KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH PROMOTION, EDUCATION AND DISABILITY STUDIES

FACTORS AFFECTING NON-USE OF LONG-LASTING INSECTICIDE TREATED NETS AMONG PREGNANT WOMEN IN KUMASI METROPOLIS, GHANA

BY

SULEMANA TAHIRU

SEPTEMBER, 2019

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A THESIS SUBMITTED TO THE DEPARTMENT OF HEALTH PROMOTION, EDUCATION AND DISABILITY STUDIES, SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF PUBLIC HEALTH IN HEALTH PROMOTION AND EDUCATION

SEPTEMBER 2019

DECLARATION

I hereby do declare that except for references to other people's work which have been duly acknowledged, this piece of work is my own composition and neither in whole nor in part has this work been presented for the award of a degree in this university or elsewhere.

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PROF. ANTHONY K. EDUSEI …… …….

(HEAD OF DEPARTMENT) SIGNATURE DATE

DEDICATION

This work is dedicated to my family: my wife Juliana Adutwumwaah, my children Christabel Boakye Mensah, Kelvin Boakye Mensah, Alisa Boakye Mensah and Lillian Boakye Mensah for their support and love during my studies

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I say thank you to all my research participants and my course mates, without their cooperation this study would not see the light of day. God richly bless you all

ABSTRACT

Pregnant women by virtue of their physiological status remain one of the most vulnerable groups to malaria. Malaria can adversely affect birth outcomes and can lead to a spontaneous abortion, pre-term labour, low birth weight, and stillbirth. Pregnancy on its part affects the prognosis of malaria and enhances progression to the severe form of the disease. The National Malaria Control Program therefore considers malaria in pregnancy as priority area to address.

The study sought to investigate factors contributing to non-use of LLINs among pregnant women in Kumasi Metropolis.

A cross-sectional design was used. Data was collected from pregnant women of all ages irrespective of the gestational age of the pregnancy at the household level between July and August 2019.

In the study population 400, majority 309 (77.3%) are married women. The results indicated that 396 (99.0%) have a knowledge on how mosquito transmit malaria from one person to the other and 4 (1.0%) with no knowledge. Of 400 study population, 258 (81.6%) slept under LLIN the night prior to the study with 58 (18.4%) did not sleep under LLIN.

There was no significant statistical association between socio-demographic characteristics and possession of LLIN's and its use.

The LLIN's possession and its utilization was encouraging in the Kumasi Metropolis among pregnant women in the household as a result of free mass distribution of LLIN's. National Malaria Control Programme should continue and sustain the free mass distribution of the LLIN's to improve on household ownership and utilization.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

LLINs	-	long-lasting insecticide-treated nets
ITNs	-	Insecticide Treated Bed Nets
IPTp	-	Intermittent Preventive Treatment in Pregnancy
WHO	-	World Health Organization
UC	-	Universal Coverage
ANC	-	Ante Natal Clinic
CWC	-	Child Welfare Clinic
NMCP	-	National Malaria Control Programme
GDHS	-	Ghana Demographic Health Survey
KMHD	-	Kumasi Metropolitan Health Directorate
DHIMS	-	Health Information Management System
MIP	-	Malaria in Pregnancy
OPD	-	Outpatient Department
GNI	-	Gross National Income
MICS	-	Multiple Indicator Cluster Survey
SP	-	Sulphurdoxine Pyrimethamine
RBM	-	Roll Back Malaria

DEFINITION OF TERMS

Long-Lasting Insecticide Treated Nets: It is a factory treated mosquito net made with netting material that has insecticide incorporated within or bound around the fiber.

Usage: The proportion of pregnant women that uses LLINs.

Household: All persons who eat from the same food pot and recognize one person as the head of their household.

Universal coverage: two persons in every household is to one insecticide Treated mosquito net.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of Study

Pregnant women by their physiological status remain one of the most vulnerable groups to malaria. Malaria has a debilitating effect on pregnancy and birth outcomes. The disease adversely affects birth outcomes and can lead to spontaneous abortion, pre-term labour, low birth weight, and stillbirth. Pregnancy on its part affects the prognosis of malaria and enhances progression to the severe form of the disease. The National Malaria Control program therefore considers malaria in pregnancy a priority (National Malaria Control, 2014).

Use of long-lasting insecticide-treated nets (LLINs) is a form of personal protection that reduces illness, severe disease, and death in endemic regions. In Ghana, two key malaria preventive methods employed during pregnancy are the provision of intermittent preventive treatment (IPTp) and the use of ITNs (Ghana Statistical Service & Ghana Demographic Health Survery, 2008).

LLINs are promoted by WHO and Roll Back Malaria partners as a cost-effective and sustainable method for protection against malaria. LLINs are nets treated in the factory with an insecticide incorporated into the net fabric. The insecticide lasts three to five years, or at least 20 washes, after which the net should be replaced. Promoting LLINs is a primary health intervention designed to reduce malaria transmission in Ghana (Ghana Statistical Service, 2015).

Every year, an estimated 150 million ITNs are needed to protect all populations at risk of malaria in sub-Saharan Africa. The numbers delivered in 2011 and 2012 are below the number of ITNs required to protect all populations at risk, and they will not fully

replace the ITNs delivered 3 years earlier, indicating that ITN coverage will decrease unless deliveries are massively increased in 2013 (WHO, 2012).

The Universal Coverage (UC) of LLIN distribution was adopted by Ghana in 2009 and the country embarked on a nationwide door-to-door LLINs mass distribution and hang-up campaigns from 2010 to 2012. The mass campaigns as a catch-up strategy was aimed at making up for the low LLINs access in the household to reach Universal Coverage. The Ghana's definition of the Universal Coverage was one LLIN to 2 people in the household (National Malaria Control, 2014).

Three foremost channels were adopted by Ghana to distribute LLINs free to various population groups to make sure Universal Coverage reached was maintained and sustained. The channels adopted are the Ante Natal Clinic (ANC) to pregnant women attending ANC for the first time (Registrants), the Child Welfare Clinics (CWC) to children 18 months to 36 months due for measles Rubella 2 and Primary Schools to pupils in primaries 2 and 6.

The distribution of ITNs has increased considerably since 2010 but the rate of increase has slowed since 2014. In 2015 and 2016, a total 360 million ITNs were distributed by NMCPs globally; of these, over 90% were distributed in sub-Saharan
Africa, where the proportion of the population with access to ITNs was 61% in 2016. Access to ITNs, however, remained variable, with many high-burden countries having a large gap in household ITN ownership (WHO, 2017).

In the year 2008, GDHS showed that 45 percent of households in Ghana own a mosquito net whether treated or untreated, and 19 percent of households own more than one net. It further showed that only 12.2 % of households in Ashanti region

Among women age 15-49 in all households, percentage who slept under ITNs the previous night during the survey (Ghana Statistical Service & Ghana Demographic Health Survery, 2008).

One country in Africa that has seen a consistently low rate of uptake of malaria interventions is Ghana. As with most Sub-Saharan African countries, malaria is endemic throughout Ghana and it continues to be a major health concern (Kramer, Clements, Woods, & Kramer, 2011).

This study aims at investigating factors contributing to non-use of LLINs among pregnant women in the Kumasi metropolis. The study will explore pregnant women their knowledge about Malaria and LLINs. The finding will be documented and will serve as a reference to guide policy makers and new strategies will be identified for program implementers.

1.2 Problem Statement

Despite the continuous education on the mode of transmission of malaria and the emphasis on the use of ITN in the prevention of the disease by health workers including community-based volunteers, the disease continues to be the number one cause of morbidity in Kumasi Metropolis.

Records Review of 2017 annual report of KMHD shows an increase trend of reported malaria cases of OPD from 14.5% in 2016 to 19.4% in 2017 (KMHD annual report 2017). The District Health Information Management System (DHIMS) also showed that, Proportion of pregnant women receiving malaria treatment has also increased from 72.5% in 2016 to 84.2% in 2017 (DHIMS, 2018) even though pregnant women are given LLINs during registration at the ANC to prevent them from malaria disease.

The main interventions used to prevent malaria in pregnancy (MIP) in Ghana and in Kumasi are the use of Intermittent Prevention Treatment in pregnancy (IPTp) and Insecticide Treated Nets (ITNs)(NMCP, 2013) at ANC and children at CWC level at no cost.

In spite of these interventions put in place to ensure the distribution and usage of LLINs given to pregnant women in the Kumasi metropolis as a preventive tool, it has not led to its regular use in households. The aim of the study is to investigate factors contributing to non-use of LLINs among pregnant women in Kumasi Metropolis.

1.3 Research Questions

- What is the proportion of pregnant women in Kumasi Metropolis that uses LLINs?
- What are the factors affecting use of LLINs among pregnant women in Kumasi Metropolis?
- What are the institutional and organizational factors affecting the use of LLINs among pregnant women in Kumasi Metropolis?

1.4 General Objective

To investigate factors contributing to non-use of LLINs among pregnant women in Kumasi Metropolis.

