FACTORS INFLUENCING INSECTICIDE TREATED NET UTILIZATION AMONG UNDER-FIVE CHILDREN IN NIGERIA

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ABSTRACT

Utilization of insecticide Treated Nets by under-five children remains unacceptably low 3% in Africa and 29% in Nigeria. Worse still, malaria continues to be the leading cause of child mortality and morbidity. This study examined the factors influencing Insecticide Treated Nets utilization (ITNU) among under-five children in Nigeria using the 2013 Nigerian Demographic and Survey, child data set. A sample of 16,721 mothers aged 15-49 who has child (ren) under age five in Nigeria were interviewed and analyzed using STATA 12.0 at univariate, bivariate and multivariate levels (logistic regression). The multivariate analysis revealed that current age of child, region, mothers' age, educational attainment, and wealth index significantly influenced under-five children ITNU in Nigeria at p-value < 0.05. Therefore, the significant factors of this study should be addressed by policy makers and programmers to boost ITNU in Nigeria.

Key Words: Insecticide Treated Nets Utilization, Mortality, Morbidity, Malaria.

INTRODUCTION

BACKGROUND TO THE STUDY

In Africa, malaria accounts for an estimated 25% of all childhood mortality below age five, excluding neonatal mortality (WHO 2003). Malaria is one of the principal causes of child deaths in Africa (Lengeler 2004) Malaria transmission is highly seasonal and often takes wide-ranging forms where notably higher malaria morbidity and mortality occurs during the peak transmission season from September to December. Even though all age groups are at risk of developing severe malaria, children and pregnant women are the most at risk (Derresa et.al 2009). Insecticide-treated nets (ITNs) have been tested and found to be true to be one of the most effective means of reducing malaria morbidity and mortality in children. Utilization of insecticide Treated Nets up till date is still unacceptably low: only 3% of African children are currently sleeping under it. Worse still, malaria continues to be the leading cause of child mortality and morbidity. The Roll Back Malaria (RBM) has identified under-five children as one of the highest risk groups for malaria, and one of the strategies set to fight malaria in this group is to increase utilization of mosquito nets (Sibhatu , Ayalu & Haji , 2012). This study is carried out to determine the practice and determinants of ITN use for children less than five years among care givers in Nigeria, and to examine the factors that influence the utilization of Insecticide Treated Nets in Household with children under the age of five.

Few studies have documented household net coverage and utilization in Nigeria. The 2003 National Demographic Health Survey reported a 12% household ownership of any net and 2% of ITN. Under-five utilization of ITN was 1.2% while 5.9% of them used any net.The 2013 National Demographic Health Survey reported that net utilization among children living in

households with an ITN was lowest in the North East (13 percent) and highest in the South East (27 percent). The percentage of children under age 5 who slept under any net was lowest in Bauchi and Kaduna (7 percent each) and highest in Cross River (34 percent). By wealth status, children's use of mosquito nets varied from 13 percent in the lowest status to 22 percent in the middle status (NPC & ICF Macro, 2013). However, some studies in Nigeria have indicated low usage of Insecticide Treated Nets among children under the age of five. In Nigeria, There is a wide gap between net possession and utilization. A target set by government is to ensure children under the age of five accesses and sleep under Insecticide Treated Nets (NPC & ICF Macro, 2008)

Sleeping under Insecticide Treated Nets can reduce overall child mortality by 20 percent. There is proof that when Insecticide Treated Nets are used properly and constantly, you can save the lives of about six children per year for every one thousand children sleeping under them. Malaria constitutes a major health problem to children being the most vulnerable to its morbidity and mortality. A simple mosquito net treated with an insecticide is proven and cost effective way to repel and kill mosquitoes carrying the parasite that causes malaria, insecticide Treated Nets are dipped into a solution of a parathyroid insecticide and this transforms the net from a simple physical barrier to physical and chemical barrier that can repel or kill female anopheles mosquito. Parathyroid insecticides are effective for 12 months, after which the nets must be retreated. While the evidence based on the effectiveness of Insecticide Treated Nets in reducing malaria transmission has grown rapidly in recent years, yet 90% of mortality is due to malaria (WHO 2006).

STATEMENT OF THE PROBLEM

Insecticide treated nets are the most prevailing malaria control tool. Only 3% of African children are at present sleeping under an Insecticide Treated Nets, and about 20% are sleeping under any kind of net (Olusola , Moshe , & Olayemi , 2008;). In 2009, malaria continues to represent a major public health problem in areas where it is endemic, with an estimated 225 million cases worldwide(World Health Organization, 2010).In spite of government, NGOs and private sector interventions to ensure that children under the age of five, who are more prone access, own and sleep under Insecticide Treated Nets, malaria continues to be the leading cause of child mortality and morbidity. Dr. Ijemba c. Ndubuisi (2010) opines that, utilization rate of (20.1%) while the rate of ownership or possession of ITN was (35.7%). The awareness of the respondents about the benefits of ITN was markedly high (87.9%). On the contrary the possession rate was low (35.7%). The objective of this study is to evaluate the availability and pattern of use of insecticide treated mosquito nets among pregnant women in Enugu metropolis. The researcherssfound out that Pregnant women with tertiary education had highest proportion 62 (39.2%) of ITN possession while those with no formal education had 0(0%) possession. She further said that the difference in ITN possession by level of education is not statistically significantly at $p < 0.005$.

In Burkina Faso, malaria is responsible for 22% of all deaths reported in medical centers, and 60% of those malaria-related deaths occur among under-five children (CDC 2013). Expanded ownership of Insecticide Treated Nets can only make a substantial reduction in malaria mortality only if the nets are used properly by under-five. But to what extent is the utilization of nets that were owned? How many family members sleep under a net? In 2013, malaria killed 584,000 people of which 78 per cent were children less than five years of age. This means that more than 1,200 children under age 5—a total of over 450,000 children a year.

It was revealed that the lives of our pre-primary school age children (roughly 22% of any given population) are in serious danger from mortality and severe morbidity from malaria attacks, if inefficient and ineffective control measures are not put in place mostly at the rural areas (WHO, 2000). This most vulnerable group, lack the necessary immunity that adults have upon repeated malarial infections and so their chances of survival are 4 times less than that of the adult (Gupta *et al..*, 1994). Probably, the greatest concern here is that the use of traditional nets has not produced effective results (Jones, 2000). Moreover, beside of the huge success recorded with ITN trials (Webster, 2000), many of such studies are outside Nigeria, especially the Southeast. Consequently, a lot of people in the area of the present study have not known much about nets or ITNs, hence this present study. With the objective to ascertain the effectiveness of Insecticide Treated bed Nets (ITNs) as a malaria prevention and control strategy among the vulnerable group (children aged 6 months to 5 years) in Umungwa Community, in Obowo LGA of Imo State, determine the general malaria morbidity situation in Umungwa community in Obowo LGA in Imo State prior to the intervention study; to determine the malaria morbidity situation in the area among children 6 months to 5 years age group during the intervention study; to determine the levels of parasitemia among children 6 months to 5 years age group during the intervention study; to determine the mean mosquito density (knock down/blood meal) counts, among children 6 months to 5 years age group during the intervention study and to determine the barrier (s) to present or future use of ITNs in the study area. These researchers found out that, there was a significant difference in the malaria morbidity situation (febrile episode) among the 100 studied vulnerable children during the intervention program.

Most of these deaths occurred in sub-Saharan Africa. Malaria remains the major cause of morbidity and mortality in sub-Saharan Africa. It is the leading cause of Deaths in children aged

under-five years (Snow, *et al.*. 2005). Aