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THE SUPPLY AND DEMAND FACTORS AFFECTING THE USE OF INSECTICIDES-TREATED MOSQUITO NETS IN THE GREATER ACCRA REGION

By

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DECLARATION

I hereby declare that this research work titled "The supply and demand factors affecting the use of Insecticides-Treated Nets in the Greater Accra Region" is the original work of Biipah Isaac Yennuyar carried out under the supervision of Dr. Isaac Osei-Akoto. This work has not been submitted to in part or whole for any other degree elsewhere. Where it is indebted to the work of others, acknowledgment has been duly made.

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(Supervisor)	Signature	Date

Dedication

This research work is dedicated to my family for their immense support without which I could not have come this far. I love you all.

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List of abbreviations

GDP – Gross Domestic Product

GHS – Ghana Health Service

ITNs – Insecticide Treated Nets

LLINs – Long Lasting Insecticides treated Nets

WHO – World Health Organization

RBM –Roll Back Malaria

MICS – Multiple Indicator Cluster Survey

ACTS - Artemisinin-based Combination Therapies

NMCP – National Malaria Control Proggramme

IRS – Indoor Residual Spraying

IPT - Intermittent Preventive Treatment

NGO – Non-governmental Organization

DRC – Democratic Republic of Congo

HIV – Human Immunodeficiency Virus

AIDS – Acquired Immune Deficiency syndrome

ICT – Information and Communication Technology

SDA – Seventh Day Adventist

IDIS – In-depth Interviews

GDHS – Ghana Demographic Health Survey

TPB – Theory of Planned Behavior

TRA – Theory of Reasoned Action

SCT – Social Cognitive Theory

SLT - Social Learning Theory

KVIP – Kumasi Ventilated Improved Latrine

NID – National Immunization Day

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Abstract

Malaria is a major cause of morbidity and mortality in many parts of the world with many and varied effects. In Africa, malaria is a development problem because of its high prevalence in many countries in the continent. Insecticide-Treated mosquito Net (ITN) is one of the most effective measures used in preventing malaria. This is because, it acts as a physical barrier, preventing access by vector mosquitoes and thus providing personal protection against malaria to individuals using the ITN.

In order to determine the supply and demand factors affecting the use of ITN, the study dwelled on two objectives: Firstly, to analyze the supply factors affecting the use of ITN in greater Accra region and lastly, to analyze the demand factors affecting the use of ITN.

To obtain information on the above objectives, the research leaned on MICS4 2011 data set and data from the field, which was mainly qualitative information. MICS4 2011 data set was used to analyze the demand factors affecting the use of ITN whereas the field data was use to elicit information on the supply factors affecting the use of ITN and also information to triangulate with the results from MICS4 2011 data set.

On the supply factors affecting the use of ITN, the study revealed that, the universal coverage system of one ITN to two persons, discontinuity of education on the use of ITN and the lack of or ineffective household monitoring and supervision are the factors likely to affect the use of ITNs in the region. On the demand side, the research established that, gender, age, locality, ethnicity, religion, education and wealth of household members were the factors likely to affect the use of ITN in the region. The result suggests that, relative to female, male household members are less likely to use ITN.

Household members who dwell in urban areas are also less likely to use ITN than their counterparts in the rural areas. The results also revealed that, household members who were under the age 5 were more likely to use ITN than all the age groups. Ethnicity and religion had a positive and a significant relationship with ITN usage as Ewes were more likely to use ITNs than the other ethnic groups likewise household members who were affiliated to SDA were more likely to use ITN than the other religious groups. There was also a positive and a significant relationship between education of household head and ITN use. Household members who reported as having had middle or JHS and secondary or more education were more likely to use ITN than household heads with no education. Lastly, there was a negative and a significant relationship between wealth status of households and ITN usage, as households who falls within the poorest wealth status were more likely to use ITN than all the households in the rest of the wealth status.

The study therefore finds that the policy on ITN use is pro-poor and recommends an expansion in ITN distribution to include more poor households, target more under 5 years children and women, intensify education on ITNs usage at programmes, institutions and the household level, massive scale-up in monitoring and supervision and a redefinition of the universal coverage system of one ITN to two people to one person one ITN.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Malaria is a life-threatening parasitic disease transmitted by mosquitoes. Approximately 40% of the world's population lives in regions where malaria transmission is endemic, mainly tropical and sub-tropical regions (Aultman et al., 2002). Malaria is a major cause of illness and deaths in malaria deaths and 482, 000 or 77% of total global malaria deaths were estimated to occur in children under-5 years of age in 2012 (World Malaria Report, 2013. p62).

The effects of malaria are many and varied. In heavily burdened countries up to 40% of public health expenditures, 30-50% of inpatient hospital admissions, and 60% of outpatient visits are attributable to malaria (World Malaria Report, 2010,). Unfortunately, the vast majority of deaths caused by malaria occur in Africa. It is estimated that, about 90% of global malaria deaths in 2012 were in the African Region (World Malaria Report, 2013. p72).

In West Africa, it is estimated that, approximately 324 million people in the 17 countries of this sub-region are at some risk for malaria and with 313 million people at high risk (World Malaria Report, 2013. p72). When malaria does not claim peoples' lives, it has a detrimental effect on worker productivity, educational attainment, population growth and savings and investment (Sachs & Malaney, 2002; Bleakley, 2010a).

Incidence of malaria is a developmental problem in Africa because of the high prevalence of the disease in many countries in the continent. Africa is the historical home of malaria, and the region with a physical environment most supportive of deadly species of mosquitoes which

transmit the disease. A widely quoted estimate is that, malaria reduces growth of GDP per capita by 1.3% per year in the African countries most afflicted. The Abuja declaration of 2005, signed by fifty three African heads of state claimed that "malaria has slowed economic growth in African countries by 1.3% per year as a result of which GDP for African countries is now 37% lower than it would have been in the absence of malaria." Ashraf, Lester, and Weil (2008) concluded that eliminating malaria in sub-Saharan Africa would increase income per capita by a total of only 2%.

In Ghana malaria is the primary cause of morbidity and mortality. According to the Ghana Health Service, malaria is the number one cause of morbidity, accounting for about 38% of all outpatient illnesses, 35% of all admissions and about 34% of all deaths in children under-five years (GHS, 2010). Between 3.1 and 3.5 million cases of clinical malaria are reported in public health facilities each year, of which 900,000 cases are in children under five years (Ghana National Malaria Control Strategic Plan, 2008-2015). It is undoubtedly true that malaria is a cost to Ghana. The cost to the country includes government's expenditure on malaria treatment and prevention, through the malaria control program and a proportion of the overall health sector expenditure. Malaria also has indirect costs on the domestic economy. It remains a major cause of low productivity in Ghana which is a drag on growth. The annual economic burden of malaria is estimated to be between 1-2 per cent of the GDP.

There is no effective vaccine or inoculation to prevent malaria. The emphasis on preventive measures has centred on insecticide-treated nets (ITNs). The use of insecticide treated nets is one of the most effective measures in preventing malaria. ITNs are mosquito nets impregnated with insecticides (usually a pyrethroid) which have residual effects to repel or kill insects on contact. Controlled trials, supported by WHO and other partner agencies, have shown convincing

evidence of the efficacy of ITNs in reducing mortality from malaria. ITNs have shown not only to reduce malaria transmission by as much as 90 percent under trial conditions, but also to reduce the indoor vector population (Binka et al, 1998; Hawley et al, 2003). It is thought that ITNs decrease both the number of malaria cases and malaria death rates in endemic populations. ITNs are the most prominent malaria preventive measures for large-scale deployment in highly endemic areas (Schellenberg et al. 2002, Lengeler 2004). Although the cornerstone of malaria control in Africa has been promotion of the appropriate use of anti-malarial drugs for treatment and prevention, the spread of chloroquine resistant *Plasmodium falciparum* parasites throughout sub-Saharan Africa has made governments to focus on measures which provide protection from mosquitoes, including mosquito nets. Thus, malaria control programmes now place greater emphasis on avoiding contact with malaria vectors and household responsibility for self-protection. Donors and governments are expressing a greater interest in insecticide-treated mosquito nets distribution and usage. In 2003, most African states agreed to half deaths from malaria by 2010 through strengthening their national prevention policies and plans so that 80 percent of those at risk of malaria will benefit from intervention by 2010. Roll Back Malaria (RBM) is a global partnership promoting treatment, prevention and control of Malaria. The RBM strengthens health services and make effective prevention and treatment strategies more widely available. ITNs are general purpose nets used to reduce human-vector contact and protect individuals from mosquitoes that carry malaria-causing parasites and to lower the intensity of malaria transmission at community level by reducing the average lifespan of the local mosquito population. They offer natural protection from insects while enhancing the bedrooms. ITNs are more effective in reducing malaria transmission. A general finding has been that treatment of the netting material or fabric with a pyrethroid insecticide greatly increases the protective effect.

Studies in Ghana and Kenya have provided further evidence that ITNs significantly reduce childhood mortality (Nevill *et al*. 1996; Binka *et al*. 1996) and there are now calls for operational research into how best to promote the use of ITNs on a large scale (Lengeler *et al*. 1996). The use of ITN's in low transmission areas is low due to the low mosquito biting pressure. However, the use of ITN's has been limited and the success of ITN's for malaria prevention has been hampered in high transmission areas because of the supply and demand constraints.

1.2 Problem Statement

The benefits of having a healthy population are undoubtedly enormous as it is linked to economic development. A society with healthy people has the tendency of increasing productivity as hours spent at work increases, household welfare rises as resources that would otherwise be used to cater for the cost of health services are diverted for other welfare services. Educational performance at all levels is likely to be improved as student and teacher absenteeism would be minimised. Conversely, an unhealthy population equally has the tendencies of dwindling productivity, household welfare and educational performance at all levels.

Insecticide-treated bed nets (ITNs) have been demonstrated to be of significant value in reducing morbidity and mortality due to malaria in sub-Saharan Africa (Lengeler C. 2004 and Fegan G, Noor A, et al, 2008). Despite their accepted effectiveness, there remain barriers to the use of ITNs.