1.5 Specific Objective

- To determine the proportion of pregnant women who use LLINs
- To explore the personal factors of pregnant women which affect the use of LLINs
- To identify the institutional/organizational factors that affect the use of LLINs

1.6 Rationale

Knowledge on the use of ITNs and factors affecting their use is inadequate in Kumasi Metropolis of Ashanti Region. Non-use of LLINs among pregnant women has never been evaluated in Kumasi Metropolis for the past years.

This study will enable Kumasi Metropolitan Health Directorate to have a document of current state of non-use of LLINs, identify factors affecting the non-use of LLINs and to make recommendations, identify the gaps to promote health promotion activities on importance and use of LLINs to the prevention of diseases.

1.7 Conceptual Framework

The use of Long Lasting Insecticidal Treated Nets (LLINs) is a key strategy for achieving a reduction of the malaria burden in Ghana and other malaria endemic countries. The conceptual framework, Figure 1.1 below, describes various factors that might contribute to the Non- use of LLINs among pregnant woman. These factors may be sub-divided into Socio demographic factors, Personal factors, organizational factors and level of Knowledge.

With regards to the use of LLINs or not among pregnant women, socio demographic factors such as age, educational status, marital status and occupation have a part to play. Moreover personal factors including, no space to hung mosquito nets, causes heat, causes rashes (allergic), looks like a burial covering and feels hot last night could affect personal decision on LLINs use or otherwise.

Organizational factors such as inadequate information on malaria and use of LLINs provided by service providers, unavailability of LLINs, inadequate guidelines on LLINs use, and lack of education on usage also affect the use of LLINs. For example, information on longevity, safety of use, and drying before use. An individual's

knowledge about how malaria is transmitted and how the use of LLINs can prevent mosquito bite also influences her decision to use LLINs or not. In addition knowledge about how sleeping under mosquito net prevents mosquito bite and the use of spray/coil kills the mosquito can also influence her decision to use LLINs.

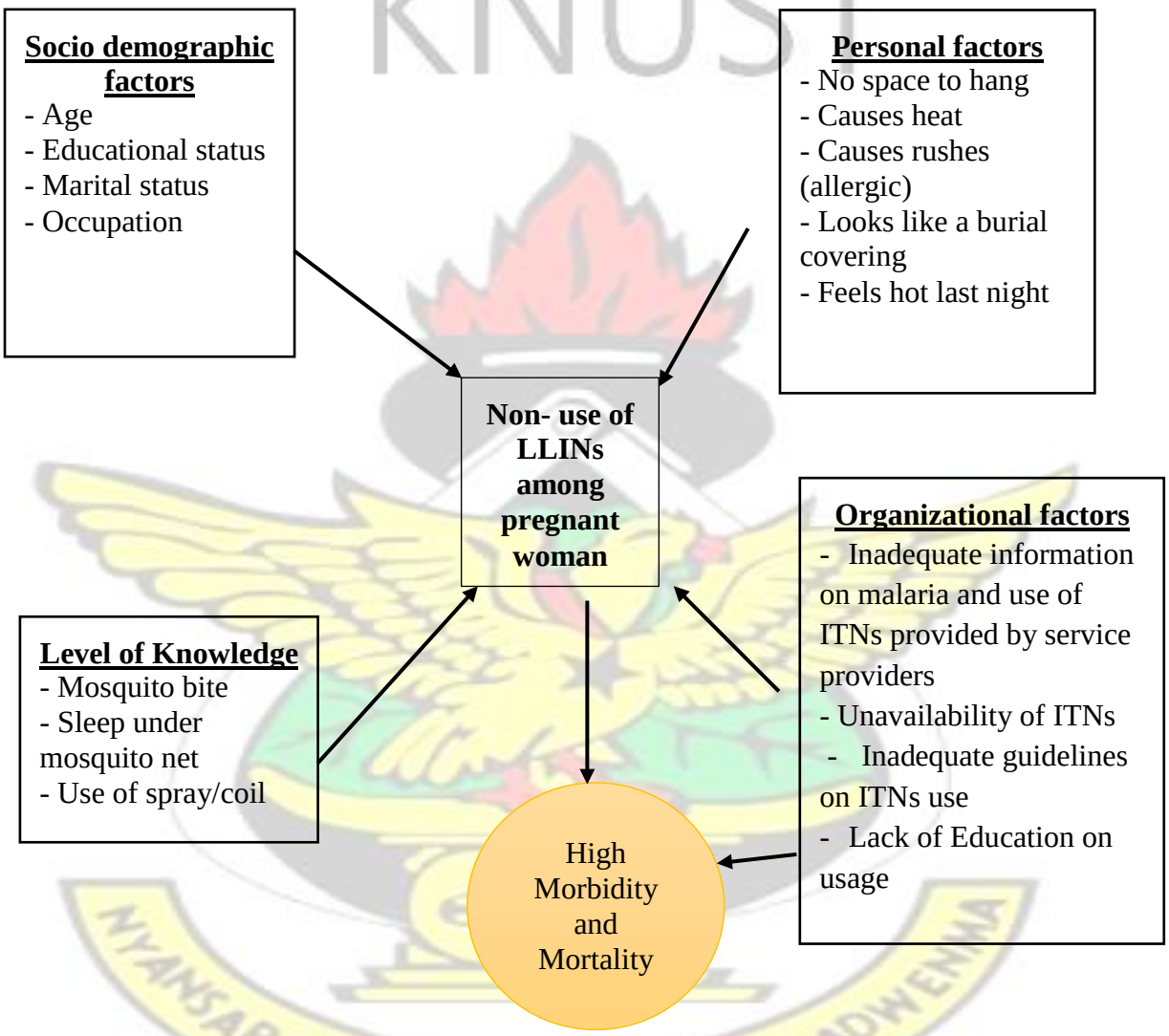

Figure 1.1: Conceptual framework adapted from Amedo, 2016.

(Authors construct, 2019)

1.8 Justification

In our bid to improve strategies to reduce incidence of malaria diseases, Vector control is an essential component of the malaria control program. However, LLINs use has been faced with some challenges. These include inappropriate and non-use of Long-Lasting Insecticide Bed Nets (LLIN's). For the past years in Kumasi Metropolis there has not been any study to explore reasons behind the non-use of LLINs which are available in the households. In order to promote the usage of LLINs in Kumasi there is the need to identify factors contributing to the non-usage of LLINS so us to provide recommendations to authorities to improve its strategies.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Malaria Epidemiology

Malaria is a life-threatening condition caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. It is preventable and curable Malaria is an acute febrile illness caused by Plasmodium parasites. The parasites are spread to people through the bites of infected female Anopheles mosquitoes. Five (5) parasite species that cause malaria in humans (*Plasmodium falciparum, P. vivax, P. ovale, and P. malariae P. knowlesi*), and 2 of these species – *P. falciparum and P. vivax* – pose the greatest threat. *P. falciparum* is the common prevalent malaria parasite on the African continent. It is responsible for most malariarelated deaths globally. *P. vivax* is the dominant malaria parasite in most countries outside of sub-Saharan Africa (http://www.who.int/news-room/fact-sheets/detail/ malaria, WHO malaria fact sheet, 11 June 2018)

2.2 Global trend of Malaria Cases

According to the latest World Malaria Report, published on November 2017, there were 216 million cases of malaria in 2016, up from 211 million cases in 2015. The predicted number of malaria deaths stood at 445 000 in 2016, a comparable number to the previous year (446 000) (*World Malaria Report,* 2017).

The WHO African Region continues to carry a disproportionately high share of the global malaria burden. In 2016, the region was home to 90% of malaria cases and 91% of malaria deaths. Some 15 countries – all in sub-Saharan Africa, except India – accounted for 80% of the global malaria burden (WHO, 2017).

2.3 Malaria cases in Africa

Approximately 342 million people in the 17 countries of this sub-region are at risk for malaria, with 289 million at high risk (reported incidence >1 per 1000). Malaria cases are almost exclusively due to P. falciparum. Among malaria-endemic countries, 15 are focused on malaria control. In 2014, the proportion of the at-risk population estimated to have access to an insecticide-treated mosquito net (ITN) in their household exceeded 50% in 11 countries (Burkina Faso, Côte d'Ivoire, the Gambia,
Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Senegal, Sierra Leone and Togo (World Malaria Report, 2015).

By 2011, 32 countries in the African Region and 78 other countries worldwide had adopted the WHO recommendation to provide ITNs to all persons at risk for malaria. A total of 89 countries, including 39 in Africa, distribute ITNs free of charge.

Every year, an estimated 150 million ITNs are needed to protect all populations at risk of malaria in sub-Saharan Africa. Between 2004 and 2010, the number of ITNs delivered annually by manufacturers to malaria-endemic countries in sub-Saharan Africa increased from 6 million to 145 million (World Health Organisation (WHO), 2012).

The percentage of households owning at least one ITN in sub-Saharan Africa is estimated to have risen from 3% in 2000 to 53% in 2011 and remained at 53% in 2012. World malaria report 2012, indicated that the proportion of the population sleeping under an ITN, representing the population directly protected, also increased from 2% in 2000 to 33% in 2011, and remained at 33% in 2012.

