AWARENESS, ACCESSIBILITY AND USE OF MALARIA CONTROL INTERVENTIONS AMONG AT-RISK GROUPS IN LAGOS METROPOLIS, NIGERIA

A dissertation submitted to Kent State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

by

PETER O. OSSAI

December 2014

Dissertation written by Peter O. Ossai B.Sc., University of Akron, 2006 MPA., University of Akron, 2009 Ph.D., Kent State University, 2014

Approved by

Sonia A. Alemagno	, Chair, Doctoral Dissertation Committee	
Jonathan B. VanGeest	, Members, Doctoral Dissertation Committee	
Mark A. James	,	
Madhav P. Bhatta	,	
John Graham	,	
Accepted by		
Jonathan B. VanGeest	, Chair, Department of Health Policy & Management	
Sonia A. Alemagno	, Dean, College of Public Health	

Description	Page
Title Page	i
Approval Page	ii
Content Page	iii
List of Figures	vi
List of Tables	vii
Acronyms	viii
Acknowledgements	ix
Abstract	X
Chapter 1: Introduction	
Introduction	1
Geographical Distribution of Malaria	1
Malaria Transmission	3
High Risk Groups	4
Malaria Burden	6
Organizational Involvement/Protective Factors	8
Objectives	9
Research Questions	10
Background/Significance	10
Rationale and expected contribution to policy and practice	14

TABLE OF CONTENTS

Chapter Summary	15
Chapter 2: Literature Review	
Introduction	17
Brief Overview	17
Theoretical/Conceptual Framework	18
Health Belief Model	19
Structural Functionalist Theory	24
Chapter Summary	33
Chapter 3: Methods	
Introduction	35
Study Design	36
Ethical Considerations	39
Data Collection	40
Sampling Procedures	40
Sample Size Determination	41
Date Management/Analyses	51
Chapter 4: Results and Analyses	46
Chapter 5: Discussion	
Introduction	67
Findings	68
Political	68
Cost	70

Funding	70
Education	70
Gaps in Policies	72
Implications for Public Health	74
Limitations	74
Conclusion	75
References	78
Appendices	
A. Definitions	87
B. NIMR Institutional Review Board	90
C. Kent State Approval of Dissertation Topic and Prospectus	92
D. Kent State Institutional Review Board	93
E. Informed Consent Form	95
F. Questionnaire	99
G. Map of Lagos	108

LIST	OF	FIG	URES
------	----	-----	------

Figure	e Number	Page
1	Where malaria occurs	2
2	Life cycle of malaria parasite	4
3	Gambian child with severe malaria anemia	6
4	Malaria effect on pregnancy	6
5	Global causes of death from infectious diseases	7
6	Conceptual framework for the health sector	18
7	UNICEF'S MICS Results for tracking child treatment/prevention	
	of malaria	26
8	Nigeria: UNICEF's MICS results for tracking maternal, new-born & child survival	27
9	Wrong use of long-lasting insecticide nets	71
10	Sources of financing of malaria intervention strategies	73
11	Map of Lagos State	108

LIST OF TABLES

Table	Number	Page
1	Roll Back Malaria Target	12
2	Community population and proportion of sample size for pregnant women	43
3	Community population and proportion of sample size for mothers of under-five year old children	43
4	Respondent Demographic Characteristics	47
5	Knowledge of Contributory Factor and Symptoms of Malaria; Awareness of LLINs and HMM	50
6	Experience with Malaria and Malaria Treatments	52
7	Preventive Measures against Malaria; LLIN Use and Care	55
8	Long-Lasting Insecticide Nets Accessibility	58
9	Awareness and Utilization of IPTp among Pregnant Women	60
10	Descriptive Statistics for Regression Analyses	62
11	Standard Linear Regression Predicting Level of Compliance with Malaria Prevention Measures (Compliance Index)	64
12	Logistic Regression of Maternal Demographic Variables Predicting Level of Malaria Knowledge	66
13	Baseline vs Current Data	68

ACRONYMS

ACT	-	Artemisinin-Based Combination Therapy	
EAs	-	Enumeration Areas	
FGN	-	Federal Government of Nigeria	
HMM	-	Home Management of Malaria	
IRS	-	Indoor Residual Spraying	
ITN	-	Insecticide-Treated Net	
IPTp	-	Intermittent Preventive Treatment for pregnant women	
LGAs	-	Local Government Areas	
LiST	-	Lives Saved Tools	
ITNs/LLINs	-	Long-Lasting Insecticide Nets	
NDHS	-	Nigeria Demographic Health Survey	
NMCP	-	National Malaria Control Program	
NMSP	-	National Malaria Strategic Plan	
NNMCP	-	Nigerian National Malaria Control Program	
NPC	-	National Population Commission	
RBM	-	Roll Back Malaria	
SPSS	-	Statistical Package for the Social Sciences	
SP	-	Sulphadoxine-Pyrimethamine	
SSA	-	Sub-Saharan Africa	
UN	-	United Nations	
UNICEF	-	United Nations Children's Fund	
WHO	-	World Health Organization	

ACKNOWLEDGEMENTS

No one can travel through life without the help of others. Where do you start to thank those who helped so much! I have always felt that my successes are because of the help I received from my professors and academic adviser.

Grateful acknowledgment is rendered to Dr. T.S. Awolola, and Niyi Adeneye for their assistance in providing the personnel and directing all activities of the entire data collection process. A special thank you goes to Dr. Lynn Falletta for her detailed review of this dissertation.

To my committee members, I want to say "thank you" to Drs. VanGeest and James for working so hard to help with my questionnaire and going over my dissertation draft. I thank also Dr. Bhatta who gave me much guidance and have supported me these many years in this program.

To my adviser, Dr. Sonia Alemagno, the Dean of the College of Public Health is the one to whom I am most indebted. Her help and support is more than anyone could expect. She has supported me in all my academic endeavors. If "thank you" were enough, it would be easy. All I can say is whatever successes and honors I have had in Kent State University would not have happened without her. Thank you so much, Dean Alemagno: I am forever indebted.

To my wife, Priscillia, who has supported me through the years in all my educational pursuits, who has understood when I was committed to doing my homework rather than going to parties or movies. She realized long ago how important education has always been to me. I owe her much appreciation for making it possible for me to pursue my goals. She has been beside me these past years, helping in so many ways and putting up with not having things done around the home. She is a wife and a best friend. I hope she knows how much I love and appreciate her. I will try to show her, now that schooling is over, that I will be available 24/7.

Abstract

With just a year remaining to the Millennium Development Goals (MDGs) deadline, there is limited evidence for and adequate level of awareness/use of malaria intervention strategies and by extension, decreases in malaria-related mortality and morbidity. This is a cross-sectional study on awareness and use of malaria control interventions based on data collected from a household survey from two of the 20 local government areas (LGAs) of Lagos State, Nigeria – Alimosho and Kosofe where a malaria control program of Roll Back Malaria (RBM) is being implemented. The sample included pregnant women (n = 250) and mothers of children under five years old (n = 233) that were interviewed using interviewer-administered, semi-structured questionnaires in a household survey. Questionnaires developed by the research staff of the Nigerian Institute for Medical Research probed respondents' demographic characteristics; knowledge and compliance of policy guidelines on the awareness and use of malaria intervention strategies. The study was implemented over a 6-month period from February to August 2014.

This study used both linear and logistic regression analysis. Linear regression was used to predict the Compliance Index as a function of the independent variables of Age, Marital Status, Maternal Status, Religion, Education and Local Government Area of residence, while logistic regression was used to predict alignment into high/moderate or low knowledge of malaria categories also as a function of Age, Marital Status, Maternal Status, Religion, Education and Local Government Area of residence.

Results of the linear regression showed that the overall model of the six independent variables was able to significantly predict the compliance index, $R^2 = .163$, F(6,409) = 13.28, p < 100

х

.001. Age, Education and LGA were significant predictors. Results of the logistic regression showed the Exp(B) of two predictors, LGA and Maternal Status, as statistically reliable in distinguishing between low and moderate/high level of knowledge ($R^2 = .19$, X^2 (8) = 88.93, p <.05). The study finds that overall, improvements have been made, however, the level of awareness and use of malaria intervention tools was still low.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The term malaria originates from Medieval Italian: mala aria – meaning "bad air." The disease was formerly called "ague" or "marsh fever" due to its association with swamps and marshland (Reiter, 2000). Malaria is one of the most severe public health problems worldwide, and a leading cause of death in many developing countries, where young children and pregnant women are the groups most affected. According to the World Health Organization (WHO) Malaria Report (2013), 97 countries had ongoing malaria transmission. Of the 3.4 billion people who are at risk of malaria, an estimated 1.2 billion are said to be at high risk of the disease (WHO, 2013a). In 2012 alone, the report estimated that approximately 207 million cases (uncertainty range 135 – 287 million) and an estimated 627,000 deaths (uncertainty range: 473,000 – 789,000) resulted from malaria (WHO, 2013a). In high-risk areas, more than one malaria case occurred per 1000 population and mortality from this disease among children was estimated at 482,000 deaths per year. As the 2013 WHO report points out, "1300 children every day, or one child almost every minute" dies as a result of malaria.

1.2 Geographical distribution of malaria

Several research studies, particularly those published by the WHO, the United Nations Children's Fund (UNICEF), and the Centers for Disease Control and Prevention (CDC) have described the biology, pathology, and epidemiology of the disease (WHO/UNICEF, 2003; WHO, 2010; CDC, 2012(a), (b) and (c)).

Malaria was found on every continent and in almost every country in the world at the end of World War II, however its geographic prevalence depends mainly on climatic factors such as temperature, humidity, and rainfall (CDC, 2010). From Figure 1 below, it can be observed that large areas of Africa (generally in warmer regions closer to the equator), South Asia, parts of Central and South America, the Caribbean, Southeast Asia, the Middle East, and parts of Oceania such as Papua New Guinea, are considered areas where malaria transmission occurs widely. The highest rates of transmission are found in Africa, south of the Sahara (CDC, 2010). Higher temperatures allow the *Anopheles* mosquito, the major mode of disease transmission, to thrive because the malaria parasites that grow and develop inside the mosquito need warmth to complete the growth cycle before they mature to be transmitted to humans (CDC, 2010)





Source: CDC, 2010

2

1.3 Malaria Transmission

Malaria is caused by parasites of the genus *Plasmodium*. Usually, people get malaria from bites of an infected female *Anopheles* mosquito. According to the 2010 CDC report,

"the parasites are spread to people through the bites of infected Anopheles mosquitoes, called "malaria vectors", which bite mainly between dusk and dawn. In humans, the parasites grow and multiply first in the liver cells and then in the red cells of the blood. In the blood, successive stages of parasites grow inside the red cells and destroy them, releasing daughter parasites called "merozoites" that continue the cycle by invading other red cells. When a mosquito bites an infected person, a small amount of blood is injected which contains microscopic malaria parasites. When certain forms of blood-stage parasites called "gametocytes" are transmitted by a female Anopheles mosquito during a blood meal, they start another cycle of growth. About a week later, when the mosquito takes its next blood meal, parasites known as "sporozoites" are contained within the mosquito's salivary glands and are injected into the person being bitten. Thus, the mosquito carries the infection from one human to another (acting as a "vector"). Differently from the human host, the mosquito vector does not suffer from the presence of the parasites" (CDC, 2010; CDC, 2012(a), (b) and (c)). Figure 2 below shows the two types of hosts: humans and female Anopheles mosquitoes.

Fig. 2: Life cycle of the malaria parasite



Source: National Institute of Allergy and Infectious Diseases, 2009

1.4 High-Risk Groups

Approximately half of the world's population is at risk of malaria, however 90% of all malaria cases and deaths occur in sub-Saharan Africa (Lagos State Min of Health, 2014; Global Malaria Report, 2013b; GMAP, 2008) with pregnant women and children under the age of five accounting for about 87% of malaria mortality. Nigeria and the Democratic Republic of Congo account for about 40% of the global malaria deaths (Nigeria Malaria Fact Sheet, 2011; WHO Global Malaria Report, 2013b; GMAP, 2008). Deaths from children under five years old are estimated at about 77% (Molavi, 2003), and 8-14% of low birth weight: infants who weigh less than 5.5 pounds at birth as against normal babies that weigh 5.5 pounds by 37 weeks of gestation (University of Maryland Medical Center, 2014), which in turn decreases the chance of a baby's

survival (CDC, 2014a and b). Two specific risk groups are the focus of this study:

- Young children and pregnant women in stable transmission areas who have not yet developed protective immunity against the most severe forms of the disease. Protective immunity is the ability of an organism to resist disease by identifying and destroying foreign substances or organisms (Figure 3).
- Non-immune pregnant women, as malaria causes high rates of miscarriage and can lead to maternal death (Figure 4).
- Semi-immune pregnant women in areas of high transmission. Malaria can result in low birth weight, and accumulation of parasites in the placenta (Figure 4).

According to several studies (Fauz and Nelson, 2012; CDC, 2014(a) and (b)), severe malaria can result in organ failure or abnormalities in the patient's blood or metabolism, including:

- Cerebral malaria, with abnormal behavior, impairment of consciousness, seizures or other neurologic abnormalities.
- Severe anemia due to hemolysis (destruction of the red blood cells).
- Acute respiratory distress syndrome (ARDS), an inflammatory reaction in the lungs that inhibits oxygen exchange, which may occur even after the parasite counts have decreased in response to treatment.
- Low blood pressure caused by cardiovascular collapse.
- Acute kidney failure, and hypoglycemia (low blood glucose) which may occur in pregnant women.

Fig. 3. Gambian Child with Severe Malaria Anemia Fig.4. Malaria effect on pregnancy



Source - The Lancet, 2005

Source - Schofield and Grau, 2005

1.5 Malaria Burden

Malaria accounts for 30-50% of hospital admissions and a yearly loss of US \$12 billion in the sub-Saharan Africa regions where the disease is most prevalent (ACT NOW 2003; Gosoniu et al, 2008; Eisele et al, 2012). Studies conducted in 2010 placed malaria as the fourthleading (see Figure 5) cause of death in children in developing countries after perinatal conditions, lower respiratory infections, and diarrheal diseases (Black et al. 2010). Among adults, malaria is the second-leading cause of death from infectious diseases after HIV/AIDS (Black et al, 2010). The Nigerian National Malaria Control Program, Malaria Indicator Survey of 2010 (NNMCP) shows that malaria remains a leading cause of maternal, child and infant morbidity and mortality in Nigeria (NNMP/MIS, 2010). A report published by the Lagos State Ministry of Health posits that 98% of all cases of malaria is due to *Plasmodium Falciparum*. The report further states that malaria poses a major challenge to Nigeria as it impedes human development, morbidity and mortality. The economic loss to Nigeria due to malaria is estimated at N132 billion annually due to loss of man hours resulting from sickness absence and cost of treatment. With particular reference to Lagos State, the report states that "malaria is responsible for 70% of outpatient attendance at the secondary healthcare facilities with the most vulnerable groups being children under five years of age and pregnant women" (Lagos State Min of Health, 2014)



Figure 5 Global Causes of Death from Infectious Diseases

Source: Black et al. 2010. Published by Lancet.

The report concluded by stating that "In a metropolitan area like Lagos State, where peoples' behavior coupled with environmental factors encourage the breeding of mosquitoes and thus increase human vector contact which promote the continuous transmission of infection, it is important to position malaria control as a top priority for government intervention" (Lagos State Min of Health, 2014).

1.6 Organizational Involvement/Protective Factors

To address this problem, there are many organizations working diligently to control malaria within the affected regions. The most well-known are those that design policies and implement projects to control malaria through the use of insecticide-treated nets (ITNs), indoor residual spraying (IRS), artemisinin-combination therapy (ACT), and intermittent preventive treatment for malaria in pregnancy (IPTp) in areas where transmission is most intense. These include multilateral international organizations such as the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), as well as non-governmental organizations such as Save the Children, Bill and Melinda Gates Foundation, Malaria No More and many other such groups which seek to improve the lives of people in developing countries (WHO, 2003; UN 2000). Some of these groups have also joined forces to create multi-faceted organizations and programs dedicated to controlling malaria, such as the Roll Back Malaria consortium, countryled aid organizations such as Department for International Development (DFID) in the United Kingdom, United States Agency for International Development (USAID) in the United States (the President's Malaria Initiative, PMI), and the Global Fund which provides millions of dollars of funding projects to fight AIDS, TB and Malaria, throughout the world (UNICEF, 2012(a); Stanley, 2012). Additionally, vast numbers of researchers are dedicated to finding new drugs to

treat malaria, new methods for control, and new insecticides to prevent transmission from mosquitoes. These researchers are found in universities and research institutes all over the world, including many in sub-Saharan Africa where the burden of malaria is very high (Stanley, 2012).

Several initiatives have been established to reduce the spread of malaria disease including:

- Epidemiologic surveillance to identify areas and populations that are at risk of malaria infection.
- Investigations of new drugs to prevent and treat malaria.
- Development and updating of guidelines for malaria prevention and treatment.
- Provision of technical assistance to the national malaria control program and local disease prevention and control partners (e.g., the reproductive health program responsible for maternal health) to strengthen malaria control activities.
- Diagnostic assistance and advice to international travelers.
- Advice to blood collection centers.

1.7 Objectives

The goal of the present study is to describe the awareness, accessibility and use of malaria control interventions, as well as factors that influence use of these among pregnant women and women with children under age five in Lagos metropolis, Nigeria, as these are the most vulnerable populations to malaria. The results of this study will contribute to the control of malaria in Nigeria at large and Lagos State in particular.

Specific objectives of the study are as follows:

- (i) Assess the knowledge of malaria and practices of home management of malaria among pregnant women and mothers of children under age five;
- (ii) Evaluate the accessibility of IPTp for pregnant women;

(iii) Investigate the factors that affect knowledge of malaria and compliance with malaria prevention among pregnant women and mothers of children under age five.

1.8 Research Questions

The following questions will be addressed in this study:

- To what extent do mothers in the Home Management of Malaria (HMM) program areas promptly recognize and treat malaria in children under five years old at home?
- 2. To what extent are pregnant women and mothers of children under five years aware of LLINs, and to what extent are LLINs available for use by these target groups in the community?
- 3. Do pregnant women know about and have access to intermittent preventive treatment of malaria?
- 4. What is the demographic profile of pregnant women and mothers of children under five who demonstrate compliance with prevention strategies?
- 5. What is the demographic profile of pregnant women and mothers of children under five years who demonstrate knowledge of the cause of malaria?

1.9 Background and Significance

1.9.1 Rolling back malaria

Consequent to the identified problems and the persistence of malaria as a major public health problem in both rural and urban communities of sub-Saharan Africa including Nigeria (UNICEF, 2004), the Roll Back Malaria (RBM) Program was initiated in 1998 by the World Health Organization (WHO). RBM was established to address all the identified issues that have thwarted early attempts at fighting malaria and to make available a number of key evidencebased and cost-effective malaria control interventions, with the stated goal to decrease malaria morbidity and mortality by 50% worldwide by 2010, and further reduce the burden by another 50% in 2015 (Nabarro and Tayler, 1998).

