
3. Educational talks at OPDs of ANC clinics must be intensified to help provide the needed information to expectant mothers. Such useful information helps expectant mothers to make informed decisions.
4. The distribution of treated mosquito nets must be intensified and government must subsidize its cost or make it freely available to ensure that expectant mothers are not excluded based on cost.
5. The use of mass media must be encouraged and widened so that those who do not come for ANC visits are covered and provided with the necessary information to help them make informed decisions.
6. In view of the findings of this study educational talks should be organized at these centers.

6.4 Limitation

1. The study was limited by the choice of study site as respondents were already attending ANCs and that gave them an added advantage. They had access to accurate information and free bed nets. This may have introduced some information bias.
2. The use of questionnaires as data collection tools may have introduced some recall bias in the responses provided by pregnant mothers.

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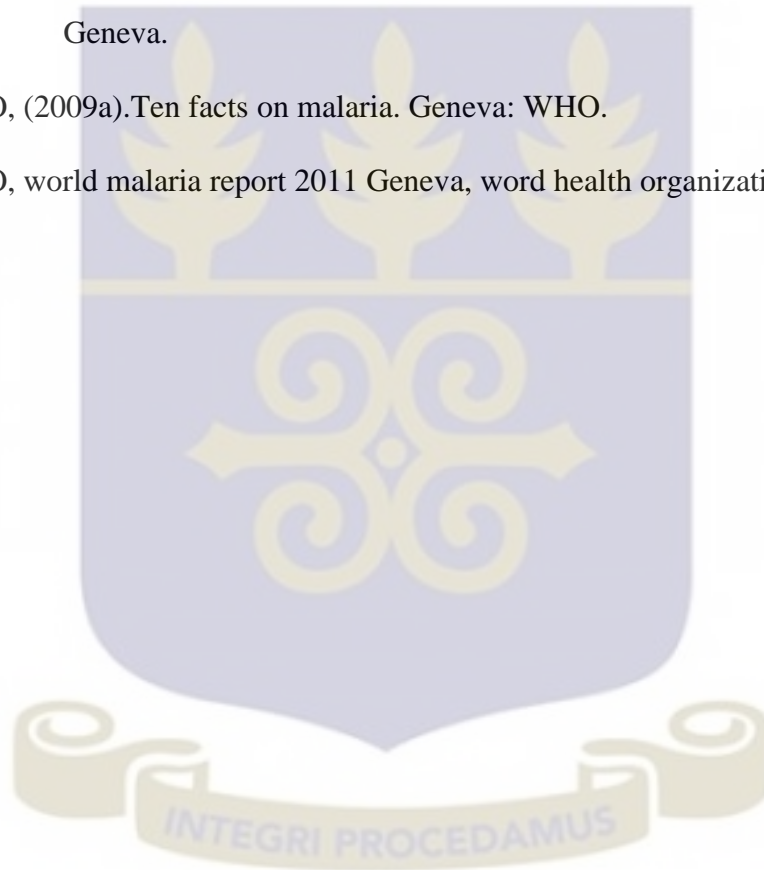
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APPENDICES

APPENDIX 1: CONSENT FORM

Title: THE USE OF INSECTICIDE TREATED NET AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT LEKMA HOSPITAL.

Principal Investigator – Rita Attoh-Okine

Address – School of Public Health, University of Ghana, Legon.

Introduction

This consent form contains information about the research named above. In order to be sure that you are informed about being in this research, we are asking you to read this consent form. You will also be asked to sign it. We will give you a copy of this form. This consent might contain some words that are unfamiliar to you. Please ask us to explain everything you may not understand.

Research purpose/General information about Research- The research is to find out use and ownership of insecticide treated net among pregnant women.

Possible risk and Discomforts- I do not for see any risk or discomfort from your participation in their research.

Possible Benefits- The use and ownership of insecticide treated nets will be improved.

Confidentiality-Unless you choose otherwise all the information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Your data will be safely stored in a locked facility and only the researcher will have access to this information. However, the staff of the School of Public Health and College of Health Sciences may sometimes locate your research records. Confidentiality will be provided to the fullest extent possible by law.

Staying in the Research

Your participation in this study is completely voluntary and you may refuse to answer any question or choose to stop participation at any time. Your decision not to volunteer will not influence the nature of the ongoing relationship you may have with the researcher or the School of Public Health, either now or in the future.

Leaving the research

You can stop participating in this study at any time, for any reason. Your decision to stop participating or to refuse to answer particular questions will not affect your

relationship with the researcher or the School of Public Health. Should you decide to withdraw from the study all data generated as a consequences of your participation will be destroyed.

Your rights as a participant

If you have question about the research in general or about your role in the study please feel free to contact Rita Attoh-Okine, MPH Candidate at the School of Public Health, University of Ghana, Legon, Tel – 0244689791, E-mail: naadede2012@yahoo.com.

Dr. Ayaga Bawah, 0244714164, E-mail: aabawah@gmail.com.