Malaria is strongly associated with poverty. Estimated malaria mortality rates are highest in countries with a lower Gross National Income (GNI) per capita. Countries

with higher proportions of their population living in poverty (less than US$ 1.25 per person per day) have higher mortality rates from malaria. Within countries, parasite prevalence rates in children are highest among poorer populations and in rural areas (World Health Organisation (WHO), 2012).

Urbanization is occurring rapidly in sub Saharan Africa and may have a significant impact on the epidemiology of malaria, Although malaria transmission is lower in urban than in rural areas of Africa, transmission and parasite prevalence may be heterogeneous within densely populated areas (Cox *et al.*, 2018)

2.4 Trend of Malaria in Ghana

Malaria is endemic and perennial in all parts of the country, with seasonal variations that are more pronounced in the north. Ghana's population is at risk of malaria infection, but children under five years of age and pregnant women are at greater risk of severe illness due to lowered immunity.

According to the Ghana Multiple Indicator Cluster Survey (MICS) conducted in 2011, 3.5 million cases of clinical malaria are estimated to be reported each year in public health facilities, accounting for 38% of outpatient attendance and 35% of all admissions and 34% of deaths in children below five years of age (GSS, 2011).

One country in Africa that has seen a consistently low rate of uptake of malaria interventions in Ghana. As with most Sub-Saharan African countries, malaria is endemic throughout Ghana and it continues to be a major health concern. In pregnant women, the rates of bed net use are slightly lower at 2.2% for ITNs and 10.1% for both treated and untreated net (Kramer *et al.*, 2011).

National mass distribution campaigns have served as the cornerstone of efforts to achieve universal coverage. The country had used different channels for the distribution of ITNs and mainly given to children under five years and pregnant women (Gakpey *et al.*, 2016).

Many recipients of the ITNs did not use the nets because they did not know how to hang the nets. To overcome this barrier and also to achieve universal coverage, the nation in 2010 opted for the "Door-to-door distribution and Hang-Up of ITNs" whereby ITNs were not just given to household members but hanged in their sleeping places freely (Gakpey *et al.*, 2016).

Mass campaign distribution, and continuous distribution through primary schools, antenatal care (ANC) clinics, child welfare clinics, and through the private sector. With Financial Year 2018 funding, PMI will continue working with the NMCP and its international partners to sustain universal coverage via the continuous distribution strategy. PMI will procure and distribute 1.3 million ITNs through schools, support the NMCP to maintain a successful national continuous distribution system, and promote ITN use through targeted, effective communication efforts (Taremwa *et al.*, 2017).

2.5 Ownership and Utilization of LLINs

The use of ITNs is still limited mainly because of its unavailability and cost, and partly because of the discomfort associated with the nets and the women's fear of possible effects of the impregnated chemicals on them and their unborn babies (Ugwu *et al.*, 2013)

ITNs use is one of the main vector control measures in Ethiopia. More than 20 million ITNs were distributed between 2005 and 2007, enabling 68% of the households living in malaria-endemic areas to own at least one ITN (Berie, Alemu, Belay, & Gizaw, 2013)

The knowledge of ANC attendance was generally good. Most of them, 69.9% knew that mosquito bite causes malaria while 30.1% erroneously attributed the cause of malaria to hard work under the sun, drinking contaminated water, and bad food among others. (Lga & State, 2010)

The reasons given for non-usage of ITNs by pregnant women include: ITNs cause discomfort and excessive heat 28.0%, chemicals in the nets harm babies in the womb 7.9%, ITNs are too costly for them 3.9%, and ITNs are not easily available 3.9%. The remaining 56.2% did not have any reasons for non-usage of ITNs. The educational status and the social class of the women had a significant association with the use of ITNs. The study demonstrated that 39.1% of the women used ITNs. (Ugwu *et al.*, 2013)

A study carried out in Papua New Guinea showed that 41.3% of pregnant women used an LLIN and 56.1% any net. Accessibility of villages was the key determinant of net ownership, while usage was mainly determined by ownership. Mostly 99.5% of the household members who did not sleep under a net did not have access to a net in their household (Hetzel *et al.*, 2012)

The perception that pregnant women do not use the ITN was that, ITN had lost its effectiveness or needed re-treatment, ITN was no longer effective had to do with not seeing dead insects, observed to have holes and tears and to be dirty, misinformation and lack of information (Auta, 2015).

Antenatal clinic attendance had high chances of receiving more health talks on the importance of ITN and IPTp- SP and hence increasing their usage rate(Leonard, Eric, Judith, & Samuel, 2016)

A survey conducted in Nigeria revealed that 44% of pregnant women living in households with an ITN slept under it, a night before the survey. The use of ITNs among pregnant women was associated with the education level and wealth quintile. Those without formal education (OR 2.65) and from the lowest wealth quintile (OR 2.31) were more likely to use ITN than those with post-secondary education and highest wealth quintile, (Auta, 2015). The free distribution of ITNs by the government may have succeeded in ensuring appreciable levels of equity in net ownership and use (Onwujekwe, *et al,* 2014).

In a study on the potential role of the educational system in addressing the effect of inadequate knowledge of mosquitoes on the use of insecticide-treated nets in Ghana, the reasons given by none-ITN-users included cost, heat, and discomfort when sleeping under it (Kudom & Mensah, 2010).

Ghana Roll Back Malaria indicated the strengthening of health services through multi and inter-sectoral partnerships and making treatment and prevention strategies more available. The goal was to reduce malaria specific morbidity and mortality by 50% by the year 2010. To achieve the goal, four main strategies were being pursued. These were to: Promote multiple preventions which include the promotion of treated bed nets usage; chemoprophylaxis in pregnancy and environmental management.

2.6 Knowledge of malaria

Knowledge of pregnant women on malaria could influence the use of ITN in their various households to help prevent malaria infection. A study conducted in Nigeria revealed that most of the pregnant women attending antenatal clinics at IMSUTH Orlu, Imo State were adequately informed about the use of LLIN during pregnancy, amongst those that own an LLIN, 70.8% of them obtained it from the national LLIN distribution

campaign, 16.2% of them received from the ANC clinic (Ozims & Eberendu, 2014). In Uganda, a study conducted affirmed that a high number of respondents were knowledgeable about mosquitoes as a cause of malaria (Obol, Lagoro, & Garimoi, 2011)

A study conducted in Northern Ghana showed that the participant perceived that malaria was caused by eating sweet foods, standing too long in the sun or "something" that you are born with (Binka & Adongo, 1997)

2.7 Knowledge of ITN

Malaria is one of the leading causes of morbidity and mortality in Ghana. Although preventable and curable, the disease remains a public health problem in Ghana, Insecticide-treated bed net (ITN's) has been known for the prevention of mosquito and other insects bite. These treated nets also serve as a barrier from the bite of mosquitoes and it kills the mosquitoes when it settles on the net. A survey conducted by GSS, 2019 indicated that participants had their main source of information about the insecticide-treated net from mass media (radio, FM station and television) followed by the hospital and some few having their source of knowledge from clinics and relatives/peers (Ghana Statistical Service, 2015)

2.8 Personal factors of pregnant women which affect the use of LLINs

Compliance with this intervention is reliant on its suitability and also on the sociocultural setting of the population (Atkinson et al., 2009). Factors related to individual and community may influence how ITNs are used for malaria control. A study conducted in the Solomon Islands showed that mosquito annoyance and apparent risk of malaria influenced bed net use. Even though the respondents knew about malaria and the means to prevent, they were not enough reasons for them to comply with LLIN

use (Sena, Deressa, & Ali, 2013). Other factors such as climate, work and evening social activities affect the use of ITNs, particularly in men (Atkinson et al., 2009). In Kenya, despite ITN ownership reaching more than 71%, compliance was low at 56.3%. Compliance rates are significantly higher during the rainy season compared with the dry season. Some reasons cited to influence net use include household head's educational level, the presence of significant-high numbers of nuisance mosquitoes and low indoor temperatures (Atieli et al., 2011).

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CHAPTER THREE

3.0 METHOD

3.1 Study Design

A cross-sectional design was used for this study. Data was collected from pregnant women of all ages irrespective of the gestational age of the pregnancy at the household level.

3.2 Study Area

The study took place in Kumasi, Ghana's second-biggest city is 300km from the national capital, Accra. The city is 150sq km in size.

Politically, Kumasi is divided into ten sub-metropolitan areas namely: Manhyia, Tafo, Suame, Asokwa, Oforikrom, Asawase, Bantama, Kwadaso, Nhyiaeso, and Subin. Healthwise the Metropolis is divided into five Sub-metros: Asokwa, Bantama, Manhyia North, Manhyia South, and Subin. Kumasi Metropolis, which forms 36.2% of the Ashanti Region Population (2010 census), shares boundaries with about 2 municipals and 4 Districts (Kwabre East and West, Asokore Mampong, Ejisu, Atwima Nwabiagya, and Atwima Kwanwoma).