In Ghana, evidence from the Multiple Indicator Cluster Survey (MICS4) conducted in 2011 shows that, there is an apparent low use of ITNs among the population. The data shows that 48.9 % of households possess at least one ITN as against 51.4% of households who posses at least one of any mosquito net despite the large acceptability of the effectiveness of ITNs in malaria

prevention. Also, only 28.6% of members in a household use ITN as against 30.5% for any mosquito net (Ghana MICS4, 2011). In the Greater Accra region for instance, an estimated 2,023,705(projected) insecticide-treated nets where distributed to all households in August 2012. In the final report of (Ghana MICS4, 2011), 25.5 % of households own at least one insecticide treated net, with only 10.9 % of the households using insecticides treated nets.

The difference in ownership and use of ITN vis-a-vis the projected total number of insecticide-treated nets that was distributed portrays an unfortunate situation which could be blamed on the mismatches between the supply and demand of mosquito nets in the Region. The mismatch between the supply and demand for insecticide-treated nets is arguably a major reason to research on the supply and demand factors affecting the use of ITNs in the Greater Accra region, considering the enormous health benefits of having a non malaria area.

1.3 Aim and Objectives of the Study

The aim of the study is to analyse the supply and demand factors affecting the use of mosquito nets in Greater Accra region. In order to achieve this aim, these objectives will be pursued.

1. To analyse the supply factors which affect the use of ITN in the Greater Accra Region
2. To analyse the determinants of the use of ITN in the Greater Accra Region.

1.4 Research Questions

Base on the objectives of the study, the research sought to answer the key question;

1. What is the supply and demand factors affecting the use of ITN in the Greater Accra Region.

1.5 Significance of the Study

While it is the preoccupation of the country to eliminate malaria by way of encouraging the use of the ITN, little empirical effort is made to understand the fundamental drivers of ITN usage. It is imperative to note that, the few of the studies on the determinants of ITNs usage in Ghana is mostly on the country as a whole. Studies on the regional determinants of ITN usage are almost non-existent and results are often inconclusive necessitating further research effort in this direction. Thus, in addition to bridging part of the gap in literature, this study sheds more light on the drivers of ITNs usage in Ghana by exclusively focusing on the supply and demand factors affecting the use of ITNs in Greater Accra region.

1.6 Organization of chapters

The study is organized in five chapters. Chapter one talks about the background of the study, the problem statement, objectives of the study, research questions, and the rational of the study. Chapter two contains the literature review and the conceptual framework. Chapter three contains mainly the source of data and the methodology. Chapter four contains analysis and discussion of the results while chapter five contains conclusion and recommendations.

CHAPTER TWO

Literature Review

2.0 Introduction

This chapter explains what malaria is, the transmission, strategies for prevention, the history of ITN in Ghana, the supply factors and the demand factors likely to affect the use of ITN. It also describes the framework within which this study was conducted.

2.1 Background of malaria

Malaria is a life-threatening parasitic disease transmitted by mosquitoes. Approximately 40% of the world's population lives in regions where malaria transmission is endemic, mainly tropical and sub-tropical regions (Aultman et al., 2002). In Ghana, malaria is endemic and perennial in all parts of the country, with seasonal variations that are more pronounced in the north. All Ghana's population of about 25 million is at risk of malaria infection, but children under five years of age and pregnant women are at higher risk of severe illness due to lowered immunity. Transition tends to be less intense in large urban centres. Malaria is the number one cause of morbidity, accounting for about 38 percent of all out outpatient illnesses, 35 percent off all admissions, and about 34 percent of all deaths in children under five years (NMCP 2010 Annual Report). Also, it is reported between 3.1 and 3.5 million cases of clinical malaria are reported in public health facility each year, of which 900,000 cases are in children under five under five years (Ghana National Malaria Control Strategic Plan, 2008-2015. Malaria is also a significant cause of child mortality and adult morbidity, and the leading cause of workdays lost due to illnesses. Additionally, there were an estimated 21,000 deaths due to malaria for children under age 5 in Ghana in 2006 (WHO, world Malaria Report 2008, cited in Ghana MICS4, 2011 report).

2.2 Malaria: Cause and Transmission

Malaria is caused by five species of parasite that affect humans, and all of these species belong to the genus Plasmodium: P. falciparum, P. vivax, P. ovale, P. malariaeand P. knowlesi. Of these, P. falciparum and P. vivax are the most important. Malaria due to P. falciparum is the most deadly form, and it predominates in Africa. P. vivax has a wider distribution than P. falciparum because it is able to develop in the Anopheles mosquito vector at lower temperatures, and to survive at higher altitudes and in cooler climates in Ghana the main parasite species causing malaria is P. falciparum (over 90-95 percent of infections in most prevalence studies). P. malariae (less than 10 percent, and P. ovale less than 2 percent are also found. P. vivax is not known in Ghana. Mixed infections of P. falciparum and P. malariae are fairly common (Noguchi Memorial Institute for Medical Research, 2010 Unpublished report). The anopheles Gamgiae species complex and A. funestus are the major vectors found in the country and they bite usually late in the night, are indoor resting and are commonly found in the rural and peri-urban areas where socio economic activities leads to the creation of breeding sites. Just like in all other countries, transmission is greatest during the rainy seasons because the increase in relatively clean, temporary fresh stagnant water bodies favor the breading of anopheles mosquitoes during the period. The normal duration of the intense malaria transmission season ranges from approximately 6-7 months in the northern-most part of the country (May-October) up to 10-11 months in the forest zone (Ghana MICS4, 2011). Peak levels of malaria infection and malaria-associated anaemia in the population persist for 2-3 months into the dry season. The MICS 2011 was conducted from mid-September to Mid December, a period which is presumed to coincide with the peak or average periods of malaria-associated anaemia and malaria parasitaemia in all areas of the country (Koram et al, 2001; Owusu-Agyei et al, 2002 cited in MICS4, 2011).

2.3 Strategies for Malaria prevention

Various strategies have been adopted by countries in the bid to prevent malaria. There has been remarkable expansion in coverage in malaria control programmes since 2000 which has led to the wide spread reduction in malaria morbidity and mortality. According to World Malaria Report 2013, WHO recommends vector control interventions, preventive therapies, diagnostic testing, treatment with quality-assured artemisinin-based combination therapies (ACTs) and strong malaria surveillance. As a results, malaria control programmes now place greater emphasis on avoiding contact with malaria vectors and household responsibility for self-protection. Notable among the control measures is the insecticide-treated nets (ITNs). ITNs are the most prominent malaria preventive measure for large-scale deployment in highly endemic areas (Schellenberg et al. 2002, Lengeler 2004). A study in The Gambia provided evidence that untreated mosquito nets confer some individual protection against malaria, but not as efficiently as insecticide-treated mosquito nets (D'Alessandro *et al*. 1995a). The treated nets were particularly effective in the prevention of infections with high parasitaemia. A previous study in The Gambia found that people sleeping under nets not treated with insecticide do not receive significantly fewer infective bites than those without nets (Lindsay *et al* 1989).

In 2000, Ghana adopted the RBM Strategy of the WHO which was launched in 1998.The same year witness Ghana signing the Abuja declaration to halve the burden of the disease through among others the distribution of insecticide-treated nets (ITNs) to cover population at risk (especially children under the age of five and pregnant women). Between the year 2003 to 2005, Ghana received a malaria grant from the Global fund to intensify malaria control interventions in 20 districts in Ghana and improving key malaria indicators in these districts and scaling-up interventions nationwide, resulting in improved indicators across the country. Scaling up proven

malaria control intervention continues to be the national strategic goals outlined in the national Malaria Control Strategy 2008-2015. This strategic plan was developed by the National Malaria Control Programme (NMCP) under the Ghana Health Service within the Ministry of health, together with all stakeholders. The strategic plan calls for a 75 percent reduction in malaria mortality by the year 2015, using 2006 as the baseline (National Malaria Control Strategic Plan 2008-2015).

Undoubtedly, Insecticide treated mosquito nets was one of the key targets of the national strategies. On universal coverage with insecticides treated nets, there should be 1 ITN available per two persons by 2015; 100 percent of household ITN ownership; 85 percent of children under five years and pregnant women, and 80 percent of the general population. Also, the strategic plan calls for the strengthening of health systems at all levels, with an emphasis on research, monitoring and evaluation and creating and sustaining partnerships for malaria control. Current priority areas are focused on sustaining coverage following ITN mass distribution campaigns; managing insecticide resistance; and resolving implementation bottlenecks in community and home management of malaria.

The National Malaria Control Programme has also undertaken several intensive public educations in the quest to influence attitude and practice on malaria prevention. All media channels were used ranging from mass media to interpersonal communication.

2.4 Malaria Prevention

Integrated vector control and intermittent preventive treatment (IPT) are the two main approaches to malaria prevention in Ghana. The integrated vector control primarily aims at reducing man-vector contact through the use of ITNs, larviciding and indoor residual spraying

(IRS). The second preventive measure is intermittent preventive treatment (IPT) that targets pregnant women at each scheduled antenatal care visit after the first trimester, in areas of moderate to high malaria transmission in sub-Saharan Africa (World malaria report, 2013).

According to Ghana's MICS 2011 report, larviciding was implemented on limited basis in central urban district in Accra, Kumasi and sunyani (since 2009-2011), as well as in Obuasi (since 2005).

2.5 Insecticide treated mosquito nets (ITNs)

An insecticide-treated net (ITNs) is one of the most effective measures used in preventing malaria. ITNs act as a physical barrier, preventing access by vector mosquitoes and thus providing personal protection against malaria to the individual(s) using the ITN. Pyrethroid insecticides, which are used to treat nets, have an excito-repellent effect that adds a chemical barrier to the physical one, further reducing human–vector contact and increasing the protective efficacy of the mosquito nets. when used by a majority of the target population, ITNs provide protection for all people in the community, including those who do not themselves sleep under nets (Binka et al, 1998; Hawley et al, 2003). ITN has not only been shown to reduce malaria transmission by as much as 90 percent under trial conditions, but also to reduce the indoor vector population (Binka et al, 1998; Hawley et al, 2003) by killing the malaria vectors that come into contact with the ITN. ITN also reduce malaria mortality and morbidity. Also, ITNs are the most prominent malaria preventive measure for large-scale deployment in highly endemic areas (Schellenberg et al. 2002, Lengeler 2004).