Additional goals of the RBM movement included: meeting the malaria-related United Nations Millennium Development Goals (MDGs); Abuja Declaration; and the RBM Partnership Global Strategic Plan. The Abuja Declaration plan is where 189 heads of state adopted the Millennium Declaration designed to improve social and economic conditions in world's poorest countries by 2015 (WHO, 2011(a)). The United Nations MDGs 4, 5, and 6 are directly linked to malaria control (see Table 1), while MDGs 1 and 2 are indirectly related. RBM Partnership Global Strategic Plan is expected to coordinate all efforts at malaria control; it will promote the development and better utilization of all tools for malaria control – old, new and future - as and where appropriate; and it will help strengthen the health sector. It will be driven by the respective individual countries (TDR News, 2000). The RBM thrust however conforms with the on-going health sector reform (HSR) initiative in Nigeria where first-phase implementation covered 2004-2007 and sought to ensure the health of citizens in the country are guaranteed (FMoH, 2005a). The achievement of the MDGs therefore depends on the success of the RBM initiative (FMoH, 2008(a) and (b)).

Table 1: Roll Back Malaria Target

RBM	MDGs	Abuja Targets	
Vision: Achieve a malaria- free world (from 2000 levels).			
Objective 1: Reduce global malaria deaths to near zero by end of 2015. Timeline: 50% by 2010; 50% by 2015	Goal #4: Reduce by two- thirds Child Mortality Target/Time: 1990 - 2015	Reduce deaths to children Target: 60% by 2005; 80% by 2010	
Objective 2: Reduce global malaria cases by 75% by end- 2105 Timeline: 50% by 2010; 50% by 2015	Goals #5: Improve by three-quarters maternal health Target/Time: 1990 - 2015	Improve maternal health Target: 60% by 2005; 80% by 2010	
Objective 3: Eliminate malaria by 2015 in 10 new countries and in the WHO European Region.	Goal #6: Combat HIV/AIDS, Malaria and other diseases. Target/Time: Have halted by 2015 the incidence of malaria and other major diseases.	Combat HIV/AIDS, Malaria and other diseases. Target: 60% by 2005; 80% by 2010 Also: 60% of people sleeping under nets by 2005; 80% by 2010.	
Targets include : Achieve universal access to and utilization of prevention measures; sustain universal access to and utilization of prevention measures; accelerate development of surveillance systems; achieve universal access to case management in the public sector; universal access to case management and referral in the private sector; achieve universal access to community case management of malaria.			
General consensus : Health information should be made available 24 hours from the onset of disease, and diagnosis/ treatment of malaria available and accessible to the			

poorest groups in the community.

It was with this in mind that the African Planning and Development Ministers, meeting in

the framework of the Roll Back Malaria Program, adopted an overall framework and a joint

approach defining a strategy intended simultaneously to address mosquito control within the

region. Specific targets included increased access of pregnant women and children under age five to the intervention with 60% by 2005, and 80% by 2010 (Nabarro and Taylor, 1998; UN 2000). This approach received the support of the General Assembly of the United Nations and the World Health Organization. Referring to the same context, the African Ministers of Health, meeting in Abuja, Nigeria, called for a Decade of Malaria Eradication for Africa on a renewed basis and with intensified efforts, capable of making healthcare into a driving force for growth and a factor of socio-economic transformation.

Within this time frame (2003-2008), two studies were carried out by the Federal Ministry of Health. Results of the 2003 Nigeria Demographic and Health Survey (NDHS) showed that only 2.2% of households had at least one LLIN (National Population Commission and ORC Marco, 2004). In contrast, the 2008 NDHS results showed an increase in LLIN ownership to 17.0% (still below targets) of households with at least one LLIN (National Population Commission and MEASURE DHS ICF Macro, 2009). While the 2003 NDHS study showed that 1.3% of pregnant women who used LLIN prior to the study; the 2008 NDHS showed that 4.8% of this population used LLIN prior to the study. With regard to IPTp use during antenatal clinics, 1.0% of pregnant women attending antenatal clinics received IPTp according to the 2003 NDHS results (National Population Commission and ORC Marco, 2004). By 2008 the NDHS showed an improvement as 6.5% of pregnant women attending antenatal clinics received IPTp.

Determined to accelerate and intensify efforts on malaria control in Nigeria, the Federal Government through the Federal Ministry of Health's National Malaria Control Program, in partnership with the RBM partners, States' Ministries of Health and their local government areas, and other stakeholders collaborated to enable a national scale-up of key preventive and curative interventions. They designed and developed a five-year National Malaria Strategic Plan

(NMSP) on malaria control. By this, the RBM goals and the MDGs were targeted for 2010 and 2015, respectively (Federal Ministry of Health, 2008(a) and (b)).

Consequently, the Lagos State government, in taking a cue from the RBM program, established the Eko Free Malaria Treatment Program in 1998 for all children under age five at its various health facilities. The State provided LLINs and IPTp to pregnant women during visits to antenatal clinics and LLINs to children under age five on completion of immunization. As of 2012, the State government had distributed about 4.2 million LLINs to the aforementioned groups using hospital-based and house-to-house distribution approaches (Lagos State Ministry of Health, 2012). This is close to the expected target population of about 2.1 and 2.2 million pregnant women and children under age five, respectively, in the State. However, LLIN use in the State is still low, based on findings of a 2008 and 2013 survey (UNICEF, 2008; Adeneye et al, 2013).

The present study was designed in view of the dearth of empirical data, following the massive rolling out campaign, and considering the proximity of the 2015 deadline for achieving the MDG targets, to evaluate the awareness of, accessibility and use of malaria control interventions among two at-risk groups, pregnant women and children under age five, in Lagos metropolis, Nigeria. The study will also investigate the availability of IPTp to pregnant women, the ability of mothers to promptly recognize and use malaria control interventions on children under five years old in Lagos State.

1.10 Rationale and Expected Contribution to Policy and Practice

As a sequel to efforts at scaling-up the use of ACT, LLINs and IPTp for malaria control in Nigeria, and given the lack of precise and relevant data on the utilization of LLINs and IPTp in Lagos State, this study will contribute to effective and successful implementation of a malaria control program in Lagos State in particular and Nigeria in general. Information obtained herein

will assist health policy makers and malaria control program managers in designing effective intervention options for the target population and various other under-served populations.

The study will also provide information to address the barriers affecting the progress of malaria control program implementation (planning and implementation strategies) in the study LGAs in particular and Lagos State at large.

1.11 Chapter Summary

Despite decades of attempts at control, malaria remains a major public health burden in the tropics, particularly Nigeria. The Nigerian National Malaria Control Program, Malaria Indicator Survey of 2012 (NNMCP) showed that malaria remains the leading cause of maternal, child and infant morbidity and mortality in Nigeria. Consequently, the Roll Back Malaria (RBM) program was initiated to promote evidence-based and cost-effective control interventions.

Taking a cue from the RBM program, the Lagos State government declared the Eko Free Malaria Treatment Program in 1998 for all children under age five at its various health facilities. The State provides long-lasting insecticide nets (LLINs) and intermittent preventive treatment of malaria in pregnancy (IPTp) to women during visits to antenatal clinics and LLINs to children under age five on completion of immunization. As of 2012, the State government has distributed about 4.2 million LLINs to the aforementioned groups using hospital-based and house-to-house approaches (Lagos State Ministry of Health, 2012).

The study was therefore designed to evaluate the awareness of, accessibility and use of malaria control interventions among two at-risk groups, pregnant women and children under age five in Lagos metropolis, Nigeria.

The study investigated health-seeking behaviors of mothers of children under age five relative to prompt malaria symptom recognition and seeking early treatment has changed with nearly two years remaining to the 2015 deadline of the Millennium Development Goal for malaria. The study will also provide information which could help to address the problems affecting the progress of malaria control program implementation (planning and implementation strategies) for more effective and successful outcome on malaria control and subsequent elimination in the study LGAs in particular and Lagos State at large.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The present study, as proposed in the first chapter, aims to evaluate the awareness of, accessibility and use of malaria control interventions among two at-risk groups in Lagos State, Nigeria. After highlighting some of the social determinants of health that hinder the control and eradication of malaria, this chapter will examine critically the previous literature as well as describe the Health Belief Model, and Structural Functionalist theories relevant to the study. After these reviews, gaps in the literature will be identified and discussed.

2.2 A Brief Overview

Malaria has been eliminated from many developed countries with temperate climates. However, the disease remains a major health problem in many developing countries in tropical and subtropical parts of the world. The highest transmission rates are found in Africa, south of the Sahara (CDC, 2012(a), (b), (c)). There are several reasons for these persistently high transmission rates, including difficulty in accessing healthcare due to geographic, economic, educational, and socio-cultural factors (CDC, 2012(a), (b), (c)). In addition, "wars and massive population movements, difficulties in obtaining sustained funding from donor countries, and lack of community participation, coupled with the emergence of drug resistance, and widespread resistance to available insecticides, made malaria control efforts in the region ineffective" (CDC, 2012(a), (b), (c)). Among these, the major issue is the inability of member nations and nongovernmental organizations (NGOs) to address the location and density of human settlements at mosquito larval breeding sites (dumping sites). Socio-economic conditions such as overpopulated slums along with the lack of effective policies have allowed malaria parasites and their *Anopheles* mosquito vectors to co-exist long enough to enable transmission.

2.3 Theoretical/Conceptual Framework

The theoretical framework of the present study is based on the WHO perspective (Fig. 6) which holds that the social determinants of health within countries are marked by health inequities which are caused by the unequal distribution of power, income, goods, and services (WHO, 2008a). The structural functional perspective of this study draws from the works of Auguste Comte, Herbert Spencer, Emile Durkheim and Talcott Parsons (Chaudhary, 2006) for insight into the intended and unintended consequences as well as the functional roles that structural dysfunctions play on the quest for equity, quality and effectiveness of the RBM program as a health policy geared towards the health system reform process, particularly in the area of malaria control in the country.



Fig. 6: Conceptual Framework for the Health Sector

Source: WHO, 2008(a)

2.4 Health Belief Model

The vision of the RBM program is to have a malaria-free world (Anyanwu and Erhijakpor, 2007). This is to be accomplished by the design of optimal, or in other words, integrated intervention strategies that benefit all populations, but also high risk children and pregnant women in particular. However, despite several decades of efforts to control malaria by policy-makers and the financial resources already expended, this vision remains somehow elusive. A key question for policy-makers is how far has the Health Belief Model (HBM) been instrumental in realizing the vision and goals of the RBM.

A critical review of published data from the WHO and several other studies (WHO, 2003; Tordrup, 2008; Zurovac et al. 1992) has shown that when intervention programs are established without addressing certain constructs, such as knowledge of causes and compliance with preventive measures of malaria, belief in the susceptibility of disease as well as readiness to take action, as theorized by the HBM will be undermined.

This was the finding of the 2003 study of the WHO. The study posits that distance to be travelled, the cost of care, and response time to access treatment are crucial in the health-seeking behavior of an individual (2003), and by extension, to the success of the RBM program. Another study conducted by Tordrup also cited high costs of treatment, poor transport infrastructure, perceptions of disease etiology, education, religious and cultural beliefs, and area of residence of the individual were major deterrents to seeking treatment (2008). All of these studies found that these factors might compel individuals who found themselves to be under threat of malaria disease to seek alternative preventive action, rather than seeking treatment in a far-distant health facility. Because the HBM speaks to an individual's belief about the

seriousness and severity of a disease, self-care behavior in treating malaria, although seen as actions to improve or preserve one's health, is an indication that the individual is not fully aware of the threat and susceptibility of acquiring the disease.

The idea underlying the determination of health-related behavior is that ill-health is recognized as a state of being, requiring exceptional responses. The tenets of the Health Belief Model (HBM) explain general health motivation, distinguishing illness behavior and sick-role behavior from health behavior. The model explains the individual's readiness to comply with a recommended health action based on perception of 'threat', i.e., the motivating and enabling (or conversely the discouraging and constraining) factors that determine what the individual will do, and the compliance behavior actually exhibited (Kasl and Cobb, 1966; Ross and Mico, 1980; Graeff, Elder and Booth, 1993).

According to the model, an individual's readiness to comply depends on three sets of related variables: first, the belief in the susceptibility to a disease to take preventive action (and vulnerability to complications for illness and sick-role behaviors) and perceived severity and seriousness of the consequences of the disease and not taking such action; second, the motives to reduce the threat with related goals for good health; and third, a belief that compliance will reduce the threat at little or no cost, and will lead to good health (Kasl and Cobb, 1966; Ross and Mico, 1980; Graeff, Elder and Booth, 1993).

For the purpose of this study, the tenets of the model are used to explain the likelihood of use of malaria control interventions by mothers of children under five years of age and pregnant women. Here, consideration is given to the women's perceived susceptibility to malaria and their perceived seriousness of the consequences of the infection and benefits of accessing and using the malaria control interventions. The model enables us to understand how perceived

constraints may determine the likelihood of the target groups to access and use malaria control interventions for the sake of their health and that of their children. Here, information on how the women perceived their susceptibility to malaria through their belief about its reality, their perceived seriousness of the consequences of malaria, the perceived benefits of adopting appropriate treatment mechanisms or protecting themselves and their children from being infected or not is generated to determine their likelihood of accessing and using advocated malaria control interventions.

Utilizing aspects of the HBM (i.e., belief in the susceptibility to a disease as a motivation to take preventive action), it can be observed that the majority of those supposed to be covered through the malaria program live in the developing world where inequalities are glaring: where the poorest and most marginalized children are most vulnerable. However, these populations are aware of their susceptibility to malaria and are taking action or making efforts to prevent themselves or their children from being infected. To try to protect themselves, the poorest are spending a third of their very meagre income to procure anti-malarial drugs, about 40% of which are counterfeit (Parry, 2005). Supporting this claim is the WHO/UNICEF report which states that "most of the costs of preventing and treating malaria in Africa today are in fact borne by people themselves. For example, people buy nets, insecticide sprays and coils, and spend a considerable amount of money on malaria treatment, which may contribute to poverty" (WHO/UNICEF, 2003).

The third aspect of the HBM, i.e., a belief that compliance will reduce the threat at little or no cost, and will lead to good health is not only a challenging task but is where little or no progress has been made for the African nations in general, and Nigeria in particular. A critical review of the literature revealed two important reasons for this deficiency. The first is cost (be it

economic cost or cost to life), the second is the issue of compliance.

Economic cost - According to WHO, costs which are critical to reaching intervention targets are transportation and distribution costs, supervision, quality assurance, monitoring, community sensitization, and salaries/incentives for the health workers who will be carrying out the interventions (2012). Costs to individuals and families are also high. A joint study conducted by the Ghana Statistical Service and UNICEF reported that 34% of the income of poor families was spent on drugs and protection measures against malaria, compared to 1% of income of the richest (UNICEF 2012a).

<u>Cost to life</u> - In a recent report by the World Health Organization Global Health Council, about 207 million new malaria cases, mostly in Africa, are reported annually, and about 627,000 of this figure resulted in death each year, the majority occurring among young children (Global Health, 2012; WHO, 2013b). Together, the Democratic Republic of Congo and Nigeria account for over 40% of the estimated total malaria deaths globally (WHO, 2013(a) and (b)). Equally important to note is the UNICEF Africa Malaria Report 2003 which shows that mortality rates amongst under-fives are 39% higher in the poorest socio-economic group compared to the richest (2003). The report also shows great disparity between rich and poor and that slum life for children holds many dangers and fewer certainties (2003; WHO, 2008b).

With particular reference to Nigeria, this growing burden of malaria among the nation's population has been reported in the scientific literature (Oresanya et al, 2008; Efunshile et al, 2011). The number of new cases of malaria in Nigeria was estimated to be 100,000 in 2003, and by 2020 it is predicted to be about 300,000 (National Bureau of Statistics, 2012). A critical review of published data from several publications has confirmed some changing trends in the

relative incidence of malaria. It is feared that by 2020, malaria incidence for Nigerian males and females may rise to 90.7/100,000 and 100.9/100,000, respectively. It is also anticipated that by 2020, death rates for malaria in Nigeria for both males and females may reach 79.3/100,000 (National Bureau of Statistics, 2012). Observing high rates of infection and death may discourage a belief in the efficacy of prevention strategies.

Despite the importance accorded to the program, the major strategies of HMM, LLINs, ACTS, and IPTp have provided no solution for high transmission rates due in part by failure to comply with WHO Guidelines by member nations in general, and Nigeria in particular (WHO, 2006). For instance, in the case management of malaria, WHO antimalarial treatment policy "provides guidelines for early diagnostic testing and prompt and effective treatment to be adapted as appropriate to the local context, for all levels of the heath care systems" (WHO/GMP, 2011). The guidelines maintain that access to healthcare which includes key intervention areas, such as case management and vector control (IRS or/and LLINs), IPTp, IPTi, and ACTs are not only essential and of strategic priorities, but these shorten the duration/prevent the progression to severe illness and the majority of deaths from malaria. "Access to malaria diagnostic testing and treatment should therefore be seen not only as a component of malaria control but a fundamental right of all populations at risk. As such, it must be an essential part of health system development and a key component of reducing morbidity and deaths due to malaria" (WHO/GMP, 2011). The guidelines further state that "it is the responsibility of all national health programs to develop a treatment policy for malaria consistent with WHO guidelines and recommendations" (WHO/GMP, 2011). However, most member nations in the sub-Saharan Africa countries and Nigeria in particular, do not fully comply with WHO guidelines. The resultant effect is their failure to protect the most vulnerable populations from this deadly disease. Supporting this assertion is WHO's Policy Brief which posits that "there is as yet no

evidence to indicate, given the current resources, prevailing health care systems, and using the existing tools, that malaria elimination can be achieved in high transmission areas with unrelentingly high vectorial capacities, nor that a 'malaria-free' status can be sustained in such areas. However, history shows that incremental improvements in socio-economic development, infrastructure, health services, housing, etc., will contribute to decreases in the malaria reproduction rate and improve the possibilities for malaria elimination over the longer time" (2011). These are the mechanisms that facilitate access to healthcare for the community, but they are not in place or readily available. Because of this, and based on the HBM, many residents of affected areas may not see compliance with malaria prevention measures as reducing the threat of illness, and may find costs of compliance too great.

2.5 Structural Functionalist Theory

Structural functionalism is a theory that sees society as a complex system whose parts (norms, customs, traditions, and institutions), work together to promote solidarity, stability and a cohesive system (Talcott, 1975; Gerber, 2010). It is an approach that takes a macro-level look at society and believes that it (society) has evolved like organisms where each parts or organs of the society work toward the proper functioning of the body as a whole to maintain equilibrium (Talcott, 1975; Urry, 2000; Gerber, 2010).