In terms of population, it is the largest of the 30 districts in the Ashanti Region. It has an estimated 2018 population of 2,057,084 with an annual growth rate of 2.7%. There are 209 communities in Kumasi. Kumasi is a cosmopolitan city with trading being the main occupation of the inhabitants. The main occupation of the citizens is trading and farming. Central Market (The largest Open-Air Market in the Ecowas Sub-Region), Adum Shopping Centre (Heart Beat of Commerce), Suame and Asafo Magazines; and Kaase/Asokwa Industrial Area and Anloga Timber Products Markets are the main trading centers. There are other satellite trading centers located in the various sub metros. The communities on the outskirts of Kumasi do some farming.

Two festivals Odwira and Akwasidae are celebrated every forty days and once in a year (December) respectively.

The major religious groups known in the metropolis are Christians, Moslems, Traditionalists, Pagans, and Faith-based organizations.

There are 2 public universities, 3 private universities, 1 polytechnic, 2 Teacher training colleges, 83 secondary schools and over 1,018 Basic schools (the private sector provides the bulk of these institutions at the pre-school.

Almost all the major roads within the Metropolis are tarred. Kumasi has an Airport, 846km of the road network but the only 271km is asphalted or bitumen surfaced, the major means of transportation is by Public Vehicles (Taxi and Trotros)

Metropolitan health services are organized around many hospitals, clinics, and maternity homes. There is 1 Teaching Hospital, 5 District Hospitals (with one designated as the Regional Hospital), 4 Quasi-Government, 7 Health centers, 3 CHAG institutions, 13 industrial clinics, 113 private hospitals/clinics, 55 maternity homes, 15 private laboratories, 672 pharmacies, and 510 chemical shops. The study took place in Kumasi, Ghana's second-biggest city is 300km from the national capital, Accra. The city is 150sq km in size.

3.4 Study Population

The focus of the study was on pregnant women of all ages irrespective of the gestational age of the pregnancy. The study engaged households in selected communities within the Kumasi Metropolis among the sub metros: Asokwa, Manhyia North, Bantama, Manhyia South, and Subin. Respondents were drawn out of the two hundred and nine (209) communities within the Metropolis by stratifying the Sub metros and using probability random sampling to select one sub metro for the study.

3.5 Sampling Technique

Health wise Kumasi Metropolitan was divided into five (5) Sub-metros: Asokwa, Manhyia North, Bantama, Manhyia South and Subin. The sub metros were stratified into five as it stands. Probability random sampling was used to select Bantama sub

metro for the study. Random sampling technique was again used to select communities from the selected sub metro. Five research assistants who can communicate in English and one Ghanaian language (Twi) were employed and trained to assist in the data collection. After data was collected, STATA version 14.1 was used for the analysis.

3.6 Sample Size Determination

According to Ghana Demographic Health Survey (GDHS, 2014), Forty-three percent (43%) of pregnant women in all households, slept under an insecticide-treated net the night before the survey. Using a confidence interval of 95% with a value of 1.96, a sample size of 337 respondents was determined using the formula illustrated below.

The number of samples was calculated using Cochran's formula as:

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

Where:

n is the desired sample size.

Z is the significant level at 95% confidence interval which has a value of 1.96. P is the proportion of the variable of interest. In this case p=43% (pregnant women in all households, slept under an insecticide-treated net the night before the survey (GDHS 2014) and d = 0.05 the allowable margin of error.

1-p = 0.57

$n = (1.96^2 * 0.43*0.57)/0.05^2$

$n = 377$

An upward adjustment of 6% given a number of respondents as 400

3.7 Sampling Procedure

Sampling technique comprising of stratification of sub metros and simple random sampling method was used to select fifteen (15) communities for the study. Probability

random sampling was used to select Bantama Sub metro out of the five sub metros. The names of all the eighty-one (81) Communities were written on pieces of papers, folded and put in a container, shaken thoroughly and fifteen picked by officers at Bantama Sub metro to get the communities for the study.

At arriving at the respondent's in a community, a proportion sampling technique was used to select respondents out of the fifteen (15) selected communities. In the event where two or more pregnant women are met in one house, a random sampling technique will be used to select only one amongst them for the study. The table below shows the sampled proportion of the fifteen selected communities.

Table 1: Proportion of pregnant women sampled out of fifteen (15) communities

Communities	Population (2019)	Sample proportion	Sample
North Suntreso	20,605	20,605/134,379*400	61
Abrepo	7,140	7,140/134,379*400	21
Adoato	6,963	6,963/134,379*400	21
Kokoso	3,851	3,851/134,379*400	12
Mpatasie	5,445	5,445/134,379*400	16
Ohwim	7,257	7,257/134,379*400	22
Kwadaso Proper	8,255	8,255/134,379*400	25
Ohwemase	18,476	18,476/134,379*400	55
Denchemouso	4,768	4,768/134,379*400	14
Edwenase	9,235	9,235/134,379*400	27
Asuoyeboa	11,443	11,443/134,379*400	34
Sokoban	9,453	9,453/134,379*400	28

Nhyieso	6,413	6,413/134,379*400	19
Nwamase	5,467	5,467/134,379*400	16
Patase Estate	9,608	9,608/134,379*400	29
Total	134,379		400

3.8 Data Collection Technique

Information on pregnant woman's background characteristics (e.g. age, level of education, marital status and occupation) were obtained using a pretested structured questionnaire. Respondents were asked questions to ascertain their knowledge about malaria and LLINs, ownership and utilization of LLINs among pregnant women. In each of the communities, the data collectors located a center point of the community and randomly choose a direction. The data collectors spanned a pencil on the ground and choose the direction the pencil points at. He/she then walked in the chosen direction and selected the first house. From the first house, the next two houses adjacent to the first house was selected. This continued in each of the communities until the entire area was covered. In any house entered, where pregnant women were more than one, a representative household was selected using a simple random sampling method. The data was collected between June and July 2019.

Inclusion criteria: Pregnant women in a household irrespective of gestational period.

Exclusion criteria: Households without a pregnant woman.

3.9 Data Analysis

Questionnaires were reviewed after data was collected, all the questionnaires collected and were kept in an envelope, STATA version 14.1 was used for the analysis. Information obtained was discussed with reference to literature reviewed.

3.10 Ethical Consideration

Ethical clearance was sought from appropriate authorities for approval of the study. Permission and informed consents were obtained from each respondent. Respondents were assured of maximum confidentiality and they have the right to opt-out at any time during data collection after being briefed of the study objectives. Before the commencement of the study, permission was also sought from the Kumasi Metropolitan Health Directorate (KMHD).

CHAPTER FOUR

4.0 RESULTS

4.1 Research Findings

4.2 Socio-demographic characteristics

A total of 400 pregnant women were sampled.

The mean age of the study respondents was 28.92 years and the standard deviation was (SD =4.430) with a minimum age of 19 and a maximum of 40 years. Also, the study indicated that most 268 (67.0%) of the respondents were between the ages of 20 and 30 years. The majority of the participants were married 309 (77.3%), followed by a single 53 (13.3%), those co-habiting 36 (9.0%) and then divorced 2 (0.5%).

Most women reported their highest level of education to be Senior high school, followed by junior high school and the rest as indicated in **Table 2**. Most of the participants were

traders with the next majority being unemployed and the rest as indicated in **Table 2**.

The most-reported religion by the respondents was Christianity

362 (90.5%) with the remaining 36 (9.5%) being Muslims.

Table 2: Socio-demographic characteristics of the respondents (N=400)

Variables	Frequency	Percentage (%)
Age		
Below 20	2	0.5
20 - 30	268	67.0
31 - 40	130	32.5
Marital Status		
Married	309	77.3
Single	53	13.3
Divorce	2	0.5
Co-habiting	36	9.0
Level of Education None	18	4.5
Primary	22	5.5
JHS	101	25.3
Secondary	183	45.8
Technical/Commercial	35	8.8
Tertiary/university	41	10.3
Occupation		
Unemployed	106	26.5
Farmer	5	1.3
Civil/public servant	56	14.0
Business woman	65	16.3
Trader	116	29.0
Student	13	3.3
Seamstress	9	2.3
Teacher	8	2.0
Hairdresser	12	3.0
Restaurant Attendant	5	1.3
Mobile Banker	5	1.3
Religion Christian	362	90.5
Muslim	38	9.5

4.3 Knowledge of Malaria

When asked what causes malaria, 55 of the respondents contributing to 13.8% of the total respondents answered malnutrition and 400 (100%) saying it is caused by mosquito bite. All respondents answered sleeping under a treated mosquito net to be a means of preventing malaria. Three hundred and thirty-seven 337 (84.3%) of the respondents answered keeping a clean environment can prevent malaria, 267 (66.8%) saying use of mosquito spray/coil can prevent malaria and some few saying good personal hygiene, eating a balanced diet taking anti-malaria and use of mosquito repellants can prevent malaria as shown in **(Table 3).** Three hundred and ninety-six (396) participants contributing to ninety-nine percent (99.0%) answered mosquito can transmit malaria from one person to the other with the rest saying no to the question.