An insecticide treated net (ITN) is any of the following: either a factory treated net that does not require any further treatment(known as "long-lasting insecticide treated net LLIN"); a pre-

treated net obtained within the past 12 months; or a net that has been soaked with insecticides within the past 12 months. LLIN are a subset of ITNs. An LLIN is a factory-treated mosquito net made with netting materials that has insecticide incorporated within or bound around the fibres. The net must retain its effective biological activity without re-treatment for repeated washes and three years of use under field conditions (WHO 2007 cited in Ghana MICS, 2011). The current generation of LLINs lasts 3-4 years, after which point the net should be replaced.

Community level protection against malaria is of interest because it helps to reduce the spread of the disease and offers an additional level of protection for the most vulnerable groups, children and pregnant women. Age is an important factor in determining levels of acquired immunity to malaria as children born within the first six months are protected by the acquired antibodies from their mothers during pregnancy. This immunity is gradually lost and children start to develop their own immunity to malaria. The pace at which immunity is developed depends on their exposure to malaria infection, and in high malaria-endemic area. Such children may experience episodes of malaria illness but usually do not suffer from severe, life-treating malaria. Immunity in areas of low malaria transmission is acquired more slowly and malaria illness affects all age groups of the population (Doolan et al, 2009). Immunity against malaria is not permanent unlike some other infectious diseases, and protection from being infected requires the regular use of the protective interventions. The use of ITNs confers some protection if the child uses the nets on a regular basis, and in Ghana, messages on ITN distribution has stressed the importance of consistent use by children under five.

2.6 Brief History of ITN Distributions in Ghana

In 2000, Ghana adopted the RBM Strategy of the World Health Organization (WHO) which was launched in 1998.The same year witnessed Ghana signing the Abuja declaration to halve the

burden of the disease through among others the distribution of insecticide-treated nets (ITNs) to cover populations at risk (especially children under the age of five and pregnant women). From 2002-2009, the mixed model of ITN distribution was adopted in Ghana. This method saw both the public and the private sector, non-governmental organizations engaged in the distribution of subsidized ITNs in Ghana. In the quest to scaling-up the distribution of ITNs in Ghana, a tax waiver policy on the importation of mosquito nets into the country was implemented in 2002 by the government of Ghana. Between the year 2003 to 2005, Ghana received a malaria grant from the Global fund to intensify malaria control interventions in 20 districts in Ghana and improving key malaria indicators in these district and scaling-up interventions nationwide, resulting in improved indicators across the country. The distribution of subsidized ITNs in Ghana together with full cost sales led to 42 percent of ITN ownership, as captured in the 2008 Ghana Demographic and Health survey (GDHS). The most recent strategy in the distribution of subsidized ITNs was the "catch –up" strategy of implementing free mass distribution campaigns with the goal of achieving universal coverage of LLINs in all ten regions by 2012. The distribution was done by Ghana Health Service (GHS) with the support of development partners. The "catch-up" strategy focused on the free, door-to-door, hang-up distribution of ITNs nationwide, distributing approximately 14 million LLINs over two years. The LLIN hang-up exercises were carried out through a programme of door to door visits by community volunteers in each region (Ghana MICS4, 2011).

Scaling up proven malaria control intervention continues to be the national strategic goal outlined in the national Malaria Control Strategy 2008-2015. This strategic plan was developed by the National Malaria Control Programme (NMCP) under the Ghana Health Service within the Ministry of health, together with all stakeholders. The strategic plan calls for a 75 percent

reduction in malaria mortality by the year 2015, using 2006 as the baseline (National Malaria Control Strategic Plan 2008-2015).

2.7 The supply factors affecting the use of ITNs.

Over the years various research organizations, donor agencies, non-governmental organizations (NGOs), the private sector and government agencies have been involved in one way or the other towards the distribution of subsidized ITNs in Africa. This is because Insecticide-treated bed nets (ITNs) have been demonstrated to be of significant value in reducing morbidity and mortality due to malaria in sub-Saharan Africa (Lengeler 2004 and Fegan, Noor, et al, 2008). This has resulted in significant gains in sub-Saharan Africa in terms of scaling up coverage of ITNs especially in light of policies and financial investments from donor agencies, non-governmental organizations (NGOs), the private sector and national governments, but there remains a wide range in the coverage rates at both national and local levels.

The supply/distribution of ITN has taken varied methods although; the intent of universal coverage of ITNs remains the same. In a study conducted by Singh et al, 2013; stock out of ITN supply or vouchers, failure to issue voucher to eligible clients, failure to redeem vouchers, refusal of coupon and lost coupon were among the supply barriers affecting ownership and use of ITNs among pregnant women in Africa. Also, in settings where voucher schemes had been adopted, there were additional potential bottlenecks reported, including the supply of vouchers, health personnel's attitudes towards distributing vouchers, customer acceptance and redemption of vouchers, and stock-outs of ITN supply at a market level.

In both Ghana and Tanzania, a considerable drop in the cumulative success of the voucher schemes was attributable to both stock-outs and failure to issue ITN vouchers to women who

were eligible to receive them, possibly because the health worker responsible for distributing vouchers did not think the pregnant woman would be able to afford the required financial contribution (Kweku, et al, 2007; Marchant, et al 2010).

In Ghana, the most recent strategy in the distribution of subsidized ITNs is the "catch –up" strategy of implementing free mass distribution campaigns with the goal of achieving universal coverage of LLINs in all ten regions by 2012. The distribution was done by Ghana Health Service (GHS) with the support of development partners. The "catch-up" strategy focused on the free, door-to-door, hang-up distribution of ITNs nationwide, distributing approximately 14 million LLINs over two years. Of this number only 48.9 percentage of households were reported to own at least one ITN (derived from Ghana MICS4,2011) The LLIN hang-up exercises were carried out through a programme of door to door visits by community volunteers in each region (MICS4, 2011).

Scaling up proven malaria control intervention continues to be the national strategic goal outlined in the national Malaria Control Strategy 2008-2015. This strategic plan was developed by the National Malaria Control Programme (NMCP) under the Ghana Health Service within the Ministry of health, together with all stakeholders.

The door-to-door, hang-up approach was tested in May 2010 in the Northern Region, through a campaign which targeted just children under five and pregnant women. The remaining campaign targeted universal coverage of the general population, defined as one net per every two persons. The NMCP goal for these campaigns was to achieve 75% of household owning at least one LLIN. By 2011 universal-coverage campaigns had been completed in the Eastern, Volta, and

Western regions. Central Region began its campaign toward the end of that period. The remaining regions had their campaigns in 2012.

2.8 The Demand factors affecting the use of ITNs

Several studies have been conducted to investigate the likely reasons for the low ownership and use of ITNs across countries with high malaria prevalence rate, Ghana not an exception.

A study in the Farafenni region of The Gambia, where malaria occurs throughout the year but is most common during the rainy season (i.e., September to November), found out that bed nets ownership by households was positively associated with the number of children less than five years of age, as well as with the number of children 5–10 years of age. The possible explanation given was that households with young children may own a greater number of nets because pregnant women tend to receive free nets from the government.

Price was found to be a significant determinant of the number of bed nets owned. Surprisingly, price had a positive relationship with the number of bed nets owned increasing with price. Though speculative, the explanation deduced from this relationship was attributed to quality. Thus, some households may be willing to pay more for ITNs that are perceived to be of good quality than other nets (i.e., ITNs that are treated, more durable and allows for more ventilation)

Increase in the number of household members and increased spending on other forms of malaria prevention were some of the other factors accounting for the decreasing likelihood of ITN ownership. This is because, as household members increases, bed net ownership decreases and the more households spent on other malaria prevention, the less likely they are to own a mosquito net. Conversely, some of the factors that increased net ownership were education of the

household head and increasing age. A perused of the study findings revealed that, the number of household members was the strongest predictor of net ownership (Wiseman,. et al, 2007).

Another study in the Kinshasa area of the Democratic Republic of Congo (DRC) evaluated the continued usage of bed nets that were freely distributed to pregnant women (Pettifor.,et al, 2009). Prior to the start of the study, net usage was approximately 25%, but this increased to about 80% after free net distribution. Findings from this study also showed that women who reported this was their first pregnancy were less likely to have slept under a bed net the night before their delivery, after the nets were freely provided. The researchers observed that education of the women, and mothers living with their partners were positive predictors of ITN ownership. Negative predictors were first time pregnant women, and marriage. Conversely, other studies have shown that a marriage is positive predictor of net ownership (Mugisha., Arinaitwe., 2003; Matovu., et al, 2009).

Adeyeri (2011) study on the determinants of ITN ownership and use in Ghana shows that the number of children less than five, the size of the household, the type of residence, electricity, ownership of a radio, sex of the household head and education of the household head are all significant determinants of ITN ownership. Specifically, the presence of children under five had the strongest predictive odds of ITN ownership. This is revealed in the study as an additional child in the household increases the ITN ownership of that household. The type of residence was the second strongest predictor, as households in the rural areas were more likely to own ITN than households in the urban areas. Electricity in the household was found to be a negative predictor of ITN ownership as it decreased the odds by a factor of 0.80. Analysis of the other variables shows that the odds ratio of ITN ownership are increased when a female is the head of the household, with the ownership of a radio, with each additional household member, and with

each additional level of education attainment. Wealth index and ownership of durable goods were not significant in the household ownership and net usage. On ITN net usage, the variables that were significant in predicting the use of ITNs were the number of children less than five, sex of the household head, and wealth index.

Sangaré and others; 2012 study on the determinants of ITN use among pregnant women reveals that, about 73% of women reported either always sleeping under the net during all trimesters of pregnancy, or always sleeping under the net after they acquired one during pregnancy. The primary reason for not always sleeping under the net was the heat produced by the net. Religion was also another predictive variable to net usage as women of Muslim religion were less likely to always use a net during pregnancy compared to those of Christian religions. Ownership of more than 1 net was associated with a slightly increased likelihood of always sleeping under a net during pregnancy. Women in the wealthiest households were less likely to always use a net during pregnancy compared to women living in the poorest households. Also, women who always slept under an ITN during pregnancy were more likely to be influenced by an advertisement on the radio/poster than being given an ITN free of charge. Other studies on ownership and usage of ITNs show ownership of durable goods and wealth index, as having a positive predictive value (Nuwaha, 2001; Rashed, 1999).