Functionalist analysis, considering its long history in Sociology, is prominent in the work of two of the founding fathers of the discipline ---- Comte and Spencer. Spencer in his part advanced the theory of social change by likening society to an organism, concluding that social development is comparable to organic evolution (Chaudhary, 2006). He argued that human society has gradually been progressing towards a better state. In its primitive stage, warring groups characterized society with merciless struggle for existence. He referred to this as the state

of militarism. Gradually, the society moved towards a period of peace and industry, which he referred to as the state of industrialism. He emphasized that during this process, society was slowly transformed from a state of lesser differentiation and integration to one of greater differentiation and integration of its parts. Although highly differentiated, society in the stage of industrialism is also highly coordinated for its various parts to form an integrated system. The establishment of equilibrium makes it possible for the different groups to live peacefully so that individuals can enjoy maximum freedom and self-determination (Demerath and Peterson, 1968).

We see an element of this theory at play in the 2012 UNICEF report. For household use of ITNs, baseline data (proportion of children under-five sleeping under an ITN in a particular year) are compared with proportion of those in another year to be able to determine the rate of malaria incidence and evaluate the impact of the intervention. Data analyzed, using the MICS systems enable UNICEF to provide evidence of the threat of malaria to public health, monitor the situation, track progress and report achievements. With particular reference to Nigeria, UNICEF was able to show histogram results from the MICS between 2003-2010 on the treatment and prevention efforts on malaria, and recommended to the Nigerian government the need for a scale-up of the use of ITNs as shown in Figure 7 (UNICEF, 2012b).
Fig. 7: Nigeria: UNICEF's MICS results for tracking child treatment/prevention of malaria



Source: UNICEF ChildInfo, 2012(b)

Using these data, UNICEF claims that its intervention strategies, particularly its recent efforts to scale-up the availability of ITNs in Africa, are yielding impressive results, and that some countries with new coverage data have already shown remarkable progress. On a countryspecific basis, for example, in Togo, UNICEF posits that ITN coverage increased from 2% to 54% of households in just 5 years, and that a number of other countries, including Kenya, Rwanda and Malawi have greatly increased the number of ITNs distributed recently. These countries are therefore expected to make specific progress toward achieving the 2000-2005 Abuja targets for ITN coverage, which is to increase the proportion of people sleeping under ITNs to 60% of households (UNICEF's MICS 2000 and CDC/MOH 2005 preliminary results).

With particular reference to Nigeria, UNICEF maintains that the impact of the intervention has already been realized and that it will be able to achieve the Millennium Development target of halting the incidence of malaria by 2015 as shown in Figure 8 below.

Figure. 8: Nigeria: UNICEF's MICS results for tracking maternal, new-born & child survival



INTERVENTION COVERAGE FOR MOTHERS, NEWBORNS AND CHILDREN

Source: UNICEF ChildInfo, 2012(c)

Looking at the data presented in Figures 7 and 8, one is therefore likely to conclude that there was indeed significant impact on the use of ITN coverage on under-five mortality, and there are studies to support such claim. Howitt et al. (2012) found that between 2000 and 2008, the use of ITNs saved the lives of an estimated 250,000 infants in sub-Saharan Africa. Also, using the LiST projection, Akachi and Atun, showed that in 34 sub-Saharan Africa countries, 0.625 lives were saved per 1,000 ITNs distributed (2011). This claim is further supported by a study carried out by Eisele et al. (2012).

Despite the fact that Eisele et al. (2012) agree that while most of the control strategies undertaken by UNICEF were highly successful, their impact have not yet approached elimination of malaria incidence in sub-Saharan Africa in general and Nigeria in particular. They posit that current efforts are still failing to fully protect the most vulnerable populations from this deadly disease; malaria remains the leading parasitic disease that is significantly associated with child mortality, mostly African children younger than 5 years (with global annual incidence ranges between 225 to 500 million clinical cases, and a death toll of 781,000 (Global Health Council Report, 2012; WHO, 2011b). Although, Eisele et al. (2012) estimated that malaria-caused deaths in children under-five years decreased by 24.4% between 2001-2010, this is less than the 50% reduction in malaria deaths goal set by the RBM as far back as 2010. By their calculations, Eisele et al. estimated that nearly 2.27 million children may be prevented from dying from malaria during the period 2011-2015 (2012). With particular reference to Nigeria, expanded ITN coverage from 0 to 45% over the period, only 165,700 out of the estimated 240,000 neonatal child malaria deaths were prevented (Eisele et al., 2012). In theory, therefore, this may be easier said than done; the reality is that none of the countries reached the ambitious Abuja targets for ITN use. From a functionalist perspective of Durkheim (1858-1917) and refined by Parsons (1902-1979), Durkheim views society as a system, which is a set of interconnected parts that form a whole (Chaudhary, 2006). The basic unit of analysis is society and its various parts are understood primarily in terms of their relationship to the whole.

Durkheim in his analysis of 'The Division of Labor in Society' distinguished between mechanical and organic solidarity which could be likened to Ferdinand Tonnies' conception of systemic change in the society from being a *Gemeinschaft* to being a *Gesellschaft (*Chaudhary, 2006). In his view, the principle of solidarity that exists in the collective conscience of people in society is responsible for cohesion in the system. Moreover, from Durkheim's conception, there

is a continuing tendency for (systemic) change to take place from mechanical towards organic solidarity; complex and differentiated ones. This tendency for change is attributable to the pressure of growing population since larger populations could be sustained and organized through developing specialization. With increasing differentiation of functions in a society come differences between its members (Demerath and Peterson, 1968; Labinjoh, 2002).

While this theory holds true in most of the developed countries, this is not the case in countries in sub-Saharan Africa. The "collective conscience of the people in society which is responsible for cohesion in a system," is non-existent both in the people and government in these regions. McLaughlin and Olson, in looking at the environmental factors and the conditions under which health sectors operate, posit that the ability to aim at a group of population, speed of reactions, prevention strategies, all these are factors important in the delivery of healthcare, but are marked by inadequacies and deficiencies (2012). The lack of effective support and inability to reach the local population express the insufficient distribution of wealth marked by inequalities which is characterized by the social determinants of health (WHO 2012). These claims are further supported by Racelma (2012), who maintains that the whole set of complementary and support functions are under-developed or indeed totally lacking. Citing examples, particularly in the case of slums that the relations between the healthcare industries and urban planners have remained inadequate. Thus:

- Needs are badly covered and access to healthcare is difficult.
- In the technological field, the Nigerian health sector suffers from several handicaps. There is no positive strategy for supporting domestic innovations. Problems arise in three areas: getting and using information, obtaining and mastering techniques, and generating innovations. Capacity to use technical information is inadequate partly since the environment is especially poor in this respect. There are few agencies that can help

acquire information, and to obtain, master and adapt technology. Little was done to encourage collaboration between the health care industry and the scientific community (Menizibeya, 2011).

- Infrastructure (electricity, water, road networks, low cost housing estates) are usually inadequate or non-existent; the gap between availability and requirement is widening even further hindering the ability to eliminate malaria within the region (Ibem, 2009; Gulyani and Basset, 2007).
- Finally, the issues of urban planning, often desirable for the environment, were never actively supported.

In parallel, little has been done from the side of the Nigerian administration to create a favorable environment or make up for its deficiencies. Bureaucratic red tape, the shortage of human and financial resources, weak links with the community, lack of coordination among the agencies concerned, and corruption account for the inefficiency of the health system. In the words of UN-Habitat's Joan Clos, former mayor of Barcelona, Spain, "In a sense, the slum is a failure of the state. It is a lack of planning, a lack of foresight by the government....For every "if" there must be a solution. If you want to improve the conditions of the slum, you need to establish a dialogue with the community (cohesion). They are the ones who will understand it, the ones who have the legitimacy to perform it..... There is no other alternative for proper city growth than to be planned. If an unplanned city is built, then its reconstruction, the introduction of planning afterwards, is much more difficult. It is very expensive, it brings social conflicts...." (UN African Renewal, 2013c). For sub-Saharan Africa countries, there are significant health inequalities. This is evident in the spread and consequences of disequilibrium. While malaria is preventable and curable, a child dies of the disease every 30 seconds and pregnant women are also at high risk (WHO, 2012).

The structural functionalist theory sees shared norms and values as fundamental to society; focus is on social order based on tacit agreement, and views social change as occurring in a slow but orderly pattern (Chaudhary, 2006). Like Durkheim, Parsons started with the question of how social order is possible. He observed that social life is characterized by mutual advantage and peaceful cooperation rather than mutual hostility and destruction. Parsons maintained that there is a functional unity of society, which holds that all standardized social and cultural beliefs and practices are functional for the society as a whole as well as the individuals in the society. He further argued that all standardized social and cultural forms and structures not only have positive functions but also represent indispensable parts of the working whole and are functionally necessary for the society. The concepts of manifest and latent functions are also components of his theoretical model. In simple terms, 'manifest functions' are those that are intended, whereas 'latent functions' are unintended. This is further related to another of Merton's concepts --- 'unanticipated consequences.' Actions, according to Merton, have both intended and unintended consequences with everyone usually aware of the intended consequences, sociological analysis are thus required to uncover the unintended consequences (Merton, 1957; Ritzer, 2000).

Generally, the functionalists provide an account of change, particularly the kind that is involved in the gradual evolution of specialized functions. Such change is thought of as occurring within the framework set by established values of the society. Where the process of structural differentiation does give rise to social tensions and to radical or revolutionary social movements for example, these are not viewed as legitimate attempts at social change but as 'temporary' disturbances, symptomatic of the 'readjustments' that must necessarily take place in

the relations between institutions at such times. Disturbances are regarded to occur because institutions are relatively imperfectly integrated, but these imperfections will be eliminated and the disturbances will cease with time (Cohen, 1968; Ritzer, 2000).

This is the case in these regions where "disturbances" tend to be the norm rather than the exception. One of the unintended consequences of this disease is the economic burden it has inflicted on the people. Greenwood et al. (2008) argue that there is a correlation between disease and poverty. Their study found that the disease is not only a major hindrance to economic development, but that both direct and indirect costs of malaria in sub-Saharan Africa constitute a leading cause of poverty accounting for substantial economic losses. According to the researchers, the average per capita GDP is high in endemic regions where the disease imposes heavy financial burden on public health expenditure, such as costs of health care, working days lost due to sickness, days lost in education, decreased productivity due to brain damage from cerebral malaria, and loss of investment and tourism. Like most researchers who have written on this aspect (Kilama, 2000; Sachs and Malaney, 2002; Federal Ministry of Health, 2008), they are in agreement that the economic impact of malaria in sub-Saharan Africa is estimated at about \$12 billion every year. This assertion is supported by WHO in its 2008 report and by other researchers (ACT NOW, 2003; Gosoniu et al, 2010; Eisele et al, 2012). Malaria contributes to low productivity, accounting for 30-50% of absenteeism in schools and in work places (particularly on farms), due to hospital visits and admissions, up to 50% of outpatient visits, resulting in up to 40% of public health spending (2010).

In view of the above, the structural functional perspective offers a useful insight into the intended and unintended consequences as well as the functional roles the latter, i.e., dysfunctions, play on the quest for equity, quality and effectiveness of the RBM program as a

health policy geared towards the health system reform process particularly in the area of malaria control in the country. For example, the perspective enhances our understanding of the safety valve function or functional roles of the poor level of awareness, attitude and use of malaria control interventions among target populations in the determination of degree of effectiveness of the program implementation in the community. This will in the long run serve as a useful warning device to indicate that an aspect of society, as illustrated in Figure 6, is malfunctioning and draws attention to the problem and leads to measures to solve it.

2.6 Chapter Summary

This chapter presented a broad overview of the theories, concepts, and previous studies which are relevant to the present study. Recent history shows that Africa is the continent which has industrialized the least, and its share has remained extremely modest. Its health sector, in most cases, is not in a position to generate resources for investment in modern technology, modernization or the establishment of new activities through research and development. They depend on resources accumulated outside the sector, or contributed from abroad. At the technological level, the learning process remains extremely slow and spreads only with difficulty. This state of affairs has meant that healthcare industries within sub-Saharan Africa in general and Nigeria in particular has participated in a multiplicity of isolated public health projects, none of them succeeding in setting off a real process of growth.

The theoretical framework used in this study was examined from the WHO perspective which holds that the social determinants of health within the sub-Sahara African countries are marked by health inequities caused by the unequal distribution of power, income, goods, and services. It was evident also from the literature reviewed that there is a systemic failure in the health system in most countries of the sub-Saharan Africa in general, and Nigeria in particular.

This failure is largely due to growing internal and external difficulties – including bureaucratic control leading to rigidities in already fragile systems, insufficient attention to the living conditions of the poor, and inequalities in healthcare delivery. Researchers, including those from WHO, UNICEF and UNESCO who have carried out related studies agree that access to health care in general is low, resources to purchase bed nets are limited, and medication too costly. Poor health systems abound in these regions; an infrastructure is lacking to deliver healthcare, and degraded environment threatens the future of most of the sub-Saharan Africa countries, where the great majority of children and pregnant women still live and where they die of preventable diseases.

CHAPTER 3

METHODS

3.1 Introduction

This chapter describes the research design and methods used in this study, including survey design and operationalization of key variables, ethical considerations, sampling technique, data collection procedures, and analyses performed.

The purpose of conducting this research was to evaluate the awareness, accessibility and use of malaria control interventions among two at-risk groups in Lagos metropolis, Nigeria, as well as to construct a profile of pregnant women and mothers of children under age five who demonstrate knowledge of and adopt malaria prevention strategies. The research questions were:

- 1. To what extent do mothers in the HMM program areas promptly recognize and treat malaria in children under five years old at home?
- 2. To what extent are pregnant women and mothers of children under five years aware of LLINs, and to what extent are LLINs available for use by these target groups in the community?
- 3. Do pregnant women know about and have access to intermittent preventive treatment of malaria?
- 4. What is the demographic profile of pregnant women and mothers of children under five who demonstrate compliance with malaria prevention strategies?
- 5. What is the demographic profile of pregnant women and mothers of children under five years who demonstrate knowledge of the cause of malaria?

3.2 Study Design

This is primarily a quantitative study utilizing data collected from a household survey (see Appendix K) on awareness and use of malaria control interventions in Alimosho and Kosofe Local Government Areas of Lagos State, Nigeria (see Appendix K.) where malaria is holoendemic and the malaria control program Roll Back Malaria (RBM) is being implemented in underserved areas. It is appropriate at this point to establish the similarities of these two LGAs. Who are the populations of Alimosho and Kosofe? Where do they live? What is their means of livelihood? The major occupation of the indigenous dwellers of these LGAs is mat-weaving. farming and fishing (NPC, 2006). The vegetation of these LGAs is swamp forest which had been encroached by construction of houses, markets and other infrastructure. However, the climatic conditions of the areas is influenced by seasons; dry between November and March, and wet between April to October. According to Udoma, "these settlements lack the basic social amenities, such as electricity, water, schools, and healthcare clinics. The residents lack sufficient sanitation: communal latrines, shared by about 15 households and where raw effluence, excreta, kitchen waste and polythene bags are discharged into rubbish-strewn waterways. Cholera and malaria are rife, while polio, still very much at large throughout Nigeria, strikes children at random. Life expectancy is under 40" (2014).

Questionnaires were developed by the Nigerian Institute for Medical Research and a pilot study was conducted in 2012. The research staff conducted the survey. Questionnaires asked respondents' demographic characteristics; perceived causes of malaria; knowledge of signs and symptoms of malaria; knowledge and use of LLINs; respondents' health seeking behavior with

emphasis on home management of malaria for children under age 5; types of antimalarials being used; the extent of awareness and use of LLIN and IPTp drugs in malaria prevention during pregnancy; and the availability and perceived effectiveness of LLINs.

Operationalization of Key Variables

Independent/Profile Variables

Six demographic variables were collected to construct a profile of women who exhibit knowledge of malaria prevention and who utilize preventive measures.

- <u>Age.</u> Age is collected in whole number years.
- <u>Marital Status</u>. Marital status is operationalized as Never Married/Single, Married, Divorced, or Widowed. For the final analyses, marital status was coded as Married "1" and all other marital statuses were coded as "0."
- <u>Maternal Status</u>. Maternal status is operationalized as Currently Pregnant with First Child; Currently Pregnant and has Other Children; and Not Pregnant, Mother of One or More Children under Age 5. For the final analyses, women who were pregnant and had no other children were coded as "0," women with children were coded as"1."
- <u>Religion</u>. For the final analyses, religion was operationalized as Christianity, coded as "0" and Islam, coded as "1."
- <u>Education</u>. Education was operationalized as No Formal Education (coded as "0"), Primary (coded as "1"), Secondary (coded as "2"), and Post-Secondary (coded as "3"). No Formal Education is the reference category for the logistic

regression.

• <u>Local Government Area of Residence (LGA)</u>. Participants were from one of two LGAs: Alimosho (coded as "0") or Kosofe (coded as "1").

Dependent/Outcome Variables

In this study, there are two outcome, or dependent variables, "knowledge of causes of malaria" and "compliance with preventive measures for malaria." One item is used to assess knowledge of the cause of malaria, "What do you know to be the most common cause of malaria?" The correct responses to this question are mosquito bites, stagnant water, and bad/dirty environment. Respondents who correctly identified all three of these contributory factors were coded as demonstrating "High" knowledge of the causes of malaria. Respondents who correctly identified two of the contributory factors were coded as demonstrating "Moderate" knowledge of the causes of malaria. Based on examination of frequency distributions, the moderate and high levels of knowledge were collapsed into one category. Respondents who correctly identified one or none of the contributory factors were coded as having "Low" knowledge.

To assess compliance with malaria preventive measures, three items were utilized to create an index, the "Prevention Compliance Index," with a possible score of 25. An index combines multiple items that measure a single construct into one score (Neuman, 1997). The three items include:

- 1) "How do you protect yourself and your household against malaria?"
 - Add one if response was "yes" to *burning coil or grass as repellents* or *sleeping with the windows closed.*

- Add two if response was "yes" to *sleeping under an ordinary net* or *cleaning gutters*.
- Add three if response was "yes" to *draining stagnant water*, *cutting bushes/grasses around the home*, *screening of windows with net*, *insecticide spraying*, or *sleeping under LLINs*.

2) "Observation on the physical condition of the treated net: Intact (not torn); Not intact (torn); Denied access to observe net." LLINs that were torn or frayed were considered not intact. Add two if any intact nets are present, one if nets are present but not intact.
3) "Observation on the actual use of the treated net: Displayed; Not Displayed; Denied access to observe net." LLINs that were displayed over bed areas were considered displayed. Add two if nets are properly displayed.

3.3 Ethical Considerations.

Ethical approval for the study was obtained from the Nigerian Institute of Medical Research's Institutional Review Board (IRB), Yaba-Laos, Nigeria and the Kent State University IRB, Kent, Ohio, USA (Appendix D). Administrative approvals were obtained from the Lagos State Ministry of Health, and the Alimosho and Kosofe Local Government Authorities before commencement of the study. IRB and administrative approvals are presented in Appendix C and D.