Table 3: Knowledge of Malaria (N=400)

Knowledge items/questions	Frequency	Percentage (%)
What causes malaria?		
Witchcraft	0	0.0
Exposure to heat	0	0.0
Overwork	0	0.0
Malnutrition	55	13.8
Mosquito bite	400	100.0
How can malaria be prevented? Avoid excessive heat	0	0.0
Clean our environment	337	84.3
Good personal hygiene	4	1.0
Eat balanced diet	2	0.5
Sleep under mosquito net	400	100.0
Cannot be prevented	0	0.0
Take anti-malaria	32	8.0
Use mosquito spray/coil	267	66.8
Use mosquito repellants	15	3.8
Can mosquito transmit malaria from one person to the other?		
Yes	396	99.0
No	4	1.0

4.4 Knowledge of Insecticide Treated Bed Net

All participants 400 (100%) admitted hearing of insecticide-treated net (ITNs). All participants 400 (100%) again answered it is used as protection against mosquitos and 19 (4.1%) saying it is used to afford a good sleep. The majority of the respondents 294 (73.5%) and 261 (65.3%) reported hearing about the insecticide-treated net from the hospital and FM stations respectively. Also, 197 (49.3%) reported hearing of it from the television. 44 (11.0%) of the respondents and 29 (7.3%) answered hearing of it from the clinic and their relatives/peers respectively. All 400 (100%) participants opined that one can purchase an ITN from the hospital with the next majority 101(25.3%) saying one can purchase an ITN from the pharmacy shop. Also, 35 (8.8%), 32 (8.0%) and 27 (6.8%) of the respondents answered saying one can make a purchase of ITN from the market place, clinic, and drug store respectively.

Table 4: Knowledge of Insecticide Treated Bed Net (N=400)

Knowledge items/questions	Frequency	Percentage (%)
Have you heard of ITNs?		
Yes	400	100.0
No	0	0.0
What is it used for?		
Room decoration	0	0.0
Protection against mosquitos	400	100.0
Affording good sleep	19	4.1
Don't know	0	0.0
Where did you hear about it?		
FM station	261	65.3
Television	197	49.3
Hospital	294	73.5
Clinic	44	11.0
Community volunteer	0	0.0

Relative /peers	29	7.3
Where can you purchase an ITN?		
Hospital	400	100.0
Clinic	32	8.0
Community volunteers	0	0.0
Pharmacy shop	101	25.3
Drug store	27	6.8
Market place	35	8.8

4.5 Possession/ ownership and source of ITNs

When asked whether the participants had mosquito bed nets for their household, 316 (79.0%) answered "Yes" with 84 (21.0%) answering "No". Respondents gave several reasons for not having mosquito bed nets, among these reasons, the most reported reason was their absence during the mass distribution program 32 (38.1%), not been given bed nets during mass distribution due to their inability to register 23 (27.4%), 16 (19.0%) respondents reporting heat to be their reason for not having, 11 (13.1%) not having any reason and the least 2 (2.4%) saying they burnt their bed nets because they got torn. All respondents who reported to have a mosquito bed net had a longlasting type. The majority of the respondents 118 (37.3%) and 106 (33.5%) reported having two and one-bed net(s) respectively with 80 (25.3%) participants reporting having three and 12 (2.6%) participants having more than 3-bed nets for their household. One hundred and eighty-two (182) of the respondents reported having their bed nets from the hospital and one hundred and twenty-one (121) reporting to have gotten their bed nets from the mass distribution program.

Table 5: Possession/ ownership and source of ITNs

Items/questions	Frequency	Percentage (%)
Do you have mosquito bed net for the household?(N=400)		
Yes	316	79.0
No	84	21.0
If no, what prevents you from having one?(N=84)		
Heat	16	19.0
Wasn't around during mass distribution	32	38.1
I wasn't given because I couldn't register	23	27.4
It got torn and I burnt it	2	2.4
No reason	11	13.1
What type of bed net do you have?(N=316)		
Long lasting Net	316	100.0
Insecticide Net	0	0.0
Treated Net	0	0.0
Re-treatable Insecticide Treated Net	0	0.0
Untreated Net	0	0.0
How many mosquito bed nets do you have? (N=316)		
1	106	33.5
2	118	37.3
3	80	25.3
More than 3	12	2.6

Where did you get the net from?(N=316)		
Mass distribution	121	38.3
Hospital	182	57.6
Clinic	0	0.0
Purchase from market	0	0.0
Purchase from the pharmacy	13	4.1

4.6 Use of Insecticide Treated Bed Nets

Concerning education on how to use the insecticide-treated net, 229 (72.5%) of the respondents reported were being told to dry the bed net in the shade before use, 63 (19.9%) reported being told to wash the bed net with mild soap and 58 (18.4%) also saying they were told to air the bed net for 24 hours or more before sleeping under the net. Two hundred and fifty-eight (81.6%) of the respondents answered to have hanged the bed net in their sleeping area with the rest 58 (18.4%) reporting not to have hanged the bed net in their sleeping area. When asked whether they slept under treated insecticide net the previous night, 258 (81.6%) answered "Yes" with the rest 58 (18.4%) answering "No" as shown in **Table 6**. All respondents who slept under the treated insecticide net 258 (100%) reported their reason for sleeping under the bed net was to prevent malaria. One hundred and thirteen respondents (43.8) again reported their reason for sleeping under the mosquito bed net was to enable them to sleep soundly and 55 (8.0%) wanting to prevent insect bite.

Concerning respondents who did not sleep under the treated mosquito bed net, 45 (77.6%) of the respondents said: "it causes heat". Six (ten point three per cent) reported the net to cause rushes (allergic) and 2 (3.4%) saying it felt hot at night.

Table 6: Use of ITNs

Usage items/questions	Frequency	Percentage (%)
What were you told about how to use it? (N=316)		
Bed net will last you 3yrs or 20 washes	0	0.0
Bed net to be washed by mild soap	63	19.9
Bed net to be dried in the shade	229	72.5
Bed net should be aired 24hrs or more before sleeping in it	58	18.4
No information was given	0	0.0
Did you hang it in your sleeping area? (N=316)		
Yes	258	81.6
No	58	18.4
Did you sleep under insecticide treated net last night? (N=316)		
Yes	258	81.6
No	58	18.4
Why did you sleep under the net? (N=258)		
To prevent malaria	258	100.0
To prevent insect bite	55	8.0
To sleep soundly	113	43.8
To provide warmth	0	0.0
Use as partition in the room	0	0.0
Why did you not sleep under the net? (N=58)		
No space to hand	0	0.0

Causes heat	45	77.6
Causes rushes (allergic)	6	10.3
Looks like a burial covering	0	0.0
Feels hot last night	2	3.4

4.7 Institutional / Organizational factors

Concerning participants who reported receiving their bed nets from the hospital, all 182 reported that the nets are given free at the facility level. And again all 182 contributing to hundred percent of all who reported receiving their nets at the facility level were educated on how to use ITN's. All respondents answered, they were told to dry bed net in shade before use and 58 (18.4%) respondents again saying they were told to air the bed net for 24 hours or more before use.

Table 7: Institutional / Organizational factors

Institutional items/questions	**Frequency**	**Percentage (%)**
Was the net free at the facility level? (N=182)		
Yes	182	100.0
No	0	0.0
Where you educated on how to use it? (N=182)		
Yes	182	100.0
No	0	0.0

What did the health worker say? (N=182)		
Bed net to be washed with mild soap	0	0.0
Bed net to be dried in the shade	182	100.0
Bed net should be aired 24 hours/ more	58	18.4

4.8 Cross tabulation of socio-demographic characteristics and dependent variables

In order to ascertain the statistical association between the socio-demographic characteristics and LLIN usage, the Chi-squared test was used. A p-value less than 0.05 was considered significant as shown in Table 7. The table indicates the association between the socio-demographic characteristics of the respondents and selected independent variables. All variables were not strong enough to yield a statistically significant association as they all yielded a P-value of more than 0.05.

Table 8: Cross tabulation of socio-demographic characteristics and dependent variables

		Dependent variables		
Variable	**N (%)**	**N (%)**	**Chi-Square (χ^2)**	**P-Value**
		Did you sleep under net?		
Educational level	**Yes**	**No**		
None	12(70.6)	5(29.4)		
primary	11(68.8)	5(31.2)	9.134	**0.104**
JHS	65 (83.3)	13(16.7)		
SHS	116(78.9)	31(21.1)		
Technical/commercial	25(92.6)	2(7.4)		
Tertiary /university	29(81.6)	58(18.4)		
Religion				
Christian	232(81.4)	53(18.6)		
Muslim	26(83.9)	5(16.1)	0.114	**0.736**
Marital status				
Married	205(82.7)	43(17.3)		
Single	32(76.2)	10(23.8))	1.553	**0.670**
Divorced	2(100.0)	0(0.0)		
Co-habiting	19(79.2)	5(20.8)		
		Do you have mosquito bed net for the house hold?		
Educational level	**Yes**	**No**		
None	17(94.4)	1(5.6)		
primary	16(72.7)	6(27.3)	3.852	**0.571**
JHS	78 (77.2)	23(22.8)		
SHS	147(80.3)	36(19.7)		
Technical/commercial	27(77.1)	8(22.9)		
Tertiary /university	31(75.6)	10 (24.4)		

Religion				
Christian	285(78.7)	77(21.3)		
Muslim	31(81.6)	7(18.4)	0.168	**0.682**
Marital status				
Married	248(80.3)	61(19.7)		
Single	42(79.2)	11(20.8)	4.130	**0.248**
Divorced	2(100.0)	0(0.0)		
Co-habiting	24(66.7)	12(33.3)		

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This chapter discusses the findings obtained from the data analysis and how they are related to other findings. Data was collected from 400 pregnant women in Bantama sub-metro of the Kumasi metropolitan. The Objectives of the study were to determine the proportion of pregnant women who use LLINs, to explore the personal factors of pregnant women which affect the use of LLINs and to identify the institutional/organizational factors that affect the use of LLINs.