In assessing which nets are being used: Factors associated with bed-net use in Ethiopia, Ngondi et al., 2011, revealed that education, household income, socio-economic status or ownership of goods, malaria and ITN knowledge, and urban residence were all predictive factors of ITN use. However, in studies where sample size exceeded 1,000 persons, factors found to be significantly associated with use included: wealth, urban residence, malaria or ITN knowledge, lack of misconceptions, age and number of ITNs in the household (Ngondi et al., 2011)

A study on the determinants of bed net use among pregnant women in Nigeria shows that pregnant women who knew that malaria can be prevented through the use of ITN were more likely to use bed-nets than those who had no such knowledge. Also, women who held no misconceptions about malaria prevention were more likely to use ITNs (Ankomah et al., 2012).

2.9 Social Cognitive Theory (SCT)

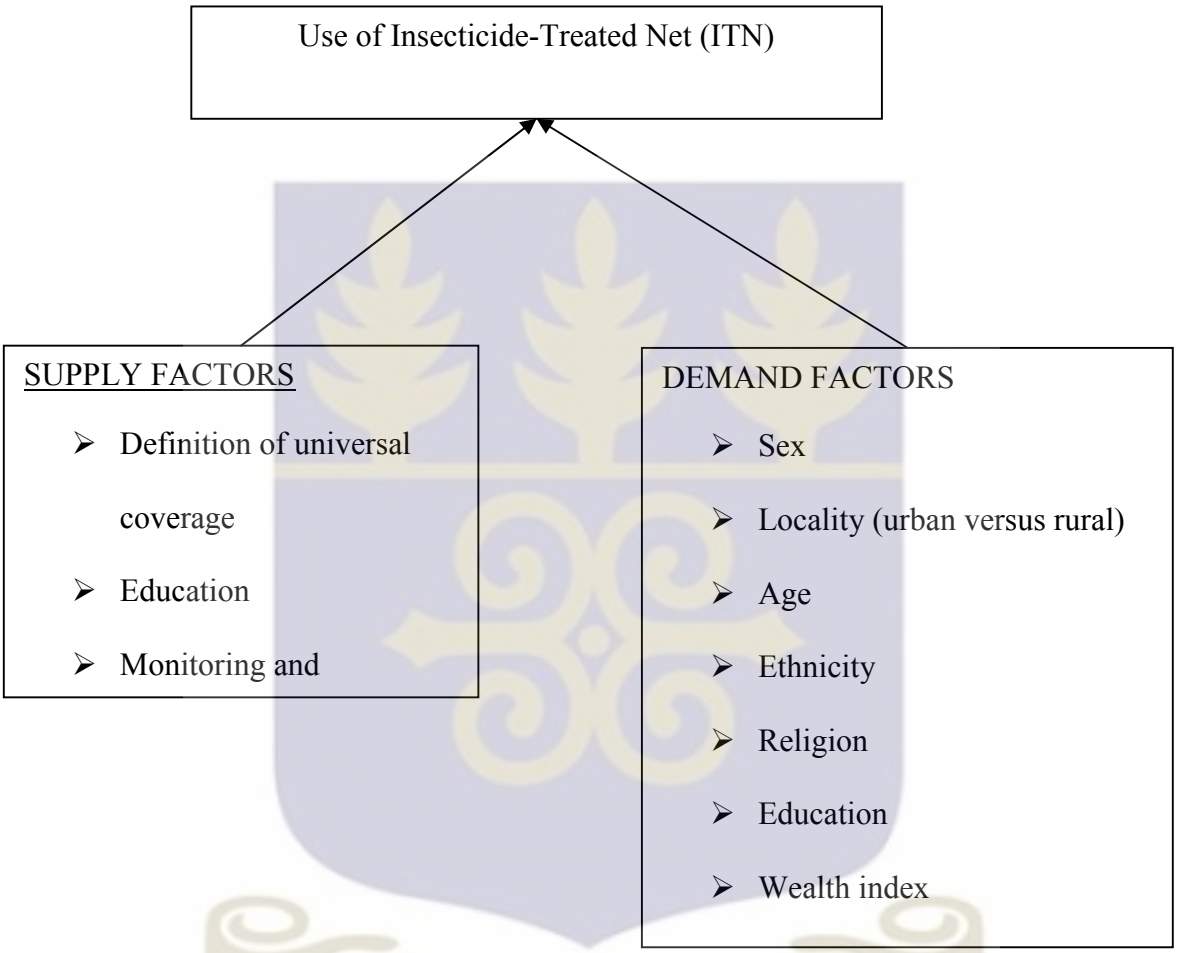
SCT evolved from research on Social Learning Theory (SLT), which asserts that people learn not only from their own experiences, but by observing the actions of others and the benefits of those actions. Social Cognitive Theory (SCT) assumes a dynamic, ongoing process in which personal factors, environmental factors, and human behavior exert influence upon each other. They also assume that, there are three main factors that are likely to affect a person to change a health behavior. These are: First and foremost, self-efficacy, secondly, goals, and lastly, outcome expectancies. If individuals have a sense of personal self-efficacy, they can change behaviors even when faced with obstacles. If they do not feel that they can exercise control over their health behavior, they are not motivated to act, or to persist through challenges. As a person adopts new behaviors, this causes changes in both the environment and in the person. Behavior is not simply a product of the environment and the person, and environment is not simply a product of the person and behavior (Glanz & Rimer, 2005 p.20). Since the SCT assumes an on-going process in which personal factors, environmental factors and human behaviors exert influence upon each other, the study leaned on the SCT to exclusively look at the socio-demographic characteristics that are likely to exert influence on users and nonusers of ITN in the Greater Accra Region of Ghana.

2.10 Conceptual framework

The conceptual framework is based on existing theoretical and empirical positions on the supply and demand factors affecting the use of insecticide treated nets. On the supply factors affecting the use of ITNs, available literature revealed the following to have influence on the use of ITN. Therefore, the study conceptualized that education on the importance of ITN use, the target definition of universal coverage and effective monitoring and supervision have influences on ITN use.

On the demand factors affecting the use of ITN, the study conceptualized that, household characteristics such as sex of the household member, age of the household member, the head of the household educational attainment, the ethnicity of the household member, locality of the household member, the religious affiliation of the household member and the wealth quintile of the household member have influence on ITN use.

Figure 2.1 Conceptual framework of the supply and demand factors affecting the use of ITN



Source: Author's own construct.

CHAPTER THREE

METHODOLOGY

3.1.0 Introduction

The chapter discusses in detail the sources of data, the sample design used, the description of the dependent variable and the independent variables, the methods of analyses, the analytical framework and the profile of the study area.

3.1.1 Data from the Ghana MICS4

The source of data for this study is partly the Ghana Multiple indicator cluster survey (MICS4) 2011 data set and data from the field. The Ghana MICS4 data were used in this study to analyze the demand factors affecting the use of ITNs in the Greater Accra Region of Ghana. The data were triangulated with interviews from the field whilst in-depth interviews were conducted in order to elicit information on the supply/distribution of ITNs in the region MICS4 selected 12,150 households for the sample but 11,970 were contacted for interviews. The Ghana MICS4 is a comprehensive nationally representative sample survey of household women aged 15-49 years, children aged 0-5 years and men aged 15-59 years. It captures data on child health, water and sanitation, reproductive health child development, literacy and education, child protection, HIV/AIDS, and sexual behavior, national health insurance, access to mass media and ICT technology and malaria thus data on insecticides treated mosquito nets. Data on the demography of individuals such as gender of individuals, sex of household heads, wealth index and locality/location, and education are available. The data also contain an enhanced malaria module and biomarker (for Anaemia and parasitemia in children aged 6-59 months).

3.1.2 Sample design

"The Ghana multiple indicator cluster survey (MICS4) was designed to provide estimates for a large number of indicators on the situation of children and women at the national level, for urban and rural areas, and for the ten regions of the country: Western, Central, Greater Accra, Volta, Ashanti, Brong Ahafo, Northern, Eastern, Upper East and Upper Western regions. The urban and rural areas within each region were identified as the main sampling strata and the sample were selected in two stages. Within each stratum, a specified number of census enumeration areas were selected systematically with probability proportional to size. The sample was stratified by region, urban and rural areas, and is not self-weighting since Central; Northern, Upper East and Upper West regions were over-sampled" (MICS4, 2011.p5).

3.1.3 Interviews

Unstructured interviews were conducted in other to triangulate the findings with the quantitative results. This was necessary because, the researcher was much interested in finding out the possible reasons why the SDA members were more likely to use ITNs than the other religious groups in the Greater Accra region and also, why the Ewes were more likely to use ITNs than the rest of the ethnic groups in Greater Accra region. Interview respondents were selected based on convenience sampling and whether one was an Ewe or SDA member.

3.1.4 In-depth interviews (IDIs)

In-depth interviews were conducted to elicit information on the supply/distribution of ITNs in Greater Accra region. The choice of respondents for the in-depth interviews was purposive to reflect the position the respondents hold. In all, 3 respondents were interviewed from the regional disease control unit. The responses were recorded using a digital device. The information on the device was later transcribed verbatim by the researcher and common themes identified and

grouped accordingly. English language was used as a medium of communication in the discussion.

3.1.5 Dependent variable

Use of ITNs by persons in the household is the dependent variable for the study. This refers to household members who slept in the household last night (the night before the survey was conducted) who slept under an ITN. Thus, all household members who slept under ITN the night before the survey were classified as users of ITN.