Informed consent was sought and obtained for all study participants in written form using an informed consent document (Appendix J). Participants were informed of the possible benefits and discomforts/inconveniences involved with participation in the study. Potential participants were informed that participation in the study was completely voluntary. Informed consent documents were translated to local languages when necessary and a participant

information leaflet was distributed where applicable. The patient information leaflet explains the study, participants' rights, and the voluntary nature of the study. The process for maintaining confidentiality of information obtained was also carefully explained to the participants. Efforts were also be made to ensure that records relating to the participants to be interviewed in the study remained confidential only to the core members of the research team, including the use of locked filing cabinets only accessible to the team.

3.4 Data Collection

The study was carried out over a 6-month period from February to August 2014. Pregnant women (n = 250) and mothers of under-five aged children (n = 233) were interviewed using interviewer-administered, semi-structured questionnaires in a household survey. Several items on the survey were open-ended and allowed the interviewers to probe for more information. Observations were also used to determine the physical condition of LLINs as well as if respondents displayed and actually used the LLINs.

3.5 Sampling Procedure

The sample included pregnant women and mothers of children under five years old. Children above the age of 5 years and adult males, although not totally free from acquiring malaria, have developed sufficient immunity against the disease. These populations were excluded from the survey and consequently are not part of this analysis.

A multi-stage sampling approach that involved a combination of simple random and systematic sampling techniques was adopted for the selection of respondents for the household survey. The first stage involved a random selection of two LGAs (Alimosho and Kosofe) from the list of 20 LGAs in Lagos State using the simple random sampling technique. Adopting the balloting approach utilized by the Nigerian National Population Commission (NPC), the names of the LGAs were written on pieces of paper, placed in a container, and shuffled. The two LGAs were subsequently selected at random from the container. The second stage involved the selection of two communities in each of the LGAs (Igando/Ikotun and Abule Egba for Alimosho LGA and Ikosi/Ketu and Ojota for Kosofe LGA) again using the balloting approach without replacement. The third stage involved the random selection of two enumeration areas (EAs) in each community selected. EAs are neighbouring blocks or geographic areas canvassed during census. A list of all the EAs based on the 2005 national census delineation exercise in the selected LGAs was obtained from the National Population Commission (NPC). In the selected EAs, a random selection of streets was conducted after which houses were selected from the streets using systematic sampling: by an ordered selection of a particular house from the sampling frame. In the selected houses women who were pregnant or had children under age five were selected for the interview. In a situation where an eligible woman was not found in a selected house, the next house to the right was visited as a replacement.

3.6 Sample Size Determination

The total sample size for the household survey was 234 pregnant women and 218 mothers of under-five aged children, respectively, of selected LGAs in Lagos State. The sample size of 234 pregnant women interviewed was derived from the table for a minimum sample size estimate for a population survey with 95% confidence interval (Lemeshow et al, 1990) using the formula:

$$n = \underline{Z^2 [p(1-p)]}{d^2}$$

where n = sample size, Z = level of significance (1.96 at 95%), p = the estimated proportion of the factor to be studied (0.187 or 18.7%), d = sampling error that can be tolerated (0.05 or 5%).

$$n = \frac{1.96^{2} [0.187 (1-0.187)]}{0.05^{2}}$$
$$n = \frac{3.84 [0.187 (0.813)]}{0.0025}$$
$$n = \frac{0.584}{0.0025} = 234$$

The value 0.187 (18.7%) used in the above sample size calculation represents the proportion of pregnant women in the population in the country and Lagos State (National Population Commission (NPC), 2009).

Similarly, the sample size of 218 mothers of children under-five years of age interviewed was derived from the table for a minimum sample size estimate for a population survey with 95% confidence interval (Lemeshow et al, 1990) using the formula:

$$n = \underline{Z^2 [p(1-p)]}{d^2}$$

where n = sample size, Z = level of significance (1.96 at 95%), p = the estimated proportion of the factor to be studied (0.171 or 17.1%), d = sampling error that can be tolerated (0.05 or 5%).

$$n = \frac{1.96^{2} [0.171 (1-0.171)]}{0.05^{2}}$$
$$n = \frac{3.84 [0.171 (0.829)]}{0.0025}$$
$$n = \frac{0.544}{0.0025} = 218$$

The value 0.171 (17.1%) used in the above sample size calculation represents the proportion of under-five aged children in the country and Lagos State (National Population Commission (NPC), 2009). The distribution of the number of respondents to be surveyed in the communities of the two LGAs of the State was determined based on proportion of population of each LGA in the total population in the selected LGAs as presented in Tables 3 and 4.

Table 2. Community population and proportion of sample size for pregnant women

LGA	Total Population 2006	Target population (18.7%)	Sampling Proportion (%)	Proportion of Sample Size
Alimosho	318,996	75,894	66.5	156
Kosofe	160,974	38,298	33.5	78
Total	479,970	114,192	100.0	234

Table 3. Community population and proportion of sample size for mothers of under-five year old children

LGA	Total Population 2006	Target population (17.1%)	Sampling Proportion (%)	Proportion of Sample Size
Alimosho	318,996	69,401	66.5	145
Kosofe	160,974	35,021	33.5	73
Total	479,970	104,422	100.0	218

3.7 Data Management and Analyses

Completeness of the questionnaires was ensured in the field by ensuring that all questions administered and answered were properly entered in the allotted space provided in the questionnaire and certified by the Field Supervisor. Completed questionnaires were coded and the codes were entered into Statistical Package for the Social Sciences (SPSS)® version 20. This study used both linear and logistic regression for the analyses. Two or more independent variables were used to predict the dependent variable. Linear regression was used to predict the compliance index as a function of the independent or predictor variables: Age, Marital Status, Maternal Status, Religion, Education, and Local Government Area of residence.

Before using linear regression, there were at least five assumptions that were tested or considered for regression to be legitimate (Mertler & Vannatta, 2010). These assumptions were:

- Variability: Values of the independent variables must vary. This can be determined by examining frequencies. There should be sufficient number of respondents in each category of each independent variable.
- Influential cases: There must not be influential cases, or "outliers" that could disproportionately affect the results. Multivariate outliers are examined using Mahalanobis Distance.
- 3.) Linearity: The relationship between the independent variables and dependent variables is linear. Residual plots are examined to determine if the assumption of linearity is met.
- 4.) Normality: Variables should be normally distributed, which is determined by examining skew and kurtosis (both should be close to 0).
- 5.) Multicolinearity: Independent variables should not be highly linearly related to one another. Mahalanobis distance to identify outliers and examine tolerance was conducted and calculated. Tolerance statistics showed that all values exceeded 0.1.

Because this study is exploratory, standard multiple regression was utilized for the Compliance Index analysis. In this method, the independent variables were entered into the regression equation simultaneously and each was evaluated in terms of its contribution to the prediction of the dependent variable (Tabachnick & Fidell, 2007).

Logistic regression was used to predict membership in high/moderate or low knowledge of malaria categories, also as a function of Age, Marital Status, Maternal Status, Religion, Education and Local Government Area of residence.

Chapter 4

RESULTS

In this chapter, respondents' demographic characteristics are described and the results of analyses of the five main research questions are presented. In addition, descriptive results from the in-home questionnaire are offered including: Respondents' knowledge of contributory factors and symptoms of malaria; awareness of LLINs and HMM; awareness and utilization of IPTp among pregnant women; experience with malaria and malaria treatments; preventive measures against malaria; LLIN use, care, and perceived effectiveness; and LLIN accessibility.

Sample Demographics

Table 4 shows the socio-demographic characteristics of respondents. As stated previously, two local government areas (LGAs) of Lagos State (Alimosho and Kosofe) from the existing 20 LGAs were surveyed. Of the 483 respondents surveyed, 313 (64.8%) were from the Alimosho LGA, while 170 (35.2%) were from the Kosofe LGA. Of the 483 respondents, 13.9% were pregnant women with no other children (first-time mothers); 28.4% were pregnant women with other children under five years; 9.5% were pregnant women with other children over five years old; and 48.2% were not pregnant but had children under 5 years old. Overall, 51.8% of the sample was comprised of pregnant women, and 48.2% of the sample were not pregnant and had children under five years old. Their ages ranged from 19 to 65 years, with an average age of 32.6 years. Data showed three main religions in Lagos State, of which 313 (64.8%) were Christian; 164 (34.0%) followed Islam; while 5 (1.0%) still worship their local gods or deities.

Data also showed that the majority of those surveyed, 420 (87%) were married; 29 were never married/single (8.1%), while 15 (3.1%) were divorcees, and 9 (1.9%) were widowed. The educational level, according to the results of this survey, indicates that a majority of respondents have completed primary, secondary, or post-secondary schools education – with 52 (10.8%) respondents completing primary school, 211 (43.7%) respondents completing secondary school, and 163 (33.7%) respondents completing post-secondary school, respectively. Fifty-four (11.2%) respondents were unemployed, 110 (22.8%) respondents were housewives, 152 (31.5%) were traders, 60 (12.4%) were civil servants, 51 (10.6%) were professionals, and 7 (1.4%) were farmers. Type of dwelling, number in household and number of children under 5 years of the respondents are presented in Table 4.

Variable	Ν	%
Local Government Area		
Alismosho	313	64.8
Kosofe	170	35.2
Maternal Status		
Currently Pregnant and Mother of Children Over Five	46	9.5
Currently Pregnant, No Other Children	67	13.9
Currently Pregnant and Mother of Child Under Five	137	28.4
Not Pregnant, Mother of Child Under Five	233	48.2
Religion		
No Religion	1	0.2
Traditional	5	1.0
Islam	164	34.0
Christianity	313	64.8
Marital Status		
Widowed	9	1.9
Divorced	15	3.1
Never Married/Single	39	8.1
Married	420	87.0
		1

Table 4. Respondent Demographic Characteristics

Level of Education		
No Formal Education	10	2.1
Primary	52	10.8
Secondary	211	43.7
Post-Secondary	163	33.7
Occupation		
Farming	7	1.4
Other	8	1.7
Artisan	41	8.5
Professional	51	10.6
Unemployed	54	11.2
Civil Servant	60	12.4
Housewife	110	22.8
Trading	152	31.5
Type of Dwelling		
Wood/Makeshift Structure	1	0.2
Duplex	15	3.1
Single Family House	38	7.9
Single Room	68	14.1
Room and Parlor	103	21.3
Mini Flat	120	24.8
Two/Three Bedroom Flat	138	28.6

The mean and standard deviation (SD) for the Age, Number in household, Number of children in household and Number of children under five variables were 32.6 (6.6); 3.8 (1.5); 1.8 (1.4); and 1.2 (0.5) respectively.

Respondents' Knowledge of Causes and Symptoms of Malaria; Awareness of LLINs and HMM

Research question 1: To what extent do mothers in the HMM program areas

promptly recognize and treat malaria in children under five years old at home?

A crucial issue in understanding mothers' recognition and response to malaria is to first assess their level of awareness of malaria symptoms. Most of the respondents (94.6%) identified mosquito bites as a contributory factor of malaria (see Table 5). However, less than half of the participants (41.9%) identified stagnant water as a contributory factor, and just 27.4% identified a bad or dirty environment as being a factor in the causation of malaria. Respondents were classified as having low (53.0%), moderate (29.2%) or high (17.8%) knowledge of malaria causes; respondents rarely identified incorrect causes of malaria.

Awareness of malaria initiatives and sources of information about those initiatives are important to determine if public health campaigns are reaching citizens. Based on the results of this study, 65.4% of respondents were aware of the governmental policy change regarding the HMM intervention strategy. Almost half (48.2%) obtained this information through radio and 36.4% obtained through television, while 28.5% learned about HMM by attending antenatal clinics. These three modes of communication seemed particularly successful in spreading the message about malaria to this population. The study showed that 86.5% of respondents were aware of government policy change about use of LLINs. Like the HMM, more than half of respondents, 54.8% reported learning about LLIN policy change from clinics, 33.3% from television, and 36.7% from radio.

Variable	Ν	%
Contributory Factors of Malaria		
Getting Rained On	6	1.2
Eating Bad Food	7	1.5
Sun Heat	12	2.5
Cold	34	7.0
Bad/Dirty Environment*	132	27.4
Stagnant Water*	202	41.9
Mosquito Bites*	456	94.6
Level of Knowledge of Contributory Factor for Malaria		
Transmission		
Low	256	53.0
Medium	141	29.2
High	86	17.8
Signs and Symptoms of Malaria		
Convulsion	16	3.3
Bad Dreams/Nightmares	22	4.6
Vomiting	69	14.3
Sweating	92	19.0
Chills/Shivering	108	22.4
Poor Appetite	166	34.4
Fatigue/Body Weakness	198	41.1
Change in Eye Color	216	44.7
Cold/Catarh	220	45.5
Body Aches/Joint Pain	284	58.8
Change in Urine Color	370	76.6
Headache	384	79.5
High Body Temperature	415	85.9
Aware of Government Policy Change on Use of LLINs		
Yes	418	86.5
No	60	12.4
Not Sure/Don't Know	5	1.0
Source of Information on LLIN Policy Change		
Pamphlet/Brochure	1	0.2
Poster	4	0.9
Pharmacy/Chemist Shop	8	1.9
Newspapers	37	8.7
Relatives	19	4.4

Table 5. Knowledge of Contributory Factor and Symptoms of Malaria; Awareness ofLLINs and HMM

Friends/Neighbors	19	4.4
Radio	114	26.7
Television	142	33.3
Clinics	234	54.8
Aware of Government Policy Change on Home Management		
of Malaria Prevention and Treatment		
Yes	276	65.4
No	146	34.6
Source of Information on Home Management of Malaria		
Pamphlet/Brochure	0	0
Poster	4	1.2
Pharmacy/Chemist Shop	4	1.2
Friends/Neighbors	7	2.1
Relatives	11	3.3
Newspapers	38	11.5
Clinics	94	28.5
Television	120	36.4
Radio	159	48.2

*Appropriate responses for causes of malaria

Table 6 gives results for respondents' experience with malaria and malaria treatments. On the extent to which mothers in the HMM program are willing to promptly treat malaria at home (see Table 6), 58.2% respondents reported that they take action within the home or seek appropriate healthcare outside the home within 24 hours of onset of malaria signs or symptoms. An additional 35.3% seek care between 24 and 48 hours, and 6.5% reported they usually seek care after 48 hours.

When the following questions were posed: "Has anyone in your household had malaria?" and "Have you heard of artemisinin-combination therapy?", 96.7% responded positively for the first question, while 56.8% responded positively for the latter. Most respondents (54.7%) preferred artemisinin-combination therapy as a drug of choice for the treatment of malaria.

Variable	n	%
Anyone in Household had Malaria?		
Yes	465	96.7
No	16	3.3
How Soon Take Action after First Onset of Symptoms?		
Within 24 Hours	277	58.2
1-2 Days	168	35.3
3 Days or More	31	6.5
Preferred Antimalarials (n=1259)		
Haematics	1	0.0
Multivitamins	1	0.0
Other	1	0.0
Antibiotics	8	0.6
Other Anti-Malarials	21	1.7
Analgesics	44	3.5
Chloroquine	93	7.4
Sulfadoxine Pyrimthamine	401	31.9
ACT	689	54.7
Heard of Artemisinin-Combination Therapy (ACT)?		
Yes	256	56.8
No	195	43.2
Have You or Any Family Member used ACT for Malaria		
Treatment?		
Can't Remember	32	10.7
No	37	12.4
Yes	229	76.8
What Influenced the Choice of ACT for Treatment?		
Fewer Tablets at Once	7	2.9
Does Not Have Bitter Taste	9	3.8
Affordability	20	8.2
Lack of Side Effects	28	11.7
Available	79	32.6
Efficacy/Effectiveness	173	71.5
What Malaria Drugs have You or Family Members Taken?		
Analgesics	13	2.9
Chloroquine	17	3.8
Others	38	7.0
Sulfadoxine Pyrimthamine	112	25.2
ACTs	264	59.5

Table 6. Experience with Malaria and Malaria Treatments

Who Prescribed the Drug?		
Drug Hawker	11	2.5
Relatives	16	3.6
Friends/Neighbors	20	4.5
Patent Medical Seller	21	4.7
Others	30	6.7
Self	87	19.4
Nurse	127	28.3
Medical Doctor	136	30.4

Preventive Measures against Malaria: LLIN Use, Care, and Perceived Effectiveness

Table 7 presents results of preventive measures against malaria and LLIN use. This study found that respondents are willing to take several preventive measures to prevent malaria at home. The most important measures identified were spraying the home with insecticide, sleeping under LLINs, draining of stagnant water, and clearing of gutters. Preventive measures respondents reported taking against malaria were: sleeping with LLINs (59.6%), sleeping with closed windows (40.0%), screening of windows with nets (51.6%), use of insecticide spraying (82.4%), burning coil/grass as repellents (29.2%), cutting bushes/grasses around the home (45.5%), draining stagnant water (55.5%), clearing of gutters (50.9%), covering the body with cloth (30.0%), and others such as sleeping under ordinary nets (7.1%) as well as rubbing repellent cream on body (3.3%).

In response to the open-ended question, "What do you do when you or someone in your family has malaria?", out of 478 respondents, 67.8% said they buy drugs from chemist/patent medical store, 11.5% use herbal remedies, 9.0% take leftover medications they have in the home, 3.1% use a tepid sponge, 3.1% do nothing, 2.7% invite a health worker to the home, and 2.7% pray.

The cornerstone of most malaria control in Africa is not only for mothers to promptly treat their febrile children as close to home as possible, but also to be able to properly use LLINs (Adeneye et al. 2013). This therefore leads to the next research question

Research Question 2: To what extent are pregnant women and mothers of children under 5 years aware of LLINs, and to what extent are LLINs available for use by these target groups in the community?

Respondents demonstrated knowledge that LLINs were intended to reduce or prevent malaria by preventing mosquito bites. Of the 483 respondents surveyed, 59.6% reported using LLINs to protect themselves and members of their family. However, when asked if provided with a treated net, who in the household was most likely to use it, only 24% claimed self and children below 5 years old. Of the 483 respondents who stated that they had LLINs in the home, a significant number, 73.1% actually use LLINs at home. Of this number, 30.7% reported that they had no LLIN in their homes. Upon further probing, respondents replied that they either don't know where to obtain the nets (25.0%) or that it causes heat (13.5%) among other responses given. When asked: "How do you protect yourself and family from malaria?", a significant number (82.4%) claimed they use insecticide spraying, 59% reported sleeping under LLINs, and 55% reported that draining stagnant water as one of the measures used to protect themselves and family members from malaria.