The above document describing, the benefits, risk and procedures for research has been read and explained to me. I have been given the opportunity to ask any questions about the research and answers given to my satisfaction. I agree to participate as a volunteer.

_____	_____
Date	Signature or thump print of
volunteer	
_____	_____
Date	Signature of interviewer



APPENDIX 2: QUESTIONNAIRE

UNIVERSITY OF GHANA
SCHOOL OF PUBLIC HEALTH

PROJECT TITLE: THE USE OF INSECTICIDE TREATED NETS AMONG
PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT LEKMA
HOSPITAL

PREGNANT WOMEN QUESTIONNAIRE

RESPONDENT ID: NAME OF RESEARCH
ASSISTANT:

DATE OF TINTERVIEW: dd/mm/yy SIGNATURE:

SECTION A: SOCIO DEMOGRAPHIC DATA

NO.	QUESTIONS	CATEGORY ANSWERS	SKIP TO
A1	What is your age in years?	Fill age in box <input type="text"/>	
A2	Religion	Christian Muslim Traditional Others	1 2 3 4
A3	Have you ever attended school?	Yes No	1 2
A4	What is the highest level of school you attended?	Primary Middle/JSS Secondary/SHS Voc / Tec Post Sec Tertiary	1 2 3 4 5 6
A5	What is your ethnic group?	Akan Ga / Ewe Non Ghanaian	1 2 3 4

		Others	5	
A6	Marital Status of Respondent	Married Divorced Single Separated Cohabitation Widowed	1 2 3 4 5 6	
A7	What is the Occupation of Respondent?	Fishmonger Housewife Civil / Public Servant Trader Others (Please specify)	1 2 3 4 5	

SECTION B: KNOWLEDGE OF EFFECT OF PREGNANCY IN MALARIA

NO.	QUESTIONS	CATEGORY ANSWERS		SKIP TO
B1	Have you ever given birth?	Yes No	1 2	
B2	How many children have you ever given birth to (dead or alive) in your lifetime	1 2 >3	1 2 3	
B3	Number of pregnancies ever had	1 ≤2 4 or more	1 2 3	
B4	How old is your current pregnancy?	1 month 2 months > 3 months	1 2 3	
B5	Have you heard of malaria in pregnancy?	Yes No	1 2	
B6	What do you think are the causes of	Correct Mosquito	Partly correct Incorrect Dirty	

	malaria (circle as many as apply)	bite	Weedy surrounding Stagnant water Malaria parasite	surrounding Eating contaminated food Standing/working in the sun Eating sweet foods Does not know	
B7	Name one symptom of malaria (multiple answer accepted)	Fever Head ache Cough Abdominal pains Bodily pains Others (please specify)		1 2 3 4 5 6	
B8	If a pregnant woman has malaria and it is not well treated do you think it can affect the unborn baby?	Yes No		1 2	
	If no skip to				B10
B9	If yes, what problem can it cause to the mother and baby?	Abortion Still birth Premature delivery Infant low birth Weight Anemia Death Does not know		1 2 3 4 5 6 7	
B10	Have you heard of	Yes		1	

	the new treatment plan for pregnant women	No	2	
B11	Where did you hear of the new treatment	Antenatal Radio Drug store Community durbar Does not know Others	1 2 3 4 5 6	
B12	Can you tell me about this treatment (more than 1 answer accepted)	Taking fansidar once a month for three times Sleeping under a mosquito net Going to the drug store to buy medicine when sick	1 2 3	
B12		Others (Specify)	4	
B13	Have you suffered malaria in your current pregnancy	Yes No	1 2	
	If no skip to			C1
B14	What will you do when you get malaria	Go to the hospital Go to the drug store Go the herbalist Others (specify)	1 2 3 4	

SECTION C: KNOWLEDGE ON INSECTICIDE TREATED NETS

NO.	QUESTIONS	CATEGORY ANSWERS	SKIP TO
C1	Does your household have any mosquito net that can be used while sleeping	Yes No	1 2
C2	How many months ago did you acquire the mosquito net?	Months ago 3 or more months Not sure	<input type="text"/> <input type="text"/>
C3	Where did you get the mosquito net from?	Antenatal clinic Field workers/outreach Drug store Private hospital Others	1 2 3 4 5
C4	When you got the mosquito net was it treated with an insecticide to kill or repel mosquitoes	Yes No Not sure	1 2 3
C5	Since you acquired the net has it been dipped in a liquid to kill or repel mosquitoes?	Yes No Not sure	1 2 3
C6	How many months ago has the net been dipped or soaked	Months ago 12 or more months ago	<input type="text"/> <input type="text"/>
C7	Did you sleep under mosquito net last night?	Yes No	1 2
C8	Do you know mosquito	Yes	1

	nets can prevent malaria	No	2	
		Not sure	3	
C9	Do you know how it prevents malaria?	Yes	1	
		No	2	
		Not sure	3	
	If no skip question C10			
C10	If yes how does it prevent malaria			

THANK YOU VERY MUCH FOR YOUR TIME



Appendix 3: Ethical Approval