5.2 Knowledge of Malaria

The results of the study showed that all respondents 400 (100%) had the knowledge that malaria is caused by mosquito bite and some few 55 (13.8%) of them saying malaria is caused by malnutrition. Similar to the recorded results, a study conducted by (Lga & State, 2010) revealed that, most of the participants in their study, 69.9% knew that mosquito bite causes malaria while 30.1% erroneously attributed the cause of malaria to hard work under the sun, drinking contaminated water, and bad food among others.

Despite the majority knowing the actual cause of malaria a few of the participants had misconceptions about what causes malaria which is alarming and need to be addressed. A comparative majority 337 (84.3%) had the knowledge that, malaria can be prevented by keeping a clean environment, all 400 (100%) participants saying malaria can be prevented by sleeping under treated mosquito net and 267 (66.8%) saying use of mosquito spray or coil can help prevent malaria. This finding is similar to that of Ozims & Eberendu (2014) in Imo State, Nigeria where other methods of malaria prevention like insecticide spraying and burning of mosquito coil was reported. A study in Southern Nigeria reported substantially high levels of use of other malaria preventive methods such as window and door nets, indoor spray, aerosol spray and cleaning of the environment (Onwujekwe et al., 2014). Clearly, this study has shown that aside ITNs that are being promoted by the NMCP and GHS, several other means to prevent malaria exist. Preference for this alternative methods for malaria prevention has a great potential to reduce the utilization of ITNs if the population finds such methods effective. Few of the participants made mention of good personal hygiene, eating balanced diet, taking anti-malaria and using mosquito repellants as means of preventing malaria. Various studies undertaken in most countries on knowledge of women on the cause and effect of malaria revealed some level of knowledge. Various misconceptions among the pregnant women were also recorded in a study conducted by (Obol et al., 2011) where 15 made mention of cold weather to be the cause of malaria, 53 mentioning dirt and 5% not knowing the actual cause. In Ghana, it has been reported that malaria is presumed to occur as a result of excessive heat and eating oily or starchy food (Ahorlu et al.,2007;(Agyepong & Manderson, 1999). Despite the discrepancies in reasons given by participants in the current study and other studies, there exist a linkage as they all showed proves of misconception. Congruent to the above studies, a study which was

done in Northern Ghana indicated that the participant perceived that malaria was caused by eating sweet foods, standing too long in the sun or "something" that you are born with (Binka & Adongo, 1997). Majority of the respondents 396 (99.0%) had the knowledge that, malaria can be transmitted from one person to the other with some few 4 (1.0%) saying malaria cannot bet transmitted from one person to the other which calls for the need to intensify health education and sensitization.

5.3 Knowledge of insecticide treated Bed net

All participants 400 (100%) had heard of insecticide treated net. Again, all participants knew it is used to protect oneself against mosquitoes and some few 19 (4.1%) saying it is to afford a good sleep. From the results, participants had their main source of information about the insecticide treated net from mass media (FM station and television) followed by the hospital and some few having their source of knowledge from clinics and relatives/peers. This is shown in a study which was done in Ghana from the 2011 MICS which supposes that women who stay in the large cities of Ghana have more exposure to information, education and communication (IEC) messages about how to enhance the control of malaria. This is really heard in radio broadcasts and seen in television advertisements about the promotion of ACTs (GSS, GLSS, GHS. 2008). Also, adverts shown on television on malaria and its prevention may have also impacted on the awareness of the disease as majority reported hearing about insecticide net from the radio and television. However, hearing of a disease condition does not necessary imply one has adequate knowledge on that condition. A research by Attoh-Okine (2015) 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. All participants 400 (100%) said one can purchase an insecticide net from the hospital, 101 (25.3%) also identifying the pharmacy shop as a place one can make purchase of an insecticide treated net.

5.4 Possession/ ownership and source of ITNs

Majority of participants 316 (79.0%) had mosquito bed nets in their household. Among the participants who did not possess bed nets, their reasons for them not having the bed nets was mainly their inability to obtain for themselves during the mass distribution campaign 55 (65.5%). Others 16 (19.0%) gave heat experienced when sleeping under the net as their reason for not having the bed net and 11 (13.1%) having no reason for not having a bed net for the household.

The long lasting bed net was the dominate type of bed net. A comparative majority 118 (57.6%) and 106 (33.5%) of the participants possessed two and one bed net(s) respectively with 80 (25.3%) having three bed nets and 12 (2.6%) having more than 3 bed nets for their household. Despite majority of households having insecticide bed nets, the sub-metro is yet to attain the NMCP's target of 100% of households owning at least one ITN (USAID, 2013). Household ownership of ITN have seen much increase compared to the coverage in the 2014 Ghana Demographic and Health Survey of 69.6% household ownership of at least one net. The high ownership of net in the sub-metro may be due to the mass distribution campaign carried out in 2018. In addition to the mass distribution, there are other distribution out-lets such as Child Welfare Clinics (CWC) and Antenatal Care (ANC). Several studies have reported such high ITN ownership in other malaria endemic communities. A study by (Ernst et al., 2017) in Mozambique showed a similar high ownership of nets (78%). Kateera et al., (2015) studied long - lasting insecticidal net sources, ownership and use in the context of

universal coverage of household in eastern Rwanda and reported an overall ownership of at least one net to be 92 %. ITN ownership was found to be equally high in Benin (84.8%) through a similar study by (Tokponnon et al., 2015). Other studies have however reported much lower levels of household owners in Eastern as well as West Africa. Their main source of getting the net was from hospitals and from mass distribution campaign.

5.6 Use of ITNs

Concerning education on how to use insecticide bed net, two hundred and twenty-nine respondents (seventy two point five percent) of all participants said they were asked to dry their bed nets under a shade before use. Others 63 (19.9%) as well said they were educated to wash the bed net with mild soap and dried before use. 58 participants contributing to (18.4%) were told to air their bed nets for 24 hours and more before use. Among all participants having bed nets, 258 (81.6%) hanged their bed nets in their sleeping area with the rest 58 (18.4%) not hanging the bed nets in their sleeping area. An individual is very unlikely to use a net once the net is not in place therefore the malaria control program is to device means to enable people hang their bed nets in the sleeping area to facilitate it use. All participants 258 (81.6) who reported to have hanged the bed nets in their sleeping area reported sleeping under the bed net the previous night. ITN usage was found to be high in the current study, the current study recorded a higher usage rate as compared to the situation in Sudan where ITN coverage among pregnant women is 59% but usage was only 11.5% according to (Yassin, Rosnah, & Osman, 2010). Also, in a study in South-West Nigeria, only 8.8% of women who had nets slept regularly under them. The target of the National Malaria Control Programme plan of action that ended in 2015, was to increase the number of under-five and pregnant women sleeping under ITN from previous lower levels to 85% (USAID, 2013). ITN

usage among pregnant women in the Bantama sub-metro was below the national target and needs more effective interventions to scale it up.

The most reported reason for sleeping under the bed net was to prevent malaria, to sleep soundly and to prevent insect bite. Concerning participants who did not sleep under treated mosquito net the previous night, 45 (77.6%) said it causes heat with 6 (10.3%) saying it causes rushes and 2 (3.4%) saying it felt hot the previous night. In a study conducted by Ugwu and colleagues in 2013, participants gave diverse reasons for the non-usage of the ITN which were different yet could all be classified as same as all reported reasons contributed to the non-usage of the ITN.

5.7 Institutional / Organizational factors

All participants who received their nets from the facility level attested that the bed nets were given without a cost and were educated on how to use the bed net. All participants responded been asked to dry the bed net under a shade for some time before use and 58 (18.4%) as well saying they were asked to air the bed net for 24 hours and more before use. Based on the current results, it could be seen that institutional/ organizational factors was not identified as a barrier to the use of insecticide treated net as they played their role in giving the bed nets out freely as and educating the populace as they are supposed to.