3.1.6 Independent variable

The explanatory variables used in this study are sex, age of household members, ethnicity, religion, educational level of household head, locality (urban and rural residents) and household members' wealth index quintile (poorest, second quintile, middle quintile, fourth and the richest). Sex is a dummy variable which denotes the sex of household members and it is given as 1= male and 0=female, age is a categorical variable which denotes the age of household members and it is given as 0= aged thus, household members who reported as being 60 years and above, 1= adults representing household members who reported as being between the ages of 18 and 59, 2= children, thus, household members who reported as being between the ages of 5 and 17, and 3= under 5 years representing household members who reported as being between the ages of 4 and below. Locality (1) is a binary variable which denotes the locality of the household members and it is given as 1= urban and 0= rural. Ethnicity is a categorical variable which denotes the ethnic background of the household members and it is given as 0= Akan, 1= Ewe, 2=Ga/Dagme, 3= non Ghanaians and 4= others. Religion is another categorical variable which denotes the religious background of the household members and it is given as 0= Catholic, 1= Deeper Life, 2= Jehovah witness, 3= Muslim, 4= Seventh Day Adventist (SDA) and 5= others. Educational

status is also a categorical variable which denotes the educational level of the household heads and it is given as 0= household heads with no education and 1, 2, and 3 are household heads with primary, middle or JHS and secondary plus, respectively. Wealth quintile is a categorical variable and represents the wealth status of the households and it is given as 0= poorest and second quintile, and 1, 2, and 3 are the middle, fourth and the richest, respectively.

3.1.7 Method of data analysis

The study sought to analyze the demand factors affecting the use of ITN and as such, the data were analyzed using descriptive statistics, bi-variate and chi-square tests to examine the relationship that exist, if any, and to ascertain whether or not there is any difference between the dependent variable and the rest of the explanatory variables.

Also, a logit regression model was employed for the analysis using the Stata13 statistical software package. This model is chosen because the dependent variable is a binary variable. Alternatively, the probit model could have been used in this study since there is no compelling reason to use one instead (Gujarati, 2004 p.614).

3.1.8 Analytical framework

The analytical framework for estimating the demand factors affecting the use of mosquito nets in this study involves a binary choice modeling approach.

In modeling the demand factors affecting the use of ITN, the logit model for the study is denoted as:

Equation (1)

$$log(y_1/1 - y_1) = \beta_1 + \beta_2 X_i + u_i \quad \text{(Gujarati, 2004)}$$

Where Y=1 if a member of the household uses ITN and zero (0) otherwise, β_1 denotes the intercept parameter, the X_is denotes the explanatory variables, β_2 denotes the coefficients to be estimated, which is interpreted as the log odds of the household members demand for ITN use and u_i is the error term.

From equation (1), the model specification for the estimation can be writing as;

$$log(y_1/1-y_1) = \beta_1 + \beta_2 sex(1) + \beta_3 age + \beta_4 locality(1) + \beta_5 ethnicity + \beta_6 religion + \beta_7 educational\ status + \beta_8 wealth\ index\ quintile + u_i$$

3.1.9 Description of variables.

Sex is a dummy variable which denotes the gender of household members and it is given as 1= male and 0=female, age is a categorical variable which denotes the age of household members and it is given as 0= aged thus, household members who reported as being 60 years and above, 1= adults representing household members who reported as being between the ages of 18 and 59, 2= children, thus, household members who reported as being between the ages of 5 and 17, and 3= under 5 years representing household members who reported as being between the ages of 4 and below. Locality (1) is a binary variable which denotes the locality of the household members and it is given as 1= urban and 0= rural. Ethnicity is a categorical variable which denotes the ethnic background of the household members and it is given as 0= Akan, 1= Ewe, 2=Ga/Dagme, 3= non Ghanaians and 4= others. Religion is another categorical variable which denotes the religious background of the household members and it is given as 0= Catholic, 1= Deeper Life, 2= Jehovah Witness, 3= Muslim, 4= Seventh Day Adventist (SDA) and 5= others. Educational status is also a categorical variable which denotes the educational level of the household heads

and it is given as 0= household heads with no education and 1, 2, and 3 are household heads with primary, middle/JHS and secondary plus, respectively. Wealth quintile is a categorical variable and represents the wealth status of the household members and it is given as 0= poorest and second quintile, and 1, 2, and 3 are the middle, fourth and the richest, respectively.

3.2 Profile of the study area

3.2.1 Location and size

The Greater Accra Region is the smallest of the 10 administrative regions in terms of landmass covering a total surface area of about 4,450km.sq. In terms of spatial interaction, it is centrally located within the coastal belt of Ghana and shares boundaries with the Eastern Region to the north, Central region to the west and Volta Region to the east. To the south of the region lies the Gulf of Guinea which span 220km coastline stretching from Langma near Kasoa in the west to Ada in the east.

3.2.2 Population growth

Greater Accra Region is estimated to have a population of about 4, 010, 05, a population density of 1,235.8 persons per square kilometers. According to Ghana population and housing Census, 2010, Greater Accra had a sex ratio of 93.6 in 2010, which means there are about 94 males to every 100 females in the region and this could be attributed to male emigration and higher life expectancy at birth for females. Also, it accounts for the largest proportion of urban dwellers (90.5%) in all the ten administrative regions of the country. In terms of Locality sex differentials, there is a higher proportion of females than males in both urban (51.7% versus 48.3%) and rural (50.9% versus 49.1%) dwellers in the region.

3.2.3 Administration:

The region is divided into 10 Assemblies namely: Accra Metropolitan Assembly, Tema Metropolitan Assembly, Ga West Municipal Assembly, Ga East Municipal Assembly, Ga South Municipal Assembly, Adentan Municipal Assembly, Ashaiman Municipal Assembly, Ledzokuku-Krowoh Municipal Assembly, Dangme East District Assembly and Dangme West District Assembly.

3.2.4 Weather:

Greater Accra region has a bi-modal rainfall pattern with the peak pattern around April to July and the minor season around August to October. Rainfall is usually characterized by thick cloudy conditions and high intensive storms. This situation always causes flooding of the valley bottoms. The coastal wet lands also get flooded as a result of the occasional opening of the Weija dam when it is full.

The annual average temperature ranges between 25.1ºC in August and 28.4ºC in February and March which are the hottest months. Relative humidity is about 75%. Average duration figures are about 94% and 69% at 6:00 and 15:00 respectively.

Soils are sandy and clayey loams. Alluvia soils are found at the valley bottoms and the estuary.

3.2.5 Education

There is a very low rate of people living in the Greater Accra region who have never attended school. This is evident in the 2010 Population and Housing Census where one in every 10 people (3 years and above) who lives in Greater Accra has never attended school. Among those who

have ever attended school, the highest proportions were those who have basic (52.6%), secondary (15.7%) and tertiary (5.1%) education. In terms of gender education differentials, higher proportion of females has never attended school compared with males (13.4% and 6.5% respectively), whereas a higher proportion of males have higher levels of education than females. Also, the proportion of the population that has never attended school is higher in rural localities (19.5%) compared with urban localities (9.1%).

3.2.6 Health

From the table below, malaria accounts for the highest percentage of out-patient morbidity (47.4%) in the region followed by upper respiratory tract infection. The least percentage of morbidity cases in the region as at 2008 was anaemia accounting for about 1.3%. Doctor population ratio was higher than nurse population ratio (5,103 and 874) respectively with Out-patient attendance per capita of 0.51 and in-patients admissions of 112,314.

Table 3.1 Top 10 causes of out-patient morbidity in the Greater Accra Region

NO	Disease	No of cases	Percentage of total cases
1	Malaria	5,041,025	47.4
2	Upper respiratory tract infection	794,301	7.5
3	Diarrhoeal	385,737	3.6
4	Skin diseases	422,948	4.0
5	Hypertension	321,994	3.0
6	Home/occupational injuries	133,051	1.3
7	Acute eye infection	185,175	1.7
8	Pregnancy and related complaints	158,458	1.5
9	Rheumatic and joint pains	254,518	2.4
10	Anaemia	139,593	1.3

Source: Ghana Health Service (GHS), 2010

3.2. 7 Sanitation

There are three types of bathing facilities that are widely used in the Greater Accra region. These are: shared separate bathroom in the same house (31.7%); own bathroom for exclusive use

(27.1%); and shared open cubicle (24.2%). The prevalence of these three facilities holds for both urban and rural localities and across all districts in the region.

On the availability of toilet facilities and places of defecation in the region, One third of households uses public toilet facilities (33.8%), followed by close to one third that use a water closet (31.0%). The use of KVIP (14.4%), pit latrine (9.9%) and bucket/pan (2.3%) is less common. However, 8.2% of households in the region do not have a toilet facility and use the bush, beaches and open fields. There are evident differences between urban and rural areas in access to toilet facilities within Greater Accra. Nearly one third of households in rural areas (31.9%) have no toilet facility and have to use the bush, beach or open fields, compared with 6.0% in urban areas where 35.4 percent use public toilets.

3.2.8 Disposal of solid and liquid waste

In Greater Accra region about 48.5 % of the households collect their rubbish from outside their homes. This can be attributed to the emergence of private sanitation firms in the region that often have contractual arrangements with metropolitan and municipal authorities. The rest of households use public container dump (25.7%) and public open space dump (8.4%). Other households burn (13.0%), dump indiscriminately (2.1%) and 1.4% bury their rubbish. While rubbish collection is predominant in urban localities (51.1%), in rural areas rubbish burning (33.1%) is most common.

Liquid waste is produced as a result of cooking, bathing and washing, among others. If it is not properly disposed of, it leads to health hazards such as malaria and cholera. Disposing of liquid waste into gutters is the most widely used method (33.9%) in the region, followed by throwing

while in rural areas; it is mainly thrown into compounds (56.1%). In urban areas, liquid waste is mainly thrown into gutters (36.3%).

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents findings on both the supply and demand factors affecting the use of ITN in the Greater Accra Region of Ghana. The supply side deals entirely with the distribution of ITNs in Greater Accra Region whilst the demand side presents the analysis and discussions of the empirical findings from the estimation of the model presented in the previous chapter. Using the Ghana MICS4, 2011 data, the analysis entails description of the distribution of ITN usage in Greater Accra Region, cross distribution and chi-square tests between ITN usage and other variables and the presentation and discussion of the estimated results.

4.1.1 The supply of ITNS in Greater Accra region

4.1.2 Introduction

One of the objectives of this study is to analyze the supply factors affecting the use of ITN. This was done through thorough in-depth interviews with three disease control officers of the Greater Accra region of Ghana. Below are the analyses of the findings from the interviews with the disease control officers.