Of 380 respondents to the question, "what is your personal view on the effectiveness of the LLINs since being used?", 89.7% said they were "effective" or "very good" at preventing mosquito bites, and 10.3% said they "didn't know." Just as in the HMM, the level of awareness and use of LLIN among pregnant women and mothers of children under 5 years old was low. These data are shown in Tables 7 and 8.

Variable	Ν	%
How Do You Protect Yourself and Family from Malaria?		
Rub Repellent Cream on Body	16	3.3
Burning Coil/Grass as Repellents	34	7.1
Sleeping Under Ordinary Net	141	29.2
Covering the Body with Cloth	145	30.0
Sleeping With Windows Closed	193	40.0
Cutting Bushes/Grasses around Home	220	45.5
Clearing Gutters	246	50.9
Net Over Windows	249	51.6
Draining Stagnant Water	268	55.5
Sleeping Under LLINs	288	59.6
Insecticide Spraving	398	82.4
Do You Have Insecticide Treated Nets in Your Household?		
Yes	332	69.3
No	147	30.7
If No Insecticide Treated Nets, Why Not?		
Prefer Chemical Spraying	3	3.1
No Need for It	5	5.2
Not at Home when LLINs were Distributed	6	6.3
Don't Know about It	8	8.3
Can't Afford	9	9.4
It Causes Heat	13	13.5
Don't Know Where to Obtain/Where to Put It	24	25.0
Other	28	29.2
Do You Use the LLINS in Your Household?	272	70.1
Yes	272	/3.1
	100	26.9
Who in Your House Slept Under the Nets Last Night?		
Children over 5 years	74	20.1
Father	95	25.7
Pregnant Mothers	97	26.3
Children under 5 years	159	43.1
Who is Most Likely to Get a Serious Case of Malaria?		
Adults	4	0.8
Pregnant Women	103	21.7
Children	175	36.8
Everyone	245	51.6

 Table 7. Preventive Measures against Malaria; LLIN Use and Care

Observation on Physical Condition of Treated Net		
Denied Access	32	10.2
Not Intact	41	13.1
Intact	241	76.8
Observation on Actual Use of Treated Net		
Denied Access	38	11.4
Not Displayed	74	22.2
Displayed	222	66.5
If the Net was Not Displayed, Why Not?		
Clean Environment/Bush Clearing	2	2.6
Use Window/Door Screens/Nets	6	7.9
No Need for It	6	7.9
Prefer Chemical Spraying/Insecticides	11	14.5
Other	12	15.8
It Causes Heat	39	51.3
Have you ever washed the treated nets since being used?		
Yes	200	64.1
No	112	35.9
What do you use in washing the nets?		
Rinse in Water Only	3	1.4
Bar Soap	47	21.4
Detergents	117	53.2
Liquid Soap	13	5.9
Toilet Soaps	43	19.5
How do you dry the nets after washing?		
Sun Dry	9	4.1
Spread Under Shade to Dry	205	94.5
Other	3	1.4

An important question posed to the respondents was: Would you be willing to purchase treated nets for N1,000.00k in your community? Of the 473 respondents (55.4%) responded positively, and 44.6% said "No," while 20.2% posits that LLINs should be provided free. Most respondents (60.7%) claimed that the government clinic was the convenient place to purchase treated nets.

The mean and standard deviation (SD) were also obtained for the following variables: How many mosquito nets does your household have? Total number of respondents was 325, the mean and SD was 1.4 (0.8). For the question, how many months have you used the LLINs? Of the 253 surveyed, the mean and SD was 8.2 (4.6). On the observed number of children under 5 sleeping under nets/total number of children in household in household, the total number of respondents was 208, while the mean and SD was 1.3 (0.5). On the observed number of pregnant women sleeping under net, the total was 91, the mean and SD was 1.0 (0.2). When respondents were asked: If yes, how many times do you think you have washed the net? Of the 199 surveyed, the mean and SD was 1.8 (1.2). Overall, the mean and SD for the Compliance Index was 12.7 (6.4) respectively.

Variable	Ν	%
Where Did You Get the Treated Net?		
Street/Market Vendor	6	1.6
Retail/Wholesale Shop	8	2.2
Private Clinic	29	7.8
Other	34	9.1
Pharmacy/Chemist Shop	48	12.9
House to House Distribution	107	28.8
Government Clinic	140	37.6
If You are Provided with a Treated Net, Who in the Household do		
You Deem Fit to Use It?		
Spouse	12	2.6
Children Over 5 Years	21	4.5
Children Below 5 Years	82	17.6
Self Only	103	22.1
Self and Children Below 5 Years	112	24.0
Self and Spouse and Children Over 5 Years	137	29.3
Would you be willing to purchase treated nets for N1,000.00k in		
your community?		
Yes	262	55.4
No	211	44.6
Most convenient place for purchase of treated net in your		
community?		
Retail/Wholesale Shop	2	0.04
Market Vendors	3	0.06
Private Clinic	41	8.8
Other	63	13.5
Pharmacy/Chemist Shop	75	16.0
Government Clinic	284	60.7
How Can LLINs and HMM be Promoted to Prevent Malaria?		
Don't Know	7	1.5
Other	13	2.7
Interpersonal Communication based on Personal Experience	19	4.0
Make Program Known through Mass Media and Provide Nets for free	22	4.6
Make the Nets and Other Programs Available/Accessible	39	8.2
Intense Awareness Creation Through Hospitals	57	12.0
Provide Nets for Free	96	20.2
Make Programs Known Through Mass Media	223	46.8

Table 8. Long-Lasting Insecticide Nets Accessibility

Two questions asked: If you have bednet, how much did you pay for the treated bednet? And if not willing to pay N1,000.00k, how much would you be willing to pay for a treated net? The mean and standard deviation response in the first question was 1605.6 (527.3), while that of the second question was 371.4 (1605.6)

Awareness and Utilization of IPTp among Pregnant Women

Research Question 3: Do pregnant women know about and have access to IPTp?

Of the 247 respondents surveyed, 82.2% reported positively to being aware of this malaria intervention strategy. Of this figure, 81.3% had received IPTp treatment during antenatal visits. This study also showed that 41.8% had received one preventive dose, 35.9% had received two doses, while 21.2% had received three preventive doses of IPTp. While a large majority (96.6%) get their information on IPTp from attending clinics, other sources of information, such as television, radio, poster, pamphlet and brochure, are extremely low. Of significant importance was their response to what respondents know about the benefit of IPTp. Of 202 respondents, 52% stated that it prevents malaria in mother and child, and 48% said it prevents malaria-related complications in pregnancy. These figures are low when compared to that reported (82.2%) on their awareness of IPTp treatment. This study therefore showed that unlike the low results observed with the other interventions strategies, results on the awareness of IPTp among pregnant women and mothers of children under five years old are mixed. These data are shown in Table 9.

Variable	Ν	%
Aware of IPTp		
Yes	203	82.0
No	44	17.8
Source of Information on IPTp		
Relatives	1	0.05
Poster	1	0.05
Pamphlet/Brochure	1	0.05
Pharmacy/Chemist Shop	2	1.0
Friends/Neighbors	6	2.9
Newspapers	6	2.9
Radio	13	6.3
Television	23	11.1
Clinics	200	96.6
Received Preventive Treatment During Antenatal Visits		
Yes	169	81.3
No	39	18.8
Number of Preventive Doses Received		
One	71	41.8
Two	61	35.9
Three	36	21.2
Six	2	0.01

Table 9. Awareness and Utilization of IPTp among Pregnant Women

Research Question 4: What is the demographic profile of pregnant women and mothers of children under five who demonstrate compliance with malaria prevention strategies?

In this study, the standard multiple regression method was adopted to answer the question. This method allowed for entry of all independent variables into the analysis simultaneously, and to examine the significance of each independent variable to predict the dependent variable (Tabachnik & Fidell, 2007). Prior to conducting the regression, data were screened for missing data and outliers, as well as evaluated for test assumption. Also multi-collinearity was addressed by tolerance statistics for each independent variable. A value for

tolerance close to zero is an indication of multi-collinearity is a distinct problem (Stevens, 2007).

First, frequencies were run to test assumptions of variability (see Table 4). LGA of residence meets the assumption. Within the Maternal Status variable with 13.9% in the category *currently pregnant/no other children* did not meet the assumption. However, because of its theoretical importance, it was kept in the analysis. These results should therefore be interpreted with caution. In the Religion variable, both of the categories, *Christianity* and *Islam*, meet the variability assumption. The *no religion* and *traditional* categories were dropped because there is insufficient variation. In the Marital Status variable, only the category *married* varied. The other three categories did not vary sufficiently, therefore the Marital Status category *married* was compared to all other marital statuses.

Next, data were examined for univariate and multivariate outliers. No univariate outliers were present in the dataset. There were, however, 13 cases which represented multivariate outliers (p<.001; DF=9) when examined using the critical value of chi square (27.888) for Mahalanobis distance. These 13 cases were deleted from the analysis.

Linear relationships were examined using standardized residual plots. Residual plots are also used to assess normality and homoscedasticity. Residual plots for the Compliance Index showed sufficient distribution of points above and below the prediction error line $\hat{e}_i = 0$.

Normality was also examined using skew and kurtosis values. The marital status and the maternal status variable had borderline acceptable skew and kurtosis values. According to Tate "with a large sample size, even moderate violations of normality are acceptable to ignore" (1992).

Finally, multi-collinearity was examined by looking at tolerance statistics. All of the tolerance values exceeded 0.1. So these variables met the assumptions that the independent
variables are not highly correlated.

Overall, the mean score on the Compliance Index was 12.75 (SD=6.41). Overall, 47.9% of respondents had moderate/high level of malaria knowledge and 52.1% had a low level of knowledge. Bivariate descriptive statistics for respondents in the regression analysis are shown in Table 10. below.

	Compliance		
	Index	Level of Malaria	
Variable	Mean (SD)	Knowled	lge
LGA		Moderate/High	Low
		%	%
Alimosho	13.07 (7.11)	30.7	69.3
Kosofe	12.20 (4.91)	78.2	21.8
Maternal Status			
Pregnant, No Other Children	12.78 (6.46)	62.7	37.3
Has Other Children	12.75 (6.41)	45.4	54.6
Religion			
Christianity	12.80 (6.24)	50.2	49.8
Islam	12.93 (6.57)	44.7	55.3
Married			
Married	13.26 (6.37)	49.3	50.7
Not Married	8.50 (4.99)	24.0	76.0
Education			
No Formal Education	7.22 (7.17)	33.3	66.7
			54.0
Primary	9.02 (6.29)	46.0	54.0
Secondary	12.82 (6.13)	60.8	39.2
Post-Secondary	15.36 (6.03)	46.3	53.8

 Table 10. Descriptive Statistics for Regression Analyses

The mean age and standard deviation for respondents in the moderate/high was 32.48 (5.64), while the mean age and standard deviation for those in the low value was 32.26 (7.14). The Pearson Correlation was .19.

To investigate whether Local Government Area, Age, Level of Education, Marital Status, Religion, and Maternal Status (being a first-time mother) were predictive of compliance with malaria prevention strategies (Compliance Index), a standard regression was computed. Table 11 presents the results of the regression analysis. The overall model of the six independent variables significantly predicts the compliance index, $R^2 = .163$, F(6.409) = 13.28, p < .001. Regression results indicate three predictors, Age, Education, and LGA significantly predict compliance (p < .05). These indices are therefore useful predictors of the compliance index. The other three variables, Married, Maternal Status, and Religion were not significant predictors to this model. The model has an R^2 of .16 which means that 16% of the total variance in compliance index is explained by LGA, Marital Status, Education, Age, Religion (Christian/Islam), and Maternal Status. There is a lot of variability in the outcome variable that is not explained. The associated p-value ask if each one of these predictors are significantly predicting compliance or not. What we see for Age, Education and LGA is that they are significant predictors. Age has a positive relationship with the Compliance Index: as age increases, so does the Compliance Index. Regression results on the impact of the LGA and community of residence to compliance index showed that respondents from the Alimosho LGA were more likely to comply with policy guidelines on the malaria intervention strategies. Findings on the impact of education on compliance index showed that as education level rises, so does compliance.

Table	11.	Standard	Linear	Regression	Predicting	Level	of	Compliance	with	Malaria
Prever	ntion	Measures	(Compl	iance Index)	1					

Variable	В	SE B	β
Constant	-3.01	2.21	
Local Government Area* - Alimosho = 0 - Kosofe = 1	-2.56	.62	20
Maternal Status -PW with no child = 0 -MC < 5 years old = 1	52	.86	03
Religion -Christianity = 0 -Islam = 1	52	.62	.04
Age*	.25	.06	.23
Married - All other marital status = 0 - Married = 1	1.20	1.29	.04
Education*	2.56	.43	.28
R^2 =.16 PW = p	regnant women;	MC = mothers of the second s	of children
*p<.001			

Research question 5: What is the demographic profile of pregnant women and mothers of children under five years who demonstrate knowledge of the cause of malaria?

Logistic regression was performed, after having conducted and calculated Mahalanobis' distance to identify outliers and examining tolerance to identify multicollinearity. Outliers were deleted and tolerance coefficients did not indicate a problem with multicollinearity. The overall model ($R^2 = .19, X^2$ (8) = 88.93, p <.05) was statistically reliable, although its R^2 was low. Two predictors, LGA and Maternal Status were statistically reliable in distinguishing between low and moderate/high level of knowledge. Kosofe LGA respondents were more likely to be classified as having moderate/high level of knowledge of malaria. Similarly, the odds ratios for

the variable Maternal Status indicated that first time mothers were more likely to be classified as having moderate/high level of knowledge of malaria causes.

The remaining six predictors did not significantly predict malaria knowledge. However, the p value for Religion was equal to .05 with Christian respondents being more likely to be categorized as having a moderate/high level of knowledge of malaria causes. Results of the logistic regression examining whether LGA, Marital Status, Education, Age, Religion (Christian/Islam), and Maternal Status predicted low versus moderate/high knowledge of the causes of malaria are presented in Table 12.

Table	12.	Logistic	Regression	of	Maternal	Demographic	Variables	Predicting	Level	of
Malar	ia K	nowledge	2							

Variable	В	SE	Exp(B)	95% CI Exp(B) Lower	95% CI Exp(B) Upper
Constant	.536	1.067			
Local Government Area** - Alimosho = 0 - Kosofe = 1	1.896	.247	6.659	4.105	10.799
Maternal Status* - PW $(1^{st} time) = 0$ - MC < 5 years = 1	834	.336	.434	.225	.839
Religion ^{*1} - Christianity = 0 - Islam = 1	459	.237	.632	.397	1.006
Age	012	.022	.988	.947	1.032
Married -All others = 0 -Married = 1	.470	.498	1.600	.602	4.249
Education(Primary)	368	.943	.692	.109	4.249
Education(Secondary)	078	.905	.925	.157	5.453
Education(Post Sec)	593	.921	.552	.091	3.357

 R^2 = .19 (Cox and Snell), .26 (Nagelkerke) Model χ^2 (8) = 88.93 *p<.05; **p<.001

Chapter 5

DISCUSSION

5.1 Introduction

It is important to acknowledge the well-meaning efforts of all players (WHO, UNICEF, World Bank, FMH, Lagos State Government, and the various NGOs) in the RBM program to help control the devastating effects that malaria caused to children and pregnant women, not only in Nigeria, but the entire sub-Saharan Africa region. Yet there is still a great deal of work to do.

Concerted efforts have been made to increase communities' awareness of malaria intervention strategies. For instance, malaria in pregnant women was until recently a relatively neglected problem with less than 5% of pregnant women having access to effective interventions like LLINs (WHO, 2003b). However, as shown in this study, there has been a remarkable increase (more than 80%) in the number of pregnant women now aware of this effective strategy for preventing and controlling malaria in pregnancy. Awareness of treating malaria with antimalarial drugs such as ACTs which was about 9% as reported in the 2010 Nigerian Malaria Indicator Survey (2012) has substantially increased to about 65%.

A critical look at all these achievements, however, revealed that participants did not meet any of the target set by the Abuja RBM. The baseline figures as provided in the 2010 Nigeria National Malaria Indicator Survey and compared against the results of this studyis shown in Table 13 below. Despite concerted efforts and substantial achievements of the Lagos State government in the RBM program, the awareness and use of malaria intervention strategies are still low. The question then is, why were most of these targets not achieved? The answer likely lies in how the policies were formulated and implemented.

67

 Table 13: Baseline vs Current Data

Intervention		Year	
	2005	2010	2014
LLIN		29%	59.6%
НММ		49%	65.4%
ACTs		9%	65.0%
ІРТр		30%	52%
Abuja RBM	60%	80%	96%

5.2 Findings

This study has highlighted the problems with knowledge of and compliance with malaria prevention among pregnant women and children under age 5. After more than three decades of malaria control, the RBM program in Lagos State in particular, and Nigeria in general is characterized by extremely low degrees of integration both as a result of poorly formulated global policies on malaria control and the logistics of implementation as they were initially conceived, the lack of adequate funding, and the implementation of uncoordinated strategy (Chiejina, 2014). Let us look at these issues separately for which a number of effective policy interventions could help in solving the problems.

5.3 Political

The first issue is political. Too often, this is where public health practitioners encounter problems. In most cases, these political problems are not seen as being directly associated with health issues confronting the community and are therefore ignored or downplayed. In Nigeria,

for instance, there is always disagreement between the federal and state governments when it comes to census figures. A case in point is the dispute made by the Lagos State government on the number of people in Alimosho LGA (NPC, 2006). There are severe public health implications if the census data are not accurate. Inaccurate census figures can result in unrealistic budgeting with regards to funding, provision of health infrastructure and services, and a shortfall in allocation and distribution of anti-malarial supplies, such as ACTs and LLINs.

A case in point is the question posed to respondents. When asked what influenced their choice of ACT for treatment of malaria, only 37% reported because it was available. This limited availability is a major problem. The question is, why was the drug in short supply? Could it be that the quantity of drugs delivered by donor nations was based on the number of people in these communities as reported by the National Population Commission? It is quite unfortunate that with barely a year to the end of the 2015 United Nations Decade to roll back malaria, most of the respondents are not able to procure the drug simply because it is unavailable. The result of this shortage is that the people tended to neglect the real cause of their illness and engaged in self-treatment at home with local herbs or other cheap analgesics rather than genuine ACTs.

With particular reference to LLIN use, this study showed that the mean number in a household among the study population is four, and the mean number of LLIN per household is one. Ideally, there should be at least one LLIN for each household member. Again, the question is, what could have accounted for this shortfall in the supply and distribution of LLIN? It is very important that national and state governments take immediate steps to resolve the census issue as failure to do so might undermine the success of the RBM program in the control of malaria in the region.

5.4 Cost

The second issue is cost. Respondents were asked, would you be willing to purchase treated nets for N1,000.00k in your community? And if not willing to pay N1,000.00k, how much would you be willing to pay for a treated net? In response to the first question, 45% reported their unwillingness to buy the treated nets for this sum. This amount might be too high, taking into consideration that these respondents are peasant farmers, fishermen and mat-weavers. The mean amount respondents are willing to pay is N372. To be fully effective, these intervention tools should be distributed free of charge.

5.5 Funding

The third issue is funding. Examining data collected by WHO, this assertion was supported in their 2013 World Malaria Report thus, "The currently available funding is far below the resources required to reach universal coverage of interventions. An estimated US\$5.1 billion is needed every year for this purpose. In 2012, the global total of international and domestic funding for malaria was US\$2.5 billion – less than half of what is needed" (WHO, 2012b; 2013b). What is the impact of a lack of adequate funding as observed in this study? The big problem here is the prioritization of intervention strategies.

5.6 Education

An important observation made during the data collection period was that rather than using an integrated approach to control malaria, government has (perhaps due to lack of adequate funding) chosen to prioritize its malaria intervention program. For instance, in the use of public

70

health campaign educational materials in the control of malaria, government has focused more on radio and television while paying little or no attention to the other sources of useful tools designed as integrated part of the intervention strategies. For example, available Information, Education and Communication/Behavioral Change Communication (IEC/BCC) materials such as posters and pamphlets with messages on malaria prevention and treatment/usage of intervention tools, were not displayed or distributed.

Without proper health education, community members will have no idea of how to use these materials. Another good example is shown in Figure 9 where LLINs are used as screens on windows.



Fig 9: Wrong Use of Long-Lasting Insecticide Nets

Source: NIMR Research Team (2014)

It is important also for the communities to be educated about the etiology of malaria (Tordrup, 2008). For instance, in this study, while the biological route of infection from mosquito to human was correctly identified by a majority of respondents, the awareness of symptoms of severe malaria, such as convulsions were not correctly identified. Neither were respondents (about 65%) able to see the correlation between dirty surroundings and stagnant water as contributory factor in the spread of malaria (Kale et al. 2003; Tordrup, 2008). Therefore, health educational programs advocating for behavioral change at the individual, household and community levels through the promotion of the importance of appropriate malaria (Nsimba and Rimoy, 2005) need to be urgently carried out in the communities.

5.7 Gaps in Policies

There are three major gaps in malaria prevention: funding, poorly implemented policy, and regulatory power. The first is in funding these interventions. No matter how effective these strategies might be, without adequate funding, the disease cannot be completely controlled. With particular reference to Nigeria, its oil surplus, when it exists, is not used for the development of the health sector or for any public health programs. In most cases, the health sector is not in a position to generate resources for modernization of its healthcare facilities or the prevention of disease and promotion of health. They depend on resources accumulated outside the sector or contributed abroad. According to the 2013 WHO Country Profile, none of the member nations, including Nigeria, budgeted funds for the improvement of the health sector as shown in Figure 13 below. While financial contributions are being made by outside sources, member nations must also be seen to be showing interest in their own health problems by also

72

contributing financially to combat this deadly disease. When the non-contributory aspect by member nations is examined within the conceptual model (figure 6) the society is constrained in their ability to control malaria incidence and achieved the RBM target as envisioned. The social equilibrium theory held by structural functionalists that sees society as a complex system whose parts (norms, customs, traditions, and institutions), work together to promote solidarity, stability and a cohesive system (Talcott, 1975; Gerber, 2010) becomes apparent.



Fig 10: Sources of financing of malaria intervention strategies

Source: WHO Country Profile (2013c).

The second major gap is that the policies were poorly implemented, leading to a great amount of prioritization and abandonment of the integrated strategy as envisaged by RBM. Thirdly, without particular reference to enforcement and regulatory policy, member nations lack regulatory power. In Nigeria, for instance, government has allowed its citizens to build all types of construction on drainage paths. With no access to the drainage system, standing bodies of water can be seen sporadically in the environment which serves as breeding sites for mosquitoes. This is unacceptable.

5.8 Implications for Public Health

The policy as presently formulated, despite the general understanding of the broad public health implications of the burden of infection and death in sub-Saharan Africa has been largely neglected. This has contributed to the low awareness of malaria intervention strategies, and the long delay in the elimination of this deadly disease in Africa, and the inability to meet the RBM/MDGs targets set for 2015. The health implication of these shortcomings is a worsening healthcare sector, a decline in quality of life, an unsafe environment, and economic/structural disequilibria.

An effective malaria intervention strategy requires coherent policy, commitment, and leadership both at the national and international levels. Consequently, the global policy on malaria control for the sub-Saharan region should be reformulated. Its market-oriented approach should be changed to reflect the public health social-justice concept.

5.9 Limitations

Limitations of this study must be borne in mind. Firstly, the study is a cross-sectional study, which means that the data analysed were those collected at a single point in time, and as a result, it is not possible to determine the direction of association, nor causality. The situation may provide differing results if another time-frame had been chosen. Secondly, only pregnant

74

women and mothers of children under 5 were surveyed. These results therefore, cannot be generalized to include men. Thirdly, the study was carried out in the south western region of the country, and only among certain ethnic groups. The geo-political nature of the country was not taken into consideration. An important variable that was not collected, but which could have had an impact on the result of this study, was income. Although, a majority of the population surveyed in this study were traders, however, knowing their income would have been significant in determining whether they are financially able to procure these malaria intervention products and drugs.

6.0 Conclusion

As noted, the term malaria originates from Medieval Italian: mala aria – "bad air"; the disease was formerly called "ague" or "marsh fever" due to its association with swamps and marshland (Reiter, 2000). Malaria has been successfully eliminated in the United States or greatly reduced in certain areas of southern Europe where it was once common, but vector control programs, in conjunction with monitoring and treatment of infected humans, eliminated it from those regions (Mason, 2008). Several factors contributed, such as the draining of wetland breeding grounds for agriculture and other changes in water management practices, and advances in sanitation, including greater use of glass windows and screens in dwelling (Meade and Emch, 2010).

This study showed that awareness of intervention strategies against malaria in communities in Lagos State and Nigeria in general, is still low; there are still insufficient national efforts to create a better environment and effective support for public health agencies in

75

healthcare delivery. This failure is largely due to growing internal and external difficulties poorly formulated and/or implemented health policies, lack of adequate funding, insufficient attention to the living conditions of the poor, and inequalities in healthcare delivery; all these factors have contributed in greater degree to the inability to completely eliminate this preventable disease from the region.

To properly address this problem, an integrated approach is required. Public health professionals must not forget the words of Boyd (1930), "malaria control should not be a campaign; it should be a policy, a long-term program. It cannot be accomplished or maintained by spasmodic effort. It requires the adoption of a practicable program, the reasonable continuity of which will be sustained for a long term of years." Writing along the same line, Stapleton (2004) summarizes Ronald Ross' point of view while the latter was speaking at the Liverpool School of Tropical Medicine in 1911: "Malaria can be completely extirpated in a locality by the complete adoption of any one of the three great preventive measures, namely, personal protection, mosquito reduction, and treatmentthat it will never be possible for any general community to adopt or enforce any one of these measures completely.....that all measures are good and useful, and that each is most suitable under certain circumstances....and that these truths still continue to apply if we adopt not one single measure, but several combined." Such is the recommendation of this paper.

Consequently, based on data presented in this study, it is evident that from a public health point of view, a multi-strategy or an integrated approach for malaria control is of paramount importance. This integrated approach will incorporate primary prevention in the control strategies; increase media involvement through partnership; strengthen advocacy at the political and professional levels; enhance the role of health professionals to support communities and families in basic prevention; promote equity by focusing on disadvantaged populations (children and pregnant women); establish basic standards of healthcare; and continue to forge strong research partnerships with leading groups from countries in the United States or Europe, that have achieved elimination status. Joint activities should focus on developing methodologies or resources that overcome current roadblocks and obstacles which have slowed down progress in the RBM malaria initiatives (WHO, 2001). The elimination of malaria from the region is a realistic and attainable goal.

References

Access to essential medicines report (2003). ACT NOW to get malaria treatment that works for Africa. *Medecins Sans Frontieres* Access to Essential Campaign – <u>http://www.accessmed-msf.org/</u> retrieved January 12, 2014.

Adeneye, A.K., Jegede, A.S., Mafe, M.A., Nwokocha, E.E (2013). Community perceptions and home management of malaria in selected rural communities of Ogun State, Nigeria. International *Journal of Malaria Research and Reviews*. ISSN: 2346-7266. Vol.1(3):22-34.

Akachi, Y., Atun, R (2011). Effect of investment in malaria control in child mortality in sub-Saharan Africa in 2002-2008. PLoS ONE, 6:6. <u>http://www/plosone.org/</u> - retrieved February 6, 2014.

Anyanwu, J.C., Erhijakpor, A.E.O. (2007). Health expenditures and health outcomes in Africa. African Development Bank, Economic Research Working Paper, No. 91.

Black, R.E., Cousen, S., Johnson, H.L., Lawn, J.E., Rudan, I., Bassani, D.G., Jha, P., Campbell, H., Walker, C.F., Cibulskis, R., Eisele, T., Liu, L., Mathers, C. (2010). Global, regional, and national causes of child mortality in 2008: A systematic analysis. *The Lancet*, 375:1969-87.

Boyd, M.F (1930). Malaria: Retrospect and prospect. *American Journal of Tropical Medical Hygiene*, 19:1-6.

Centers for Disease Control and Prevention (2010). Where Malaria Occurs. http://www.cdc.gov/malaria/about/distribution.html – accessed on February, 1, 2014.

Centers for Disease Control and Prevention (CDC, 2012a). *What is malaria?* – <u>http://www.cdc.gov/malaria/about/faqs.htm/</u> retrieved February 1, 2014.

Centers for Disease Control and Prevention (2012b). *Biology of Mosquito*. <u>http://www.cdc.gov/malaria/about/biology/index.html</u> - accessed on February 1, 2014.

Centers for Disease Control and Prevention (2012c). *History of malaria, an ancient disease*. http://www.cdc.gov/malaria/about/history/index.html - accessed on February 1, 2014.

Centers for Disease Control and Prevention (2014a). Malaria Facts. http://www.cdc.gov/malaria/about/facts.html – accessed on October 12, 2014.

Centers for Disease Control and Prevention (2014b). Disease. http://www.cdc.gov/malaria/about/disease.html – accessed on October 12, 2014.

Chaudhary, S.K (2006). *Thinkers and Theories in Sociology: From Comte to Giddens*. Bookseller: Alden Books, (New York, NY, U.S.A.). ISBN: 8188865265.

Chiejina, A (2014). Logistics, irregularities mar distribution of treated nets in Nigeria. Business Day. Accessed at <u>http://businessdayonline.com/2014/05/logistics-irregularities-mar-distribution-of-treated-nets-in-nigeria/#.VBMtpvldW2g</u>. Retrieved on September 3, 2014.

Demerath, N.J., Peterson, R.A (1968). *Systems, change and conflict: A reader in sociological theory and the debate about functionalism.* New York: Free Press.

Cohen, J.M., Moonen, B., Snow, R.W., Smith, D.L [2010]. How absolute is zero? An evaluation of historical and current definitions of malaria elimination. *Malaria Journal* – <u>http://www.malariajournal.com/content/9/1/23 retrieved March 5</u>, 2013.

Cohen, P. (1968). Modern social theory. London: Heinemann Books Ltd.

Efunshile, M., Amoo, A.O.J., Akintunde, G.B., Ojeleka, O.D., Konig, W., Konig, B (2011). Use and effects of malaria control measures in pregnancy in Lagos, Nigeria. *Korean J. Parasitol*, vol. 49, 4:365-371.

Eisele, T.P., Larsen, D.A., Walker, N., Cibulskis, R.E., Yukich, J.O., Zikusooka, C.M., Steketee, R.W (2012). Estimaes of child deaths prevented from malaria prevention scale-up in Africa 2001-2010. *BioMed Central, Malaria Journal* 2012, 11:93.

Fauz, K., Nelson, R. (2012). What are the symptoms of malaria? Africa Freelance Science Writing - <u>http://freelancesciencewriting.com/2012/05/30/what-are-the-symptoms-of-malaria/</u>retrieved July 10, 2014.

Federal Ministry of Health, Nigeria (2005a). *Federal Republic of Nigeria: Achieving healthrelated Millennium Development Goals in Nigeria (A Report of the Presidential Committee on Achieving Millennium Development Goals in Nigeria).* Abuja, Nigeria: FMoH.

Federal Ministry of Health (2008). National Malaria and Vector Control Division. *National Guidelines on Diagnosis and Treatment of Malaria*. Abuja, Nigeria: FMoH.

Federal Ministry of Health (2008a). Nigeria National Malaria Control Program. *Strategic Plan* 2009-2013: A Road Map for Malaria Control in Nigeria. Abuja, Nigeria: FMoH.

Federal Ministry of Health (2008b). Nigeria National Malaria Control Program. *Strategic Plan 2009-2013: National Guidelines for LLIN Campaign in Nigeria*. Abuja, Nigeria: FMoH.

Gerber, M (2010). Sociology 7th Canadian Ed. (Pearson Canada Inc., 2010), pg. 14-19.

Global Malaria Action Plan (2008). For a malaria-free world. <u>http://www.rollbackmalaria.org/gmap/gmap.pdf</u> - retrieved July 31, 2014.

Global Health Council (2012). Global HIV/AIDS and malaria initiative. Global Health Council, 1111 19th Street, NW, Suite 1120 Washington, DC 20036. <u>http://www.globalhealth.org/</u> - retrieved February 8, 2014.

Gosoniu, L., Vounatsou, P., Tami, A., Nathan, R., Grundmann, H., Lengeler C (2008). Spatial effects of mosquito bednets on child mortality. *BioMed Central Public Health*, 8:356.

Graeff, J.A., Elder, J.P., Booth, E.M (1993). *Communication for health and behavior change: A developing country perspective*. San-Franscisco: Jersey-Bass Publishers. p.20.

Greenwood, B.M., Fidock, D.A., Kyle, D.E., Kappe, S.H., Alonso, P.L., Collins, F.H., Duffy, P.E (2008). *Malaria: Progress, perils, and prospects for eradication. The Journal of Clinical Investigation* 118(4): 1266-1276.

Gulyani, S., Bassett, E.M (2007). Retrieving the baby from the bathwater: Slum upgrading in sub-Saharan Africa. *Environment and Planning C: Government and Policy*, vol. 25, pp 486-515.

Health Council (2012). Global HIV/AIDS and malaria initiative: Global Health Council, 1111 19th Street, NW, Suite 1120, Washington, DC 20036. <u>http://www.globalhealth.org/</u> - retrieved February 12, 2014.

Heggenhougen, H.K et al (2003). *The behavioral and social aspects of malaria and its control: An introduction and annotated bibliography*. UNDP/World Bank/WHO Special Program for Research and Training in Tropical Disease (TDR).

Howitt, P., Darzi, A., Yang, G.Z., Ashrafian, H., Atun, R., Barlow, J., Blakemore, A., Bull, .M., Car, J., Conteh, L., Cooke, G.S., Ford, N., Gregson, S.A., Kerr, K., King, D., Kulendran, M., Malkin, R.A., Majeed, A., Matlin, S., Merrifield, R., Penfold, H.A., Reid, S.D., Smith, P.C., Stevens, M.M., Templeton, M.R., Vincent, C., Wilson, E. (2012). Technologies for global health. The Lancet, 380(9840):507-35.

Ibem, E.O (2009). Community-led infrastructure provision in low-income urban communities in developing countries: A study on Ohafia, Nigeria. *Elsevier*. Doi:10.1016/j.cities.2009.02.001.

Kale, O.O et al (2008). Assessment of a treatment guidelines to improve home management of malaria in children in rural south-west Nigeria. *Malaria Journal*. Vol.7(2).

Kasl, S.V., Cobb, S (1966). *Health behavior, illness behavior, and sick role behavior. Archives of Environmental Health.* Vol.12:246-66, pp 531-41.

Kilama, W.L (2000). Roll back malaria in sub-Saharan Africa? *Bulletin of the World Health Organization*. Vol. 78(12): 1452-53.

Labinjoh, J (2002). The sociological trio: *An introduction to Marx, Weber and Durkheim. Currents and perspectives in sociology.* U.C. Isiugo-Abanihe, A.N. Isamah and J.O. Adesina, Eds. Lagos: Malthouse Press Ltd. pp 1-51.

Lagos State Ministry of Health (2012). Malaria control program.

Lemeshow, S., Hosmer, D.W., Klar, J., Lwanga, S.K (1990). *Adequacy of sample size in health studies*. Geneva: World Health Organisation.

Map of Lagos - <u>www.nigerianmuse.com</u>. Accessed on September 30, 2013.

Mason, B (2008). UNICEF Report: Infant mortality rates still high. *World Socialist*, published by the International Committee of the Fourth International (ICFI),

McLaughlin, D.B., Olson, J.R (2012). *Healthcare operations management*, 2nd edition. Health Administration Press, Chicago, Illinois. ISBN 078-1-56793-444-1.

Meade, M.S., Emch, M (2010). *Medical geography*, 3rd ed. Guilford Press, pp. 120-3. ISBN 978-1-60623-016-9. Accessed at <u>http://books.google.com/books?id=LhnmiNYRj7kC&pg=PA120</u> Retrieved September 17, 2014.

Menizibeya, O. W (2011). The Nigerian health care system: Need for integrating adequate medical intelligence and surveillance systems. *Journal of Pharmacy and Bioallied Sciences*, vol. 3(4): 470–478. doi: 10.4103/0975-7406.90100

Mertler, C. A., & Vannatta, R. A. (2010). *Advanced and Multivariate Statistical Methods: Practical Application and Interpretation (Fourth Edition)*. Glendale, CA: Pyrczak Publishing.

Merton, R.K (1957). Theory and social structure. New York: Free Press.

Molavi, A. (2003). Africa's malaria death toll still "outrageously high." National Geographic News, Thursday, October 28, 2010.

http://news.nationalgeographic.com/news/2003/06/0612 030612 malaria.html - retrieved February 2, 2014.

Mutabingwa, T.K [2005]. Artemisinin-based combination therapies (ACTs): Best hope for malaria treatment but inaccessible to the needy! *Acta Trop*. Sept.95(3): 305-15. PubMed.gov

Nabarro, D.N., and Tayler, E.M (1998). The roll back malaria campaign. *Science* 280 (5372): 2067-8.

National Bureau of Statistics (2012). Nigeria poverty profile 2010. Abuja National Bureau of Statistics.

National Institute of Allergy and Infectious Diseases. (2009). *Life Cycle of the Malaria Parasite*. <u>http://www3.niaid.nih.gov/topics/Malaria/lifecyce.htm</u> Retrieved July 31, 2014.

National Population Commission, (NPC) and ORC Marco (2004). *Nigeria demographic and health survey 2003*. Calverton, Maryland, USA.

National Population Commission (2006). *Popultion data sheet: Land summary sensitive tables*. The National Secretariat of the National Population and Housing Commission of Nigeria, Abuja. Vol.5.