5.8 Cross tabulation of socio-demographic characteristics and dependent variables

There was no significant statistical association between socio-demographic characteristics and possession of ITNs and its use. The findings in this current study was congruent with a study which was done across 15 countries to assess ITN use among children and pregnant women. That study revealed that a mother's education,

socio-economic status, sex of child, urban/rural residence and ethnicity were not significantly associated with ITN use (Eisele, Keating, Littrell, Larsen, & Macintyre, 2009). Contrary to the current results, another survey conducted in Nigeria by Auta in 2015 revealed that the use of ITNs among pregnant women was associated with their education level. Saying those without a formal education (OR 2.65) were more likely to use ITN than those with post-secondary education.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

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

6.2 Conclusion

Findings from this study revealed that the majority of the participants 316 (79.0%) in the study possess LLIN but only 258 (81.6%) of them slept under LLIN the night before the study. This showed that pregnant women are not using the bed net consistently.

The study showed that 396 (99.0%) of the pregnant women knew that mosquitoes transmit malaria. Though the pregnant women had adequate knowledge about the transmission of malaria and the use of LLINs but that did not translate into the consistent use of the LLINs in order to have a positive impact on their health.

6.3 Recommendations

National Malaria Control Program (NMCP)

1. They should continue and sustain the free mass distribution of the LLIN's to improve on household ownership and utilization
2. Should ensure to maintain the supply chain of LLIN's at CWC and ANC services
3. They should continue with the mass education of the populace through the media especially the use of Frequency Modulation (FM) or Television (TV)
4. Mass spraying of the environment should be scaled down to all the communities in the country

Kumasi Metropolitan Health Directorate

1. Ensure equitable distribution of LLIN's to the various sub metros and communities to avoid shortage
2. Sensitization of communities on the importance of LLIN's as a preventive measure for malaria control must be intensified at the Community Information Centre's (CIC's)
3. Metropolitan Health Directorate should intensify education of pregnant women on the effect of malaria on the pregnant woman and the unborn baby

Health Facility Level

1. Educate ANC clients on the importance and the consistent use of LLIN's as a preventive measure for malaria
2. Education of clients on how to use the LLIN's should be continues to avoid some of the misconceptions about the LLIN's

REFERENCE

Agyepong, A. I., & Manderson, L. (1999). Mosquito Avoidance And Bed Net Use In The Greater Accra Region, Ghana. *Cambridge University Press*. https://doi.org/https:// doi.org/10.1017/S0021932099000796

Amedo, E. (2016). *Utilization of Insecticide-treated Mosquito Nets among Caregivers of Children Under-Five in Hohoe township of Ghana*. University Of Ghana, Legon. https://doi.org/10.1038/253004b0

Atieli, H. E., Zhou, G., Afrane, Y., Lee, M. C., Mwanzo, I., Githeko, A. K., & Yan, G. (2011). Insecticide-treated net (ITN) ownership, usage, and malaria transmission in the highlands of western Kenya. *Parasites and Vectors*. https://doi.org/10.1186/1756-3305-4-113

Atkinson, J., Bobogare, A., Fitzgerald, L., Boaz, L., Appleyard, B., Toaliu, H., & Vallely, A. (2009). types of long-lasting insecticide-treated bed nets in Solomon Islands : implications for malaria elimination, *12*, 1–12. https://doi.org/10.1186/1475-2875-8-119

Auta, A. (2015). Demographic Factors Associated with Insecticide Treated Net use Among Nigerian Women and Children, *4*(1), 40–45. https://doi.org/10.4103/1947-2714.92903

Berie, Y., Alemu, K., Belay, A., & Gizaw, Z. (2013). Factors affecting utilization of Insecticide treated nets among people living with HIV / AIDs in Bahir Dar city , northwest Ethiopia, *2*(6), 147–152. https://doi.org/10.11648/j.sjcm.20130206.11

Binka, F. N., & Adongo, P. (1997). Acceptability and use of insecticide impregnated bednets in northern Ghana, *2*(5), 499–507.

Cox, Jonathan Nottingham, E. W., Rosenthal, P. J., Kamya, M. R., Dorsey, G., & Steadke, S. G. (2018). Short Report: Proximity To Mosquito Breeding Sites As A Risk Factor For Clinical Malaria Episodes In An Urban Cohort Of Ugandan Children. *The American Journal of Tropical Medicine and Hygiene*. https://doi.org/10.4269/ajtmh.2003.69.244

Eisele, T. P., Keating, J., Littrell, M., Larsen, D., & Macintyre, K. (2009). Assessment of Insecticide-Treated Bednet Use Among Children and Pregnant Women Across 15 Countries Using Standardized National Surveys, *80*(2), 209–214.

Gakpey, K., Baffoe-Wilmot, A., Malm, K., Dadzie, S., & Bart-Plange, C. (2016). Strategies towards attainment of universal coverage of long lasting insecticide

treated nets (LLINs) distribution: Experiences and lessons from Ghana. *Parasites and Vectors*, *9*(1), 1–3. https://doi.org/10.1186/s13071-016-1328-5

Ghana Statistical Service. (2015). Ghana demographic health survey. *Gss, Ghs, Usaid, Unfpa, Undp, Unicef, Ilo*, 530. https://doi.org/10.15171/ijhpm.2016.42

Ghana Statistical Service, & Ghana Demographic Health Survery. (2008). *Ghana Demographic and Health Survey 2008: Ghana Statistical Service, Ghana Health Service, Ghana AIDS Commission*. *Ghana Statistical Service (GSS) Ghana Demographic and Health Survey*. https://doi.org/10.15171/ijhpm.2016.42

GSS. (2011). Multiple Indicator Cluster Survey Ghana 2011 - Final Report. *Ghana Statistical Service*. https://doi.org/10.1017/CBO9781107415324.004

Hetzel, M. W., Gideon, G., Lote, N., Makita, L., Siba, P. M., & Mueller, I. (2012). Ownership and usage of mosquito nets after four years of large-scale free distribution in Papua New Guinea Ownership and usage of mosquito nets after four years of large-scale free distribution in Papua New Guinea, *192*(June).

Kramer, R., Clements, D., Woods, C., & Kramer, R. (2011). No Title Determinants of Insecticide Treated Nets (ITNs) Ownership and Use in Ghana by.

Kudom, A. A., & Mensah, B. A. (2010). The potential role of the educational system in addressing the effect of inadequate knowledge of mosquitoes on use of insecticide-treated nets in Ghana, (May 2014). https://doi.org/10.1186/14752875-9-256

Leonard, N., Eric, F. B., Judith, A. K., & Samuel, W. (2016). Factors associated to the use of insecticide treated nets and intermittent preventive treatment for malaria control during pregnancy in Cameroon. *Archives of Public Health*, 1–5. https://doi.org/ 10.1186/s13690-016-0116-1

Lga, E. W., & State, E. D. O. (2010). ITN UTILIZATION AMONG PREGNANT WOMEN ATTENDING ANC IN NIGERIA, *13*(June), 144–148.

National Malaria Control. (2014). 2014 Annual Report National Malaria Control, (January), 89. Retrieved from http://www.ghanahealthservice.org /downloads/ NMCP_2014_ ANNUAL_REPORT.pdf

NMCP. (2013). National Malaria Control Programme Ghana Malaria Programme Review, (June), 24. Retrieved from https://www.ghanahealthservice.org /downloads/ghana_ malaria_programme_review_final_report_june_2013.pdf Obol, J., Lagoro, K. D., & Garimoi, O. C. (2011). Knowledge and Misconceptions about Malaria among Pregnant Women in a Post-Conflict Internally Displaced Persons ' Camps in Gulu District , Northern Uganda, *2011*. https://doi.org/ 10.4061/2011/ 107987

Onwujekwe, O., Etiaba, E., Uguru, N., Uzochukwu, B., & Adjagba, A. (2014). Towards making efficient use of household resources for appropriate prevention of malaria : investigating households ' ownership , use and expenditures on ITNs and other preventive tools in Southeast Nigeria, 1–7.

Ozims, S. J., & Eberendu, I. F. (2014). International Journal of Research In Medical and Health Sciences Awareness , Ownership And Utilization Of Long Lasting Insecticide-Treated Net (Llin) Among Pregnant Women Attending Antenatal Clinic In Imo State University Teaching Hospital , Orlu , Imo State, *4*(8).

Sena, L. D., Deressa, W. A., & Ali, A. A. (2013). Predictors of long-lasting insecticide-treated bed net ownership and utilization: Evidence from community-based cross-sectional comparative study, Southwest Ethiopia. *Malaria Journal*. https://doi.org/ 10.1186/1475-2875-12-406

Taremwa, I. M., Ashaba, S., Adrama, H. O., Ayebazibwe, C., Omoding, D., Kemeza, I., … Hilliard, R. (2017). Knowledge, attitude and behaviour towards the use of insecticide treated mosquito nets among pregnant women and children in rural Southwestern Uganda. *BMC Public Health*. https://doi.org/10.1186/s 12889-017-4824-4

Ugwu, E. O., Ezechukwu, P. C., Obi, S. N., Ugwu, A. O., & Okeke, T. C. (2013). Utilization of insecticide treated nets among pregnant women in enugu, South Eastern Nigeria. *Nigerian Journal of Clinical Practice*. https://doi.org/ 10.4103/ 1119-3077.113449

WHO. (2017). *World Malaria Report 2017*. *World Health Organization*. https:/ /doi.org/ 10.1071/EC12504

World Health Organisation (WHO). (2012). world malaria report 2012.

World Health Organization. (2017). *World Malaria Report 2017. World Health Organization*. https://doi.org/10.1071/EC12504

World Malaria Report 2015. (2015).

APPENDICES

APPENDIX A: QUESTIONNAIRE FOR PREGNANT WOMEN

FACTORS AFFECTING NON-USE OF LONG-LASTING INSECTICIDE TREATED NETS AMONG PREGNANT WOMEN IN KUMASI

To all respondents: All your answers will be kept strictly confidential. They will be put together with over 399 other people we are going to talk to. It will be impossible to pick you out from what you say, so please feel free to speak to me honestly.

(Proceed with interview only if answer is positive).

IDENTIFICATION

Name of community ……

Household number ……

Interviewee contact number……

Interviewer name…… Date…….

Section A: Socio demographic data

1. Age (years)……

2. Marital status

Married { }

Single { }

Widow { }

Divorce { }

Co-habiting { }

3. Level of education

None { }

Primary { }

JHS { }

Secondary { }

Technical/commercial { }

Tertiary/University { }

Other (specify)……

4. Occupation

Unemployed { }

Farmer { }

Civil/public servant { }

Business woman { }

Trader { }

Other (specify)……

5. Religion

Christian { }

Muslim { }

Traditional { }

Other …….

Section B: Knowledge of Malaria

6. What causes malaria?

Witchcraft { }

Exposure to the sun/heat { }

Overwork { }

Malnutrition { }

Mosquito bite { }

Others (specify)……..…

7. How can malaria be prevented?

Avoid excessive heat { }

Clean our environment { }

Good personal hygiene { }

Eat balanced diet { }

Sleep under mosquito net { }

Cannot be prevented { }

Take anti malaria { }

Use mosquito spray/coil { }

Others (specify) ……..…

8. Can mosquito transmit malaria from one person to the other?

Yes { }

No { }

Don't know { }

Section C: knowledge of insecticide treated mosquito net

9. Have you heard about ITNs?

Yes { }

No { } If No skip to section D

10. What is it used for?

Room decoration { }

Protection against mosquitoes { }

Affording good sleep { }

Don't know { }

11. Where did you hear about it?

FM station { }

Television { }

Hospital { }

Clinic { }

Community volunteer { }

Relatives/peers { }

Others (specify) ……

12. Where can you purchase an ITN?

Hospital { }

Clinic { }

Community volunteers { }

Pharmacy shop { }

Drug store { }

Others (specify) ……..…

Section D: possession/ownership and source of ITNs

13. Do you have any mosquito bed net for the household?

Yes { }

No { }

If No what prevents you from having one? (End the interview)

…….

14. What type of bed net do you have?

Long Lasting { }

Insecticide { }

Treated Net { }

Re-treatable Insecticide Treated Net { }

Untreated { }

15. How many mosquito bed nets do you have?

…….Indicate Number

16. Where did you get the net (s) from?

Mass distribution by Nurses { }

Hospital { }

Clinic { }

Purchase from market { }

Purchase from pharmacy { }

Other (specify)…….

SECTION E: USE OF ITNs

17. What were you told about how to use it?

Bed nets will last you 3yrs or 20 washes { }

Bed net to be washed by mild soap { }

Bed net to be dried in the shade { }

Bed net should be aired 24hrs or more before sleeping in it { }

No information was given { }

Others (specify) …….

Multiple answers required

18. Did you hang it in your sleeping area?

Yes { }

No { }

If No skip to Q 21

19. Did you sleep under insecticide treated net last night?

Yes { }

No { } if No skip to Q 21

20. Why did you sleep under the net?

To prevent malaria { }

To prevent insect bites { }

To sleep soundly { }

To provide warmth { }

Use as partition in the room { }

21. Why did you not sleep under the net?

No space to hung { }

Causes heat { }

Causes rushes (allergic) { }

Looks like a burial covering { }

Feels hot last night { }

Others (specify) ……

SECTION F: INSTITUTIONAL/ORGANIZATIONAL FACTORS

22. Was the net free at facility level?

Yes { }

No { } if yes skip to Q 24

23. How much was the cost for one net?

Amount in cedis ……

24. Where you educated on how to use it?

Yes { }

No { }

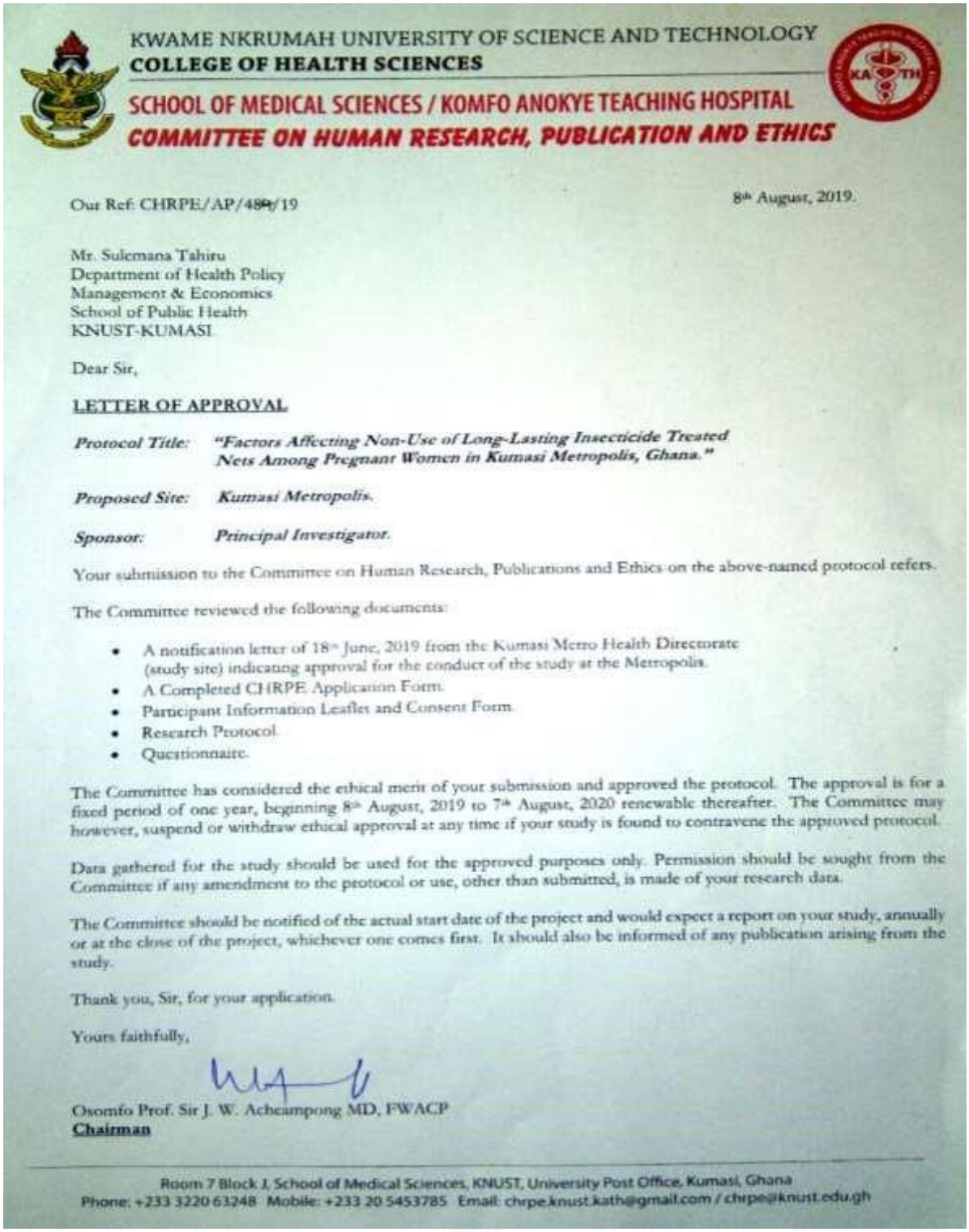
25. What did the health worker say?

……

……

THANK YOU FOR YOUR ATTENTION

APPENDIX B: ETHICAL APPROVAL



KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/489/19

8th August, 2019.

Mr. Sulemana Tahiru
Department of Health Policy
Management & Economics
School of Public Health
KNUST-KUMASI

Dear Sir,

LETTER OF APPROVAL

Protocol Title: ***"Factors Affecting Non-Use of Long-Lasting Insecticide Treated Nets Among Pregnant Women in Kumasi Metropolis, Ghana."***

Proposed Site: ***Kumasi Metropolis.***

Sponsor: ***Principal Investigator.***

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 18th June, 2019 from the Kumasi Metro Health Directorate (study site) indicating approval for the conduct of the study at the Metropolis.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning 8th August, 2019 to 7th August, 2020 renewable thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

Osomfo Prof. Sir J. W. Acheampong MD, FWACP
Chairman

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