4.1.3 History of ITN distribution in Greater Accra region.

There have been an over lapping series of mosquito net distribution in the region since 2001. This saw mosquito nets in the region being distributed first, through the use of the voucher system, the national Immunization day (NID), to the mass distribution and now through the ante-natal and child welfare clinic or centres.

The voucher system of ITN distribution was the first of its kind in the region. Pregnant women were primarily the target for this system of distribution as they were given vouchers during ante-natal visits to collect ITN from accredited centres, largely the pharmacy shops. Children under age five were not targeted under this system of ITN distribution. It must be stated clearly that, the vouchers were given to the pregnant women free of charge. The duty of the pregnant women was to go for the voucher from the ante-natal and to the accredited centre for their ITNs. Though anecdotal, one of the reasons for the transition to the NIDs for ITN distribution was the ease in the distribution and receiving of the ITN in the facilities rather than the approved centres which sometimes was difficult to direct.

Following the voucher system of ITN distribution was the National Immunization Days (NIDS) distribution. The NIDs was seen as a good period for the distribution of ITNs to pregnant women and children who were under the age 5. Here, children under the age 5 years were included as beneficiaries of the free ITN distribution because of the weak immune system they have.

In 2012, the hang up strategy of free mass distribution of ITN was carried out in the region. It was a national exercise that was carried out in all the 10 regions of Ghana. Being the first of its kind in the region, its target was universal. That is, it targeted all the population of the country.

4.1.4 Source and mass distribution of ITN in the region

ITNs in the region were obtained from the National malaria control programme, stored at the regional office and subsequently dispatched to the metropolitan, municipal and districts assemblies for further distribution to the households. As in the case of the previous experience in ITN distribution where some sect of the population was targeted, the distribution targeted the whole population. At the household level, two people were targeted to receive one bed net and

in instances were a household has an odd number of household members, an additional net was given to that household to make up for the additional person. It was planned that, ITN distribution should be continuous after every six months but this has come to a halt in the region because of the burning of the Greater Accra central medical stores.

When asked about the sources of the ITNs and whether they are manufactured in Ghana, one of the respondents said;

"*No no no they are not manufactured in Ghana. Yeah they are not manufactured in Ghana. We receive them from the national malaria control programme. As for us we know the national malaria control bring the net, we don't know who ever supplies them"*

Also on the distribution of ITNs in the region, this is what the focal person for ITN distribution in the region had to say.

"*The bed-nets were sent from the national straight to the various regions, then we had a point where they distributed the bed-nets to the Metropolitan, Municipal,and District Assemblies and then to the households. Yeah we stored the bed nets and then distributed. That was the first mass distribution we did. But before then we were distributing ITNs on NIDs for the under 5 and then the pregnant women. Yeah before, we were doing the distribution during the NIDs. Because we were doing the universal coverage system of distribution where two people were given one net. That was what we used. So, at least 50 percent of the population was given bed nets. Yeah So that they can pair".*

4.1.5 The Supply factors affecting the use of ITN in the region

The use of ITN is well known in its ability to repel mosquitoes, kill mosquitoes and to prevent human to vector contact. In the Greater Accra region, on average about 11.09% of households uses ITN according to the reports from the Multiple Indicator Cluster Survey, 2011. The low use of ITN in the region cannot be attributed wholly to the demand side factors (peoples' unwillingness to use ITNs due to the heat and discomfort it produces to the people, etc) but also the supply factors. The supply factors that came from the in-depth interviews as being likely to affect the use of ITN were; firstly, the issue of two persons to one ITN. This is because, even in households with an even number of household members, ITN use was going to be minimal as the individuals in the households do not share the same sleeping places.

One of the responses on how the universal coverage distribution affects ITN use was that;

"*You see, because we were not giving everybody, we were doing the universal coverage, it was even a very big challenge. Because somebody thinks that even though if we are six in a household but we are sleeping in separate rooms how are we going to manage with the nets. You see. And then somebody also thinks that, if I have adult children how can and how can they sleep under the same mosquito nets. So there was this type of challenges*"

Secondly, education on the importance of the use of ITNs was reported as a challenge. Prior to the mass distribution exercise, a campaign on malaria as a deadly disease and the need to sleep under ITNs was launched. This was purposely to educate the people on malaria, the causes of malaria and the use of ITNs as a means to prevent the deadly malaria disease. The medium for the dissemination of the information was the television stations, national and district level radio stations and at the households level. Little has been done to ensure the continuity of this

education since changing the life long attitudes and behaviours of people can be somewhat tedious and very challenging. This is what one of the respondent's had to say when asked what their outfit has been able to do in order to ensure the continuity of the education/sensitization exercise.

"*Even though we are doing it, we cannot do it on household basis. Maybe when they* (pregnant women) *come to the clinic in the morning, we normally give talks in the morning, we talk about that. And then if somebody invites us to a church or any other programme, any opportunity we get, we talk about that. But it shouldn't be just waiting for an opportunity. We have to incorporate it in every activity that we do so that the messages can go down. So we need to go on air. We need to go to different places to talk about this thing but it looks like the means is not there. And even we need to go on supervision to see what is happening in the households but the means is not there. No funds. Somebody needs to board a vehicle, somebody needs to buy fuel to go and do that job, but it looks like there is no support coming from anywhere to do that job"*

This is what another respondent had to say on the issue of whether or not, information dissemination about ITN use was important.

"*It is very very important. It was done before the distribution. So initially, when we hang the bed nets, the few days' people were using it. But after sometime, I think we should have reinforced our message. But you see too, those who are continuously using it have said that the number of episodes of malaria has reduced*".

Household monitoring and supervision on the use of ITN was also reported to be a challenge. Regular monitoring helps identify the people who are not using ITN and the reasons why they

are not using them. Also, it helps reinforce the peoples' knowledge on the use of ITN at the household level.

When asked whether their outfit has been able to conduct monitoring exercise to check whether people were using the ITNs or not, this is what one of the respondents had to say.

"*Before then we did a survey, but it was the district that carried out the survey. But after that, we have not done anything. Yeah, after the distribution, I think we did some sampling and it was observed that some of them were still not using it with the excuse that it is warm. Yeah, with the excuse that it is warm. Because, it was just some sampling we could not generalized the information because we cannot say that information is general for Greater Accra. Yeah because, we do the population that I don't think it was any huge thing. Yeah, these were the major challenges. People were not using it because of the heat*".

4.2 .0 The demand factors affecting the use of ITN in Greater Accra region

4.2.1 Introduction

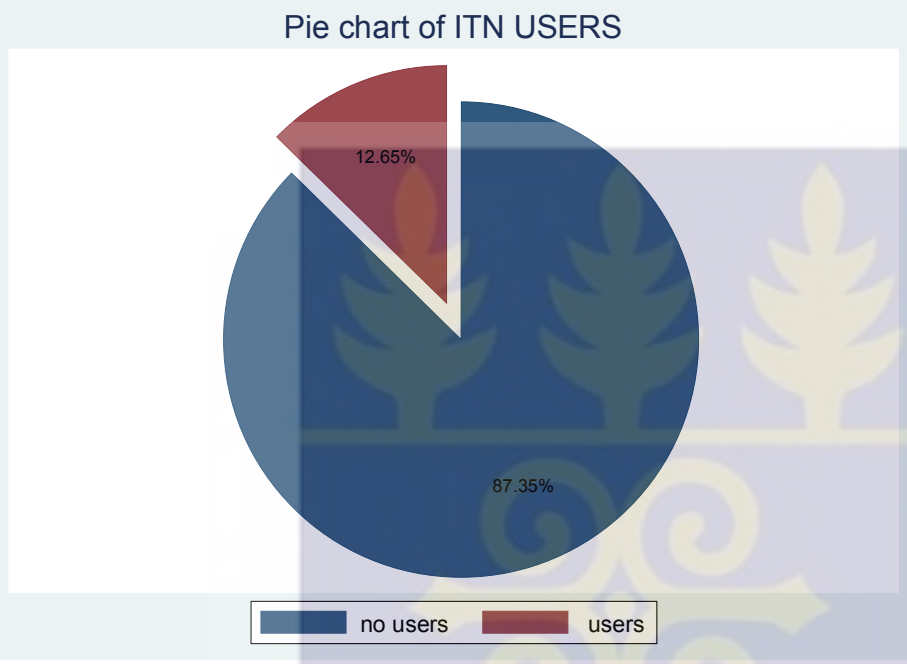
This section presents the analysis and discussions of the empirical findings from the estimation of the model presented in the previous chapter. Using the Ghana MICS4, 2011 data, the analysis entails description of the distribution of ITN usage in Greater Accra Region, cross distribution between ITN usage and other variables and the presentation and discussion of the results from estimated logit model.

4.2.2 The distribution of ITN usage in Greater Accra region.

Distribution of household members who use ITN in the Greater Accra Region shows that less than 15% of households in the region use ITN (Figure 4.1). The data revealed that about 12.65% of household members in Greater Accra use ITN whilst the remaining proportion (87.35%) does

not use ITN. It is evident from the data that, there is a very low patronage and usage of ITN in the region.

Figure.4.1 Distribution of ITN usage in the Greater Accra Region (%)



Source: Author's construct using the Ghana MICS4, 2011 data

4.2.3 Bi-variate analyses of ITN usage by all the explanatory variables

In attempting to establish the factors which are more likely to influence the use of ITN, a bi-variate analyses and chi-square tests were run for different variables. With respect to sex, 1,682 females and 1,599 males were sampled from the Ghana MICS4, 2011 data. About 1,449 female households members in Greater Accra Region representing 86.15% were not using ITN meaning that only 13.85% of females in the region use ITN (Table 4.1). Meanwhile, about 1,417 male household members in the region representing 88.62% were not using ITN implying also that only 11.38% representing 182 males in Greater Accra Region use ITN (Table 4.1). The

relationship between ITN use and gender of household members was significant at p>0.033. This further suggests that, gender of household members is likely to influence the use of ITN.