National Population Commission, (NPC) and MEASURE DHS ICF Macro (2009). *Nigeria demographic and health survey 2008*. Calverton, Maryland, USA.

Neuman, W.L. (1997). *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: Allyn and Bacon.

Nigeria Demographic and Health Survey/MIS (2010). DHS program. USAID.

Nigeria Demographic and Health Survey (2010/2012). *National Population Commission/National Malaria Control Program*. Calverton, Maryland: USA.

Nigeria National Malaria Control Program (2010). Malaria Indicator Survey: Final Report.

Nigeria National Malaria Control Program (2012). Malarial Scope.

Nigeria Malaria Indicator Survey (2012). *Final Report*. National Population Commission/ National Malaria Control Program, Federal Republic of Nigeria, Abuja, Nigeria and MEASURE DHS, ICF International, Calverton, Maryland, United States.

Nsimba, S.E., Rimoy, G.H. (2005). Self-medication with chloroquine in a rural district of Tanzania: A therapeutic challenge for any future malaria treatment policy change in the country. Journal of Clinical Pharmacology and Therapeutics. Vol. 30(6): 515-9.

Oresanya, O.B., Hoshen, M., Sofola, O.T (2008). Utilization of insecticide-treated nets by under-five children in Nigeria: Assessing progress towards the Abuja targets. *Malaria Journal, BioMed Central*, 10.1186/1475-2875-7-145.

Oyinloye, M., Olamiju, I., Adekemi, O (2013). Environmental impact of flooding on Kosofe local government area of Lagos State, Nigeria: A GIS perspective. *Journal of Environment and Earth Science*. Vol.3:5.

Parry, J (2005). WHO combats counterfeit malaria drugs in Asia. *British Medical Journal*. 330(7499):1044.

Racelma, K (2012). Towards African cities without slums: Governments set course towards improving poor urban areas. *United Nations African Renewal*, Africa Section, Strategic Communications Division, Dept of Public Information, UN.

Reiter, P (2000). From Shakespeare to Defoe: Malaria in England in the little ice age. *Emerging Infectious Diseases* 6(1):1-11.

Ritzer, G (2000). Sociological theory, (4th ed). Singapore: McGraw-Hill Book Companies.

Ross, H.S., Mico, P.R (1980). *Theory and practice in health education*. Palo Atto: Mayfield Publishing Company. Pp 58-59.

Sachs, J., Malaney, P (2002). The economic and social burden of malaria. Nature 415:680-685.

Sande, M.A. et al (2006). Laboratory medicine in Africa: A barrier to effective health care. *Clinical infectious diseases*. Vol. 42, pp. 377-82.

Stanley, C. (2012) Organizations against malaria. Malaria.com http://www.malaria.com/questions/organizations-against-malaria - retrieved February 12, 2014

Stapleton, D.H (2004). Lessons of history: Anti-malaria strategies of the international health board and the Rockefeller foundation from the 1920s to the era of DDT. *Public Health Reports, 119*(20), Mar-Apr:206-15.

Stevens, J. (2000). *Applied multivariate statistics for the social sciences* (4th ed,). Hillsdale, NJ: Lawrence Erlbaum Associates.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using Multivariate Statistics* (5th Edition).Boston: Allyn & Bacon.

Tate, R. (1992). *General linear model applications*. Unpublished manuscript, Florida State University.

Talcott P (1975). The Present Status of Structural-Functional Theory in Sociology. In Talcott Parsons, *Social Systems and the Evolution of Action Theory* New York: The Free Press, 1975.

TDR News (2000). *Roll Back Malaria: Spotlight on Africa*. Geneva: World Health Organization, No. 62:10 and 15.

TDR News (2000). *Scaling up Home Management of Malaria*: Geneva: World Health Organization, No. 67:1-2.

The World Health Organization (2001). *Antimalarial drug combination therapy report*. Roll Back Malaria/World Health Organization http://whqlibdoc.who.int/hq/2001/WHO CDS RBM 2001.35.pdf retrieved January 6, 2014.

The World Health Organization/UNICEF (2003a). *Africa Malaria Report*. <u>http://www.whqlibdoc.who.int/hq/2003/WHO_CDS_MAL_2003.1093.pdf</u> retrieved January 12, 2014.

The World Health Organization (2003b). Shaping the future. <u>http://www.who.int/whr/2003/en/</u>retrieved January 12, 2014.

The World Health Organization (2004). *A strategic framework for malaria prevention and control during pregnancy in the African Region*. World Health Organization, Regional Office for Africa, Brazzavile. AFR/MAL/04/01.

The World Health Organization (2006). *WHO briefing on Malaria Treatment Guidelines and artemisinin monotherapies*. Accessed at http://www.malaria.org/ABOUT%20MALARIA/Meeting_briefing19April%20on%20Treatment%20guidelines%20WHO.pdf Retrieved on September 17, 2014.

The World Health Organization (2008a). *Closing the gap in a generation*. Commission on Social Determinants of Health FINAL REPORT - accessed September 30, 2013 http://whglibdoc.who.int/publications/2008/9789241563703_eng.pdf

The World Health Organization (2008b). *Statistical information system*. Accessed at <u>http://www.who.int/whosis/en/index.html</u> Retrieved on September 3, 2104.

The World Health Organization (2008c). *Global malaria control and elimination*. Geneva, Switzerland. <u>http://whqlibdoc.who.int/publications/2008/9789241596756_eng.pdf</u> retrieved January 8, 2014.

The World Health Organiztion (2008d). A conceptual framework for action on the social determinants of health. Geneva. http://whqlibdoc.who.int/publications/2010/9789241500852 eng.pdf - retrieved Feb 2, 2014,

The World Health Organization (2010). The Guidelines for the treatment of malaria, 2^{nd} Geneva, Switzerland ed.

The World Health Organization/GMP (2011). *Malaria: Global fund proposal development*. WHO Policy Brief – Global Malaria Program.

The World Health Organization (2011a). The Abuja declaration: Ten years on. <u>http://www.who.int/healthsystems/publications/Abuja10.pdf</u> retrieved October 15, 2014

The World Health Organization (2011b). *Malaria deaths are down but progress remains fragile* – <u>http://www.who.int/malaria/world_malaria_report_2011/en/index.html/</u> retrieved January 12, 2014.

The World Health Organization (2012). *Economic costs of malaria: Roll Back Malaria WHO Partnership*. <u>http://www.rollbackmalaria.org/cmc_upload/000/015/363/RBMInfosheet_10.pdf</u> retrieved February 12, 2014

The World Health Organization (2013a). *Factsheet on the World Malaria Report*. <u>http://www/who.int/malaria/world_malaria_report_2013/en</u> retrieved July 31, 2014.

The World Health Organization Country Profile (2013b). Source of financing for intervention strategies <u>http://www.who.int/malaria/publications/country-profiles/profile_nga_en.pdf?ua=1</u> – retrieved September 1, 2014.

The World Health Organization (2013c). World Malaria Report. <u>http://reliefweb.int/report/world/world-malaria-report-2013</u> - retrieved July 31, 2014.

Tordrup, D. (2008). Approaches to development. Solidum Petit in Profundis. Universitas Arhusiensis, 2002554.

Udoma, O (2014). *Future cape town: Makoko, Venice of Lagos*. Accessed at <u>http://futurecapetown.com/2014/04/makoko-venice-lagos/#U_TlmvldV8F</u> Retrieved September 3, 2014.

UNICEF/National Planning Commission of Nigeria (1998). *Child survival protection and development (CSPD) in Nigeria: Key Social Statistics*. Lagos:UNICEF.

UNICEF (2003). The African malaria report

http://whqlibdoc.who.int/hq/2003/WHO_CDS_MAL_2003.1093.pdf - retrieved February 8, 2014.

UNICEF (2004). The State of Africa's children and youth: Perspective from West and Central Africa. Dakar: UNICEF. pp. 9-16.

UNICEF Report (2005). Monitoring the situation of children and women. *MICS 2000 and CDC/MOH 2005 Preliminary Results*. <u>http://www.childinfo.org/</u> - retrieved February 10, 2014.

UNICEF Statement (2008). *World Malaria Day*. <u>http://www/unicef.org</u> - retrieved February 10, 2014.

UNICEF Report (2012a). *Monitoring the situation of women and children*. <u>http://www.childinfo.org/</u> - retrieved February 10, 2014.

UNICEF (2012b). Maternal, Newborn & Child Survival, *Statistics and Monitoring Section / Policy and Practice.*

UNICEF Report (2012c). UNICEF in action: Malaria. http://www.unicef.org/health/index_malaria.html - retrieved February 8, 2014.

UNICEF Report (2013). *Malaria*. Accessed at <u>http://www.unicef.org/health/index_malaria.html</u>. Retrieved on September 17, 2014.

United Nations (2000). *Millennium development goals: We can end poverty 2015*. <u>http://www/un.org/millenniumgoals/</u> retrieved January 12, 2014.

United Nations Africa Renewal (2013). *For sustainable cities, Africa needs planning: Interview with UN-Habitat's Joan Clos.* Created by Africa Section, Strategic Communications Division, Department of Public Information, United Nations.

University of Maryland Medical Center (2014). Low birth weight. <u>http://umm.edu/health/medical/pregnancy/labor-and-delivery/low-birth-</u> weight#ixz23GKEeCTOn - retrieved October 12, 2014.

Urry, J (2000). *Metaphors - Sociology beyond societies: Mobilities for the twenty-first century*. Routledge. p. 23. ISBN 978-0-415-19089-3.

Wagstaff, A. (2002). Poverty and health sector inequalities. *Bulletin of the World Health Organiztion*. Vol. 80, pp 97-105.

Webster, J (2006). A framework of strategic options for the integrated delivery of insecticide-treated nets and immunization. Global Malaria Program, *World Health Organization*.

Williams, H.A et al (2003). Trends in antimalarial drug deployment in sub-Saharan Africa. *Journal of Experimental Biology*. Vol. 206, pp 3761-69.

Zurovac, D., Midia, B., Ochola, S.A., English, M. (1992). Microscopy and outpatient malaria case management among older children and adults in Kenya. *Tropical Medicine and International Health*, Vol.11(4), 432-440.

Appendices

A. Definitions

Malaria Control – World Health Organization (WHO) defines malaria control as "reducing the disease burden to a level at which it is no longer a public health problem, but at which continued intervention measures are required" (WHO, 2008). Cohen and colleagues define malaria control as "a state where interventions have reduced endemic malaria transmission to such low levels that it does not constitute a major public health burden, but at which transmission would continue to occur even in the absence of importation" (Cohen et al, 2010). For this study, the latter definition will be adopted.

Malaria Elimination/Eradication – WHO defines malaria elimination/eradication as: "interrupting local mosquito-borne malaria transmission in a defined geographical area – i.e., zero incidence of locally contracted cases. While Cohen and colleagues define elimination/eradication as "a state where interventions have interrupted endemic transmission and limited onward transmission from imported infections below a threshold at which risk of reestablishment is minimized. Both capacity and commitment to sustain this status indefinitely are required" (Cohen et al, 2010). A more appropriate definition that will be adopted in this paper is the former.

Long-lasting insecticide nets (LLINs)/(ITNs) - Insecticide-treated nets are mosquito nets that are treated with insecticides to repel, disable or kill the vector mosquitoes which transmit malaria. LLINs or ITNs are therefore, an intervention strategy that provide vital protection from mosquitoes and malaria. There are at present three LLINs recommended as eligible for public sector procurement by the WHO Pesticide Evaluation Scheme –

87

- Olyset Net®, which has 2% permethrin incorporated into the polyethylene fibres, and a wider mesh size (4mm x 4mm)
- PermaNet® is treated with 55mg/m2 of deltamethrin to coat fibres
- Interceptor®, which has a target dose of 200mg alpha-cypermethrin per square metre polyester.netting.

Indoor Residual Spraying (IRS) – is a proven and highly effective malaria control measure that involves the coordinated, timely spraying of the interior walls of homes with insecticides to kill mosquitoes that spread malaria. Mosquitoes are killed when they rest on the walls. "Sprayed houses are protected for about 4 to ten months, depending on the insecticide used and the housing construction" (WHO, 2003).

Artemisinin-Based Combination Therapy – are the best antimalarial drugs used to treat malaria. It consists of two drugs, often co-formulated, with one artemisinin derivative and another antimalarial drug from a different class. By combining the two drugs to treat malaria, artemisinin enhances efficacy and has the potential of lowering the rate at which resistance emerges and spreads (Mutabingwa, 2005). The following five ACTs are presently recommended:

- Artemether+Lumefantrine
- Artesunate+Amodiaquine
- Artesunate+Mefloquine
- Artesunate+Sulfadoxine-primethamine
- Dihydroartemisinin-Piperaquine

Case Management (Home Management of Malaria - HMM) – is a collaborative process, which assesses, plans, implements, coordinates, monitors and evaluates the options and services required to meet an individual's health needs, using communication and available resources to

promote quality, cost-effective outcomes (WHO, 2003). As an intervention strategy, HMM is the process by which clinical cases of fever in the under-fives can be recognized and treated at home using pre-packaged antimalarial drugs distributed by:

- Care givers
- Community health workers.

The goal is to provides prompt delivery of effective malaria treatment at home (WHO, 2003). *Intermittent-Preventive Treatment in pregnancy (IPTp)* – WHO recommends that IPTp should be given at each routine antenatal care visit, starting in the second trimester. IPTp involves administration of a curative dose of an effective antimalarial drug (currently sulfadoxine-primethamine) to all pregnant women whether or not they are infected with the malaria parasite (WHO, 2003).

B. NIMR INSTITUTIONAL REVIEW BOARD

INSTITUTIONAL REVIEW BOARE

 NIGERIAN INSTITUTE OF MEDICAL RESEARCH
 IRE-NM

 6, Edmond Crescent Off Murtala Muhammed Way, P.M.B. 2013 Yaba, Lagos.
 761:01-4823123, 2014

 7el: 01-4823123, 01-7744723, 08050254484, 08033460947
 Fax: 01-4823123, 2244-1-3425171

 E-mail: nimr_irb@yahoo.com *Website:* www.nimr-nig.org
 Secretariat: Room 207, Biochemistry Division, Research Block, 2014

PROJECT TITLE:

AWARENESS, ACCESSIBILITY AND USE OF MALARIA CONTROL INTERVENTIONS AMONG AT-RISK GROUPS IN LAGOS STATE, NIGERIA

PROJECT №:

IRB/13/238

APPROVAL LETTER

The above named proposal has been adequately reviewed; the protocol and safety guidelines satisfy the conditions of NIMR-IRB, policies regarding experiments that use human subjects.

Therefore the study under its reviewed state is hereby approved by Institutional Review Board, NIMR.

PROF. F. E. OKONOFUA Name of IRB Chairman

MRS. O. A. NWOGBE Name of IRB Secretary Signature of IRB Chairman & Date

This approval is given with the investigator's Declaration as stated below; By signing below I agree/certify that:

- 1. I have reviewed this protocol submission in its entirety and that I am fully cognizant of, and in agreement with, all submitted statements.
- I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate an apparent immediate hazard to a given research subject.
 - immediate hazard to a given research subject.
 I will notify the IRB promptly of any change in the research procedures necessitated in the interest of the safety of a given research subject.
 - I will request and obtain IRB approval of any proposed modification to the

research protocol or informed consent document(s) prior to implementing such modifications.

- 3. I will ensure that all co-investigators and other personnel assisting in the conduct of this research study have been provided a copy of the entire current version of the research protocol and are fully informed of the current (a) study procedures (including procedure modifications); (b) informed consent requirements and process; (c) potential risks associated with the study participation and the steps to be taken to prevent or minimize these potential risks; (d) adverse event reporting requirements; (e) data and record-keeping; and (f) the current IRB approval status of the research study.
- 4. I will respond promptly to all requests for information or materials solicited by the IRB or IRB Office.
- 5. I will submit the research study in a timely manner for IRB renewal approval.
- 6. I will not enroll any individual into this research study until such time that I obtain his/her written informed consent, or, if applicable, the written informed consent of his /her authorized representative (i.e., unless the IRB has granted a waiver of the requirement to obtain written informed consent).
- 7. I will employ and oversee an informed consent process that ensures that potential research subjects understand fully the purpose of the research study, the nature of the research procedures they are being asked to undergo, the potential risks of these research procedures, and their rights as a research study volunteer.
- I will ensure that research subjects are kept fully informed of any new information that may affect their willingness to continue to participate in the research study.
- 9. I will maintain adequate, current, and accurate records of research data, outcomes, and adverse events to permit an ongoing assessment of the risks/benefit ratio of research study participation.
- 10.1 am cognizant of, and will comply with, current federal regulations and IRB requirements governing human subject research including adverse event reporting requirements.
- 11.1 will make a reasonable effort to ensure that subjects who have suffered an adverse event associated with research participation receive adequate care to correct or alleviate the consequences of the adverse event to the extent possible.
- 12. I will ensure that the conduct of this research study adheres to Good Clinical Practice guidelines

MR. OSSAI PETER Principal Investigator's Name

Principal Investigator's Signature and Date



NOTIFICATION OF APPROVED DISSERTATION TOPIC AND PROSPECTUS

The graduate student will file this form with the College or Independent School office before beginning the dissertation research but in any case no later than the semester preceding that in which the candidate expects to receive a doctoral degree. Please present the information in typewritten form. If any of the information on this form changes, a new form must be filed.

Name PETER O. OSSAI	Date	03/04/2014	
Local Address 1409 BEARDSLEY STREET, AKRON - OH, 44301			

Local Address The BEARBOLLT BITTE	21, ARION - 01, 44301	
Telephone No. 330-256-9362	Student No. 810552694	

Department or School and area of concentration HEALTH POLICY & MANAGEMENT

Proposed title of Dissertation

Institutional Review Board 02/27/2014

AWARENESS, ACCESSIBILITY AND USE OF MALARIA CONTROL INTERVENTIONS AMONG AT-RISH GROUPS IN LAGOS METROPOLIS, NIGERIA.

Are human subjects involved in this research? If yes, date of approval by the Kent State University

Name (type	d or printed)	Department	Signature
SONIA A. AL	EMAGNO, Ph.D.	HEALTH POLICY & MANAGEMENT	
JONATHAN VANGEEST, Ph.D.		HEALTH POLICY & MANAGEMENT	
MARK A. JAME	S, Ph.D.	BIOSTATS, EPI & ENV HEALTH SCIENCE	
MADHAV P. B	HATTA, Ph.D.	EPIDEMIOLOGY	
JOHN GRAH	AM	PSYCHOLOGY	
'Outside discip	line" person		
APPROVED:	SONIA ALEN	MAGNO	03/06/2014
	Advisor		Date
	Graduate Coordin	nator	Date
	JONATHAN	03/06/2014	
	Chair/Director	Date	
	SONIA ALEMAGNO		
	College Dean		Date

 While (original):
 Registrar

 Yellow:
 College

 Gold:
 Student

 Pink:
 Departme

Feb. 05

D. Kent State Institutional Review Board

From: Richmond, Aileene On Behalf Of RAGS Research Compliance
Sent: Thursday, March 06, 2014 5:41 PM
To: Alemagno, Sonia; <u>possai@kent.edu</u>
Subject: IRB approval for protocol #14-149 - retain this email for your records

<u>RE: IRB # 14-149 entitled "Awareness, Accessibility, and Use of Malaria Control Interventions Among</u> <u>At-Risk Groups in Lagos Metropolis, Nigeria"</u>

Hello,

I am pleased to inform you that the Kent State University Institutional Review Board reviewed and approved your Application for Approval to Use Human Research Participants as a Level II/Expedited, category 7 project. **Approval is effective for a twelve-month period:**

March 6, 2014 through March 5, 2015.