Table 4.1 Use of ITN by sex of household members

	Gender of household members			**Total (%)**
ITN usage (persons slept under mosquito net last night)		**Female (%)**	**Male (%)**	
	No users	1,449 (86.15)	1,417(88.62)	2,866(87.35)
	Users	233(13.85)	182(11.38)	415(12.65)
Total (%)		1,682(100.00)	1,599(100.00)	3,281(100.00)
Pearson's Chi-square value = 4.5280 (Pr = 0.033)				

Source: Author's construct using Ghana MICS4 data

About 208 aged household members (60+ years), 1,729 adults (19-59 years), 944 children (5-18 years) and 400 under five years children were sampled from the Ghana MICS4, 2011 data for the study (Table 4.2). About 11.5% (representing 24) of the aged were using ITN in the region meaning some 88.5% (representing 184) of the aged werenot using ITN in Greater Accra Region. 188 adults representing 10.9% of the sampled adults were using ITN in the region while some 1,541 representing 89.1% of adults were not using ITN in the region. Also, 101 children in Greater Accra Region representing 10.7 of the sampled children were using ITN while some 89.3% were not using. About 102 under five children representing about 26% of the sampled under five children were using ITN while some 74% were not using ITN in the region. The chii square test established a significant difference between age of household members and ITN use. This was statistically significant at 1% (p=0.00<0.1). Thus, age of household members was likely to influence the use of ITN.

Table 4.2 Use of ITN age of household members

	Age of household members					
ITN usage (persons slept under mosquito net last night)		Aged (%)	Adults (%)	Children (%)	under 5 (%)	Total (%)
	no users	184(88.46)	1,541(89.13)	843(89.30)	298(74.50)	2,866(87.35)
	users	24(11.54)	188(10.87)	101(10.70)	102(25.50)	415(12.65)
	Total (%)	208(100.00)	1,729(100)	944(100)	400(100)	3,281(100)
Pearson's Chi square value = 68.2037 (Pr = 0.000)						

Source: Author's Construct using Ghana MICS4 data.

The relationship between ITN usage and educational level of household head is presented in Table 4.3. There were 815 household heads without any education while 345, 1249 and 872 completed primary, middle school/JHS and Secondary and beyond, respectively. Only about 11, 12, 14 and 13 percentages of household heads with no, primary, middle/JHS and secondary plus education completed used ITN in Greater Accra Region respectively.

Table 4.3 Use of ITN by educational level of household head

	Educational level of household head					**Total (%)**
ITN usage (persons slept under mosquito net last night)		**None (%)**	**Primary (%)**	**Middle/JHS (%)**	**Second + (%)**	
	No users	725(88.96)	303(87.83)	1,078(86.31)	760(87.16)	2,866(87.35)
	Users	90(11.04)	42(12.17)	171(13.69)	112(12.84)	415(12.65)
Total (%)		815(100)	345(100)	1,249(100)	872(100)	3,281(100)
Pearson's Chi-square value = 3.2305 (Pr = 0.357)						

Source: Author's Construct using Ghana MICS4 data.

The data also shows that about 237 of household members belong to the Catholic faith while 23, 68, 335, 45 and 2,573 household members belong to Deeper Life, Jehovah Witness, Moslem, SDA and Other faiths respectively (Table 4.4). About 49 percent of the sampled SDA members used ITN in the region while 26 percent of the sampled Deeper Life members used ITN. Only 12, 10, 11 and 12 percentages of Catholic, Jehovah Witness, Moslems and other religious groups used ITN in the region respectively. The chi square test established that, there was a significant difference between a religion of household members and ITN use. This was statistically significant at 1% ($p=0.00<0.1$). Thus, religion of household members exerted more influence on the use of ITN.

Table 4.4 Use of ITN by religious background of household members

	Religion of household members							
		Catholic (%)	Deeper life (%)	Jehovah (%)	Moslem (%)	SDA (%)	Others (%)	Total (%)
ITN usage	no users	208(88)	17(74)	61(89.71)	299(89.25)	23(51.11)	2,258(88)	2,866(87)
	users	29(12)	6(26)	7(10.29)	36(10.75)	22(48.89)	315(12)	415(13)
Total (%)		237(100)	23(100)	68(100)	335(100)	45(100)	2,573(100)	3,281(100)
Pearson's Chi-square value = 59.1096 (Pr = 0.000)								

Source: Author's Construct using Ghana MICS4 data.

About 360 samples for the study lived in rural areas in the Greater Accra Region while 2,921 lived in urban areas. The data above show that the proportion of ITN users in the rural areas (25%) was higher than the proportion of ITN users in urban areas (11.1%). The relationship between ITN use and locality of household members was significant at 1% ($p=0.00<0.1$). This chi square test suggests that the locality of household members' matters as far as ITN use is concern. This is because the locality of household members exerted much influence on household members' use of ITN.

Table 4.5 Use of ITN by locality of household members

	Locality of household members			Total (%)
ITN usage (persons slept under mosquito net last night)		Rural (%)	Urban (%)	
	no users	270(75.00)	2,596(25.00)	2,866(87.35)
	Users	90(25.00)	325(11.13)	415(12.65)
Total (%)		360(100.00)	2,921(100.00)	3,281(100.00)
Pearson's Chi-square value = 55.8340 (Pr = 0.000)				

Source: Author's Construct using Ghana MICS4 data.

The relationship between ITN usage and ethnicity of household members is shown in Table 4.6 The sampled household members consist of 1,219 Akans, 654 Ewes, 954 Ga/Dangme, 389 other ethnic groups and 74 non-Ghanaians. About 16 percent of the sampled Ewes use ITN while 13.12 and 12.6 percent of the sampled Ga/Dangme and other ethnic groups used ITN in the region. Only about 10.42 and 10.81 percent of the sampled Akan and non-Ghanaians used ITN in the region. The chi square test established that, there was a statistically significant difference between ethnicity of household members and ITN usage. This was statistically significant at 1% ($p=0.007<0.1$). This implies that ethnicity of household members was likely to influence the use of ITN in the region.

Table 4.6 Use of ITN by ethnicity of household members

	Ethnicity of Household members						Total (%)
ITN usage (persons slept under mosquito net last night)		Akan (%)	Ewe (%)	Ga/Dangme (%)	Non-Gh (%)	Others (%)	
	No users	1,092(89.58)	547(83.64)	821(86.88)	66(89.19)	340(87.40)	2,866(87.35)
	Users	127(10.42)	107(16.36)	124(13.12)	8(10.81)	49(12.60)	415(12.65)
Total (%)		1,219(100)	654(100)	945(100)	74(100)	389(100)	3,281(100)
Pearson's Chi square value = 14.0635 Pr = 0.007							

Source: Author's Construct using Ghana MICS4 data.

The sample for the study consisted of 3 poor household members, 126 household members from the second quintile, 459 household members from the middle quintile, 769 household members from the fourth quintile and 1,924 household members from the richest quintile. All the poorest household members sampled used ITN in the region. About 38% of household members in the second quintile also used ITN while only 16, 13 and 10 percent of household members from the middle, fourth and richest quintiles used ITN, respectively. The relationship between ITN use and wealth index quintile was statistically significant at p>0.000 from the chi square test. This suggests that, wealth index was likely to influence the use ITN in the region.

Table 4.7 Use of ITN by wealth status of household members

	Wealth index quintile of household members						Total (%)
ITN usage (persons slept under mosquito net last night)		Poorest (%)	Second (%)	Middle (%)	Fourth (%)	Richest (%)	
	No users	0(0.0)	78(61.90)	386(84.10)	667(86.74)	1,735(90.18)	2,866(87.35)
	Users	3(100)	48(38.10)	73(15.90)	102(13.26)	189(9.82)	415(12.65)
Total (%)		3(100)	126(100)	459(100)	769(100)	1,924(100)	3,281(100)
Pearson's Chi-square value = 113.1297 (Pr = 0.000)							

Source: Author's Construct using Ghana MICS4 data.

4.2.4 Estimation Results

Table 4.8 logistic regression presents the empirical results from estimating the logistic model developed in the preceding chapter. The variables are shown in the first column while the odd ratios, standard errors, z-statistics and the probability values are presented in the second, third, fourth and fifth columns respectively. The superscripts represent the base or reference category and the asterisks represent significance of the variables. The superscripts are defined in the lower part of the table. The total sample used in the study is 3,278. The model is generally fit as indicated by the Wald chi square statistics with a probability value of 0.0000.

Table 4.8 Estimated Logistic Results

Variable	Odd Ratio	Std. Error	z-Statistic	P-Value
Dependent variable is ITN Usage				
Sex[A]				
Male	0.784	0.096	-1.99	0.046**
Locality[B]				
Urban	0.520	0.093	-3.65	0.000*
Age Category[C]				
Adults	0.806	0.201	-0.86	0.388
Children	0.753	0.198	-1.08	0.279
Under 5	2.363	0.640	3.17	0.002*
Ethnicity[D]				
Ewe	1.496	0.241	2.5	0.012**
Ga/Dangme	0.966	0.163	-0.21	0.838
Non-Ghanaian	1.472	0.672	0.85	0.398
Other	1.363	0.326	1.29	0.196
Religion[E]				
Deeper life	1.987	1.019	1.34	0.181
Jehovah	0.745	0.395	-0.56	0.579
Muslim	0.669	0.220	-1.22	0.223
SDA	5.186	2.145	3.98	0.000*
Others	0.915	0.218	-0.37	0.711
Education[F]				
Primary	0.967	0.224	-0.14	0.886
Middle/JHS	1.908	0.300	4.11	0.000*
Secondary+	2.405	0.437	4.83	0.000*
Wealth index[G]				
Middle	0.408	0.104	-3.51	0.000*
Fourth	0.336	0.086	-4.27	0.000*
Richest	0.206	0.051	-6.32	0.000*
Constant	0.556	0.232	-1.41	0.160

No. of obs.: 3278	Prob > chi2: 0.0000
Wald chi2 (20): 181.97	

Base/Reference Category	
A –Female	E – Catholic
B - Rural	F - No Education
C - Aged	G- Lowest (Poorest)
D - Akan	

*, ** represent significance at 1% and 5% respectively

With respect to sex and ITN usage, the odds of a male household member using ITN are 1.28 times less likely than their female counterpart holding other variables constant. In other words, females are more likely to use ITN than their male counterparts in Greater Accra Region. The effect of sex on ITN usage was significant at 5% level and the results agrees with the findings by (Garley et al, 2013) where female were more likely to sleep under ITNs than male in their study to determine the gender differences in the use of ITNs, three months after the free mass distribution exercise in Nigeria. One possible explanation could be that, in Ghana,women often sleep at the same place with their children especially, young children. They will often put up protection measures not only for themselves, but the children against mosquito bites. This explains why women are more likely to use ITN.

The influence of locality of household members on the usage of ITN is significant at 1% level. Holding other variables constant, the odds of a household member who dwells in an urban area using ITN are 1.92 times less likely than rural household member using ITN. In other words, the likelihood of using ITN increases for rural folk in the Greater Accra Region than urban dwellers. This finding corresponds with the findings by Baume et al, 2011 which revealed an association between ITN uses in people living in rural locations. Possible explanation could be attributed to the targeting approach used by GHS to benefit rural dwellers than urban household members.

The effect of age on the usage of ITN is significant for only the age category "under Five (5) years" with the effects of adults and children being statistically insignificant at the conventional 5%. This could be explained from the fact that the ITN distribution programme in the region often targets the "under five" age category more than any other age category. The effects of the under-five on ITN usage in the Greater Accra Region are statistically significant at 1% level. The odds of an under-five child using ITN are 2.36 times higher than an aged household member in

the region holding other variables constant. This result is in sync with the findings of (Adeyeri, 2011). In his study on the determinants of ITN ownership and use in Ghana, it was found that children under age 5 were very significantly associated with ITN use. The possible reasons could be because of the fact that children under the age of five are a vulnerable group to malaria infection or because previous ITN interventions have always targeted children under age 5 and pregnant women.

On ethnicity and use f ITN, Ewes were more likely to use ITN than Akans and Akans and other groups were equally likely to use. This means that Ewes were more likely to use ITN as compared to all other ethnic groups in the region and this was significant at 1%. The odds of Ewes using ITN were 1.49 times more likely than the Akan in the Greater Accra Region holding other variables constant. According to the qualitative study, Ewes in Greater Accra Region were likely to use ITN because it may either be a transfer of habit (using mosquito nets) from their ethnic region to Greater Accra Region or just consciousness to mosquito bites. Usually, people from ethnic groups with conditions favorable for mosquito breeding such as forest cover, existing water bodies like lakes, ponds, lagoons cultivate the habit of preventing mosquito bites and they are likely to transfer such habits to wherever they go.

Religious background of household members also has a slight effect on ITN usage in Greater Accra Region. SDA members were more likely to use ITN than Catholics and Catholics and other groups were equally likely to use. This means that SDA members were more likely to use ITN as compared to all other religious groups in the region and this was statistically significant at 1%. The odds of SDA members using ITN were 5.19 times more likely than Catholics in the Greater Accra Region holding other variables constant. According to the qualitative findings, the logit result for the effect of being an SDA member and ITN usage has to do with a well tailored

awareness creation and education campaigns often undertaken by the SDA church to sensitize people concerning malaria and other diseases prevention mechanisms.

Higher educational level completed by the household had increasing effects on ITN usage in Greater Accra Region. Given that it is one of the regions with most literate population, education plays key role in the patronage and use of ITN even though there is no difference between having no education and having completed primary level and the effects on ITN usage. The odds of a household head who completed Middle School or JHS using ITN are 1.9 more likely than household head with no education while the odds of a household head who completed Secondary school and beyond using ITN are 2.41times more likely than household head with no education. In other words, household heads who have completed Middle or JHS and Secondary school and beyond are likely to use ITN more than their counterparts with no education. This finding corresponds with the finding of Mwamba, 2013 on the determinants of ITN utilization in older children and young adults in Zambia. This study revealed that relative to households headed by those who have never attended school, households headed by those who have tertiary education were more likely to sleep under ITN though not inclusive households headed by those who have middle/JHS. The bottom line is that Education exposes people to the health benefits of using ITN and the dangers of non-usage hence household heads with some level of education often take prevention measures.

According to the estimated logistic regression results, higher wealth of households have decreasing effects on the usage of ITN in Greater Accra Region and the effects are statistically significant at 1%.Compared to the poorest households, the odds of using ITN in the Greater Accra Region are 0.41, 0.34 and 0.21 times less likely for households from the middle, fourth and richest wealth quintile holding other variables constant. In other words, household members

from lower wealth quintiles were more likely to use ITN than households from upper wealth quintile. This finding was not surprising because, the ITN distribution policy was pro- poor. In that it targeted poor households in the region.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this last chapter, the study is concluded with a summary of the findings. Relevant recommendations are drawn from the findings for policy consideration. The chapter starts with summary of the findings followed by the conclusion and recommendations in that order.

5.1.2 Summary of the Study

The factors affecting the use of ITN can best be looked at from both the supply side and the demand side. Leaning on the SCT, A conceptual framework was developed by exclusively looking at the possible socio-demographic characteristics that were likely to have influence on users and nonusers of ITNs in the Greater Accra region of Ghana. This was based on the premise that, people learn not only from their own experiences, but by observing the actions of others and the benefits of those actions and that, personal factors, environmental factors, and human behavior exert influence upon each other.

The supply factors that came from the study as being likely to affect the use of ITN had to do with firstly, the definition of the universal coverage system of one ITN per two people as the target of the mass distribution exercises. This is because, even in households with an even number of household members, ITN use was going to be minimal as the individuals in the households may not share the same sleeping places. Also, Education on the use of ITNs was reported as a challenge. This is because, little has been done to ensure the continuity of education on the use of ITN after the free mass distribution since changing the lifelong attitudes and behaviors of people can be somewhat tedious and very challenging. Lastly, household

monitoring and supervision of the use of ITN was also reported to be a challenge. Regular monitoring and supervision helps identify the people who are using ITN or not and the possible reasons for using or not using ITN. Also, it helps reinforce peoples' knowledge on the use of ITN at the household level. Despite the importance of household monitoring and supervision of the use of ITN, there has not been any household monitoring activity carried out in the Greater Accra region after the free mass distribution exercise.

Another primary objective of the study is to investigate the demand factors affecting the use of ITN in Greater Accra Region. With various demographic factors (sex of household member, location of household member, age category of household member, ethnicity of household member, religion of household member, education of household head and wealth index of household member) identified through reviewed theories and empirical literature, the study relies on secondary data (Ghana MICS4, 2011 data) and primary data using both in-depth interview and informal discussions. With a dichotomous dependent variable (ITN usage), the study uses binary logistic regression methodology combined with the other demographic independent variables.

The results revealed that female household members were more likely to use ITN than male household members while rural folks in the Greater Accra Region had higher odds of using ITN than their urban counterparts. The odds of using ITN increases for children under five years relative to the aged while Ewes in Greater Accra Region had higher odds of using ITN relative to other ethnic groups. Households belonging to the SDA faith had higher odds of using ITN relative to those belonging to other religious faiths. Education and wealth play key roles in ITN usage in the region. Household heads who had completed higher educational levels were more

likely to use ITN than those who had no education while increasing wealth decreases the usage of ITN in the region.

5.1.3 Conclusion

The use of ITN in the Greater Accra Region depends on certain demographic factors including gender, location, age, religion of the household member, educational level of the household head and the wealth of the household. The most influential factors were gender, locality, under five years' children, educational level completed by the household head and the wealth level of the household. Clearly, the policy on ITN distribution in the country has been pro-poor. This is good as it serves as a strong case for scale-up, given the low use of ITN in the region.

5.1.4 Policy Recommendations

Based on the findings of the study, the following recommendations are suggested for policy actions.

- Poor households use ITN often than rich households hence the distribution of ITN in the region should be expanded to include more poor households especially those living in poor drainage environment and slum areas in the capital region.
- Educational campaigns and awareness level creation should be intensified at programmes and institutions such as churches and other religious bodies. Such campaigns already happening in some religious groups should be emulated by others to enhance the patronage and use of the ITN
- While it is ideal to reach out to as many as will desire to use the ITN through the distribution programme, it is important to continue targeting the under-five years children. The empirical data shows that quite a significant proportion of these under-five

years children were using ITN and the likelihood of ITN usage by household members of this age category was statistically significant.

- The ITN distribution programme should further target women more than men because women who turn to be more protective of their children and dependents are more likely to use the ITN more than men.
- The study also recommends a massive scale-up in monitoring, evaluation and supervision systems at the household level to ensure the usability or otherwise of ITNs.
- Lastly, there should be a redefinition of the universal coverage of one net per two persons to one net per person since household members may not share sleeping places.

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Appendix

IN-DEPTH INTERVIEW (IDI)

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)

IN-DEPTH INTERVIEW (IDI)

Good morning/afternoon! My name is _____ and I am a student of University of Ghana. I am conducting a research on the topic: THE SUPPLY AND DEMAND FACTORS AFFECTING THE USE OF ITN IN GREATER ACCRA REGION. The research seeks to gather responses from you about the supply factors affecting the use of ITN in the region. There will be no risk involved. All answers will be treated as confidential and I expect you to answer all questions truthfully without any worries. I hope you will participate since your views are important. The discussion will take less than one hour to complete. Do you agree to participate?

GENERAL INFORMATION

Region	
Date of interview	
Time in	
Portfolio of interviewee	

1. Have you been involved in the distribution of ITNs in the region?
2. If yes, from where did your outfit get the ITNs (source)?
   - ✓ How many ITN did you receive?
   - ✓ Frequency: number of times received?
   - ✓ When were the ITNs received?
3. Are these ITNs manufactured in Ghana or imported?
4. Was the ITN distribution at a cost to the hospital (cost of storage, transportation, price per ITN, other cost)
5. How many was distributed?
6. How was the distribution done? (By the health directorate or other channels).
7. On what basis was a household supposed to be given a mosquito net? (was it for all, the less privilege)
8. When and how were they distributed to the households?
9. How often is ITN distributed in the Region?
10. During which season are ITNs distributions intense?
11. Since distribution, has your office followed up on its usage at the household level?
12. What challenges confront you in the distribution of ITN?

13. How does this challenge if any, affect the use of ITN?

14. Tell me your experience about the old system of ITN distribution and the new one?

This is the end of the interview

Thank you