*A copy of the IRB approved consent form is attached to this email. This "stamped" copy is the consent form that you must use for your research participants. It is important for you to also keep an unstamped text copy (i.e., Microsoft Word version) of your consent form for subsequent submissions.

Federal regulations and Kent State University IRB policy require that research be reviewed at intervals appropriate to the degree of risk, but not less than once per year. The IRB has determined that this protocol requires an annual review and progress report. The IRB tries to send you annual review reminder notice to by email as a courtesy. However, please note that it is the responsibility of the principal investigator to be aware of the study expiration date and submit the required materials. Please submit review materials (annual review form and copy of current consent form) one month prior to the expiration date.

HHS regulations and Kent State University Institutional Review Board guidelines require that any changes in research methodology, protocol design, or principal investigator have the prior approval of the IRB before implementation and continuation of the protocol. The IRB must also be informed of any adverse events associated with the study. The IRB further requests a final report at the conclusion of the study.

Kent State University has a Federal Wide Assurance on file with the Office for Human Research Protections (OHRP); <u>FWA Number 00001853</u>.

If you have any questions or concerns, please contact the Office of Research Compliance at <u>Researchcompliance@kent.edu</u> or <u>330-672-2704</u> or <u>330-672-8058</u>.

Respectfully,

Kent State University Office of Research Compliance 224 Cartwright Hall | fax <u>330.672.2658</u> **Kevin McCreary** | Research Compliance Coordinator | <u>330.672.8058</u> | <u>kmccrea1@kent.edu</u> **Paulette Washko** | Manager, Research Compliance |<u>330.672.2704</u>] <u>Pwashko@kent.edu</u>

For links to obtain general information, access forms, and complete required training, visit our website at <u>www.kent.edu/research</u>.

E. INFORMED CONSENT FORM

Why are we giving you this form?

We are giving you this form to tell you about this research study. You have the opportunity to participate in this study. After you have learned more about the study, you can decide if you would like to participate. The title of the study is "AWARENESS, ACCESSIBILITY AND USE OF MALARIA CONTROL INTERVENTIONS AMONG AT-RISK GROUPS IN LAGOS STATE, NIGERIA."

Background Information

Malaria remains a major public health burden in many communities in Nigeria and other tropical parts of the world. The disease is known for causing serious health problems particularly among pregnant women and children under five years. Consequently, the Roll Back Malaria (RBM) Program was initiated to promote evidence-based and cost-effective control interventions namely; home management of malaria (HMM), Artemisinin-based Combination Therapy (ACT), Long-Lasting Insecticidal Nets (LLINs), and Intermittent Preventive Treatment of Malaria in pregnancy (IPTp).

We believe that your community is one of the affected communities where the disease is endemic. We therefore want to assess the awareness, accessibility and use of malaria control interventions and factors that influence these among at-risk groups focusing on pregnant women and under-five children in Lagos metropolis. This will help us understand the availability, accessibility and feasibility of achieving widespread coverage with malaria control interventions as well as know the factors that promote or impede the programme efforts on the awareness and use of the interventions among the target populations.

You are a resident of this community. We would therefore like you to participate in our study. Your participation is voluntary. Whatever information you disclose for the purpose of this study will be kept confidential. We expect up to 234 pregnant women and 218 mother of children under five years to participate in the study in Alimosho and Kosofe LGAs of Lagos State. Participation will take less than 30 minutes of your time.

What Happens in this Research Study (Household Survey and In-depth Interview):

Questionnaire and Interview Guide:

We will ask you several questions about yourself, your knowledge and perception of malaria, prevention and treatment practices and use of some malaria control products. This will take approximately 20-30 minutes to complete.

Possible Risks and Discomforts from Participating in this Study

The time it takes to answer the questionnaire may be inconvenient.

Benefits from Participating in this Study

Your participation in this research will not cost anything. There may be no direct benefits to your participation in this research. You will not receive any payment for participation. Participation in this research may provide benefits to your community. Your participation in the research may contribute to improving the malaria control program in reducing illness and death due to malaria in the community.

Your Right to Participate, Not Participate, or Withdraw from this Study

Your participation in this research is completely voluntary. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty.

Confidentiality of the Information Used in the Study

Records relating to your participation in the research will remain confidential. Your information will be kept in a locked file cabinet in the Principal Investigator's office. The questionnaires used for information collection will be destroyed 3 years after the study results would have been completed. Your name or identity will not be used for this research.

What happens to research participants and communities when the research is over?

Researchers will inform you of the outcome of the research through a news bulletin. During the course of the study, you will however be informed about any information that may affect your continued participation in the study.

Any apparent or potential conflict of interest

None of the researchers have any conflict of interest in the study.

Statement of person obtaining informed consent

Date	Signature/thumbprint	
Name		

By signing below, you confirm that you have been informed about the research study on awareness, accessibility and use of malaria control interventions and factors that influence these among at-risk groups in Lagos metropolis. If there is any part of this explanation that you do not understand, you may ask the investigator before signing. You will receive a signed copy of this signed consent form.
Statement of person giving consent

I have read the description of the research or have had it translated into language that I understand. I have talked it over with the research representative to my satisfaction. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research to judge that I want participate. I understand that I may freely stop being part of this study at any time. I have received a copy of the consent form and an additional information sheet to keep for myself.

Date	Signature/thumbprint
Name	

 Witness' signature/thumbprint (if applicable)

 Witness' Name (if applicable)

Questions and Medical Care for Injury

If you have questions about this study or should you be injured as a direct result of participating in this study, you should contact Mrs. O. Nwogbe, Secretary, Institutional Review Board at the Nigerian Institute of Medical Research, 6 Edmond Crescent, Yaba, Lagos State, Nigeria with phone number 08051361966. Please also contact the investigator below if you have any questions relating to this research study.

Contact Information:

Peter O. Ossai Department of Public Health, Kent State University, Kent OH 44242-0001 USA Phone: +1-330-256-9362

QUESTIONNAIRE



PETER O. OSSAI

JANUARY 2014

Awareness, knowledge, perception and practices relating to effective malaria control among pregnant women and children less than five years old in Lagos State, Nigeria

The purpose of this study is to assess the level of awareness, knowledge, perception and practices relating to effective malaria control among pregnant women and children less than five years old in Lagos State, Nigeria using recommended malaria control strategies.

Quest. ID No:	Date of Inter	view		
Name of Respondent				
Name of Interviewer				
Local Government Area (LGA)	Fac	ility	
Interview Starts	Inter	rview Ends		
Section A: Background	of Respondent			
 Age (in years) Marital Status: □ Never Married Religion: □ No religion 	□ Married □ Div □ Christianity □ Isla	orced □ Sing m	gle □Traditional	
□ Other [<i>please sp</i>	ecify]			
 4. Level of education □ No formal educa □ Other [<i>please sp</i> 	∷ ation □ Primary <i>ecify</i>]	□ Secondary	□ Post-secon	ıdary
 5. Occupation: □ Unemployed □ Civil servant 	□ Housewife □ Professional	□ Farming □ Other [<i>plea</i> .	□ Artisan se specify]	□ Trading
 6. Type of dwelling □ Single family ho □ Mini flat □ R □ Other [<i>please sp</i> 	structure in which the resouse Duplex oom and parlor Sing <i>ecify</i>]	spondent resides	s bedrooms flat Wood/Mal	keshift structure
7. Number in househ	old			
8. Are you pregnant	at this time?		□ Yes	□ No

9.	Are you a mother of under-five aged child/children? \Box Yes	\Box No
[IF	F "NO" TO Q-8 AND Q-9, THANK RESPONDENT AND END INTERV	VIEW].
[1]	IF "YES" TO Q8 CONTINUE]. [IF "YES" TO Q9, SKIP TO Q21]	
10.	0. How far are you along in your pregnancy? □ First trimester □ Second trimester □ Third trimest	er
11	How old was your pregnancy when you first registered for antenatal care at facility? months	this health
12	Where did you go for your antenatal care?	
	□ Nowhere □ Private hospital □ Public hospital □ TBA/Herbal	home
	□ Other [<i>please specify</i>]	
13	How long have you been coming for antenatal care at this facility?	
14	Have you heard of the intermittent preventive treatment for malaria during	pregnancy?
	\Box Yes \Box No	
	If [Q11] is no, go to Q18 and end interview. But if [Q11] is yes, continue.	
15	If [Q11] is yes:	
	(i) What is your source of information? [Multiple responses allowed. out options]	Do not read
	\Box Relatives \Box Friends/Neighbors \Box Clinic \Box Newspapers	Radio
	\Box Television \Box Poster \Box Pamphlet/Brochure \Box Pharmacy/Chemist s	hop
	□ Other [<i>please specify</i>]	
	(i) What do you know about it?	
16	Have you received any preventive treatment dose(s) for malaria during you clinic visits to this health facility? \Box Yes \Box No	r antenatal
17	If [Q13] is yes, how many times have you received the preventive treatmen	t dose?
18	Do you know the benefits of the preventive treatment dose? \Box Yes	\Box No

19	If [Q15] is yes, state the benefits you know
20	If [Q15] is no, have you been informed about intermittent preventive treatment for
Secto	malaria by the health workers here? \Box Yes \Box No
Sectio	n B: Knowledge of the cause and signs/symptoms of mataria
21 V	What do you know to be the most common cause of malaria? [Check all that apply. Do
n	ot read out options]
	\Box Cold \Box Bad/dirty environment \Box Eating bad food \Box Eating new food
	\Box Mosquito bites \Box Sun heat \Box Getting rained on \Box Witchcraft

- □ Stagnant water □ Other [*please specify*]
- 22 Please describe the signs and symptoms of malaria

[After listening and recording narrative report, tick $\sqrt{}$ the items that were mentioned below. Multiple responses allowed. Do not read out options].

1.	High body temperature	8.	Cold
2.	Headache	9.	Poor Appetite
3.	Chills/shivering	10.	Bad dreams/nightmares
4.	Vomiting	11.	Body ache/joint pain
5.	Change in eye color	12.	Other [<i>please specify</i>]
6.	Convulsion		
7.	Change in urine color		

Section C: Knowledge and perception of malaria control programs

23a. Have you heard of the government action (policy) on change in malaria prevention using long lasting, insecticide-treated bednets (LLINs)?

	\Box Yes		No	I	□ Not sure/I don	't know
23b.	If [Q22a] is ye	es				
	(i) When option	re did you get th ns]	ne infor	mation? [Check	c all that apply.	Do not read out
	□ Relatives	□ Friends/neig	ghbors		□ Newspapers	□ Radio
	□ Television	□ Poster	🗆 Parr	nphlet/brochure	□ Pharr	nacy/Chemist shop
	□ Other [plea	se specify]				

. . . .

	(ii) W	'hat do you know ab	out it?				
24a.	Are yo malaria	u aware of the gover a prevention and trea	rnment ac atment?	tion (policy) o □ Yes	on home	management (No	of malaria for
24b.	If [Q24	la] is yes					
	(i)	What do you know	about go	vernment acti	ion?		
	(ii)	What are your most [Check all that ap	t common ply. Do n	sources of in tot read out	formation options]	n on governm	ent action?
	□ Rela	tives \Box Friends/ne	eighbors	□ Clinics	□ New	spapers	□ Radio
		vision 🗆 Poster	🗆 Pam	phlet/brochur	e	□Pharmacy/0	Chemist shop
	□ Other [<i>please specify</i>]						
	(iii)	From which source	do you ge	et most of you	ır inform	ation on gover	rnment action?
Sectio	on D: Ho	ome management o	f malaria	and the utili	ization of	f ACT	
25.	Have a	nyone in your house	hold had	malaria?	□ Ye	S	\Box No
26.	What c	lo you usually do wi	thin the h	ome when yo	u or your	child have/ha	ıs malaria?
27.	How so	oon do you usually t	ake such t	first action aft	ter the on	set of the sign	s/symptoms?
	□ With	in 24 hours \Box 1-2	2 days	□ After 3 da	ys or moi	e	
	□ Othe	r [<i>please specify</i>]					

28.	Please name 3	antimalarials y	ou prefer taking	for malaria treatment.
		2		

- (a)
- (b)
- (c)
- 29. Have you ever heard of artemisinin-combination therapy (ACT)? \Box Yes \Box No

[IF Q29 IS "YES", CONTINUE ON Q30, IF "NO", SKIP TO Q32].

Have you or any member in your household ever used ACT for malaria treatment?
 □ Yes
 □ No
 □ Cannot remember

[IF Q30 IS "YES," CONTINUE ON Q31]. BUT IF [Q30] IS "NO", SKIP TO [Q32].

31. What influenced the choice of ACT for treating malaria? [Multiple responses allowed. Do not read out options]

Affordability	\Box It is available	□ Efficacy/effectiveness
---------------	------------------------	--------------------------

 \Box Does regimen with fewer tablets required to be taken at once?

□ Other [*please specify*].....

PROBE: I AM GOING TO READ A LIST OF COMMON MALARIA DRUGS. PLEASE LET ME KNOW WHICH ONES YOU OR ANY MEMBER OF YOUR HOUSEHOLD HAVE USED.

- 32. What antimalarial drug did you or any member of your household take the last time you had malaria? □ Don't know
- 33. Who prescribed the drug for you?

□ A medical doctor	□ Nurse	□ Relatives	\Box Self
□ Drug hawker	□ Patent med	icine seller	□ Friends/neighbors
□ Other [<i>please specify</i>]			

Section E: Perception and utilization of LLINs by respondents

How do you protect yourself and your household against malaria? 34. **[IF LLIN IS NOT MENTIONED IN RESPONSE TO [Q34], CONTINUE WITH Q35]** 35. Do you have insecticide-treated nets in your household? \Box Yes \Box No If [Q35] is yes, go to [Q37]. 36. If [Q35] is no, why? 37. How many mosquito nets does your household have? 38. If [Q35] is yes, do you use the LLIN(s) in your household? \Box Yes \square No 39. If [Q38] is yes, how many months ago have you been using the LLIN? (in months) 40. Who slept under the mosquito nets last night in your household (the night before the survey)? [Multiple responses allowed. Do not read out options]. \Box Pregnant mothers \Box Children under five years \Box Children over five years □ Other [*please specify*] □ Fathers 41. Who is most likely to get a serious case of malaria? [Multiple responses allowed. Do not read out options] □ Children \Box Adults □ Evervone Pregnant women □ Other [*please specify*] NOTE: Q42-45 ARE NOT ASKED, BUT SHOULD BE ANSWERED BY **INTERVIEWER FOLLOWING OBSERVATIONS** 42. Number of children under 5 years sleeping under treated net: Number of pregnant women sleeping under treated net: 43. Observation on the physical condition of the treated net: 44. \Box Intact (not torn) \Box Not intact (torn) \Box Denied access to observe net 45. Observation on the actual use of the treated net: \Box Displayed \Box Not Displayed □ Denied access to observe net

[RESU	JME QUESTIONNING RESPONDENT]. [IF LLIN IS NOT DISPLAYED,
CONT	TINUE ON Q46]. [IF DISPLAYED, SKIP TO Q47].
46	If LLIN is not displayed in observation [45], why?
47.	What is your personal view on the effectiveness of the LLIN since being used?
48.	Where did you get/buy the treated net from?
	□ Pharmacy/chemist shop □ Street/market vendor □ Retail/Wholesale shop
	$\Box \text{ Private clinic} \qquad \Box \text{ Government clinic} \qquad \Box \text{Other } [please specify] \dots \dots$
49.	How much did you pay for the treated bednet?
50.	Since the purchase or use of the net(s), have you ever washed it/them? \Box Yes \Box No
51.	If [Q50] is no, why?
52.	If you are provided with a treated net, who in the household do you deem fit to use it?
	□ Self only □ Spouse □Grown-up children above five years
	\Box Young children below five years \Box Self & spouse \Box Self & grown-up children
	\Box Self & young children below five years
53.	Supposing the treated nets are provided for sale at the cost of N1,000.00k in your community, would you be willing to purchase the nets at this price? \Box Yes \Box No
54.	If [Q53] is no, please give reasons
55.	If [Q53] is no, how much will you be willing to pay for a treated net? N

56. Have you ever washed the treated net(s) since being used?

□ Yes □ No [If "No" skip to Q60]

- 57. If [Q56] is yes, how many times do you think you have washed the treated net(s)?
- 58. What do you usually use in washing the net(s)? [Multiple responses allowed. Do not read out options].

\Box Rinse in water only	\Box Bar soaps	□ Liquid soap
□ Detergents – (OMO	, Elephants, Ariel etc)	□ Toilet soaps – (Lux, Imperial
Leather, Joy etc)	□ Other [<i>please specify</i>]	

59. How do you usually dry the net(s) after washing?

🗆 Sun dry	□ Spread under sha	de to dry \Box Other	[please specify]	
-----------	--------------------	------------------------	------------------	--

60. In your own opinion, where would you feel more convenient to go for the purchase of a treated net in your community?

	□ Government clinic	□ Private clinic	□ Pharmacy/chemist shop
	□ Retail/Wholesale shop	□ Market vendors	□ Other [<i>please specify</i>]
61.	Kindly state the effective w malaria could be successful	ay(s) in which the use ly promoted for the pro	of LLINs and home management of evention and treatment of malaria

			•••	•••			•••					•				• •							•							•				• •									•	•	•••	•••		•••			•••	• •		•••					•••
• •	• •	• •	• •	• •	• •	••	••	• •	••	••	• •	•	•••	••	• •	• •	••	•••	•••	•••	•••	•••	•	• •	•	• •	• •	••	• •	•	•••	• •	• •	• •	• •	• •	• •	•	• •	•••	•••	• •	•	• •	•••	•••	••	••	••	• •	• •		••	• •	••	• •	••	• •	•••
		• •	•••	• •	• •		• •	• •		• •		•	•••			• •	• •			• •	• •	• •	• •		•		• •	• •	• •	•	• •	• •		• •	• •			•			• •	• •	•	• •	•••	•••	• •	• •	• •		• • •	• •	•••	• •	••	••	••	• •	•••

Thank you.

Fig. 11. Map of Lagos State



Source: www.nigerianmuse.com 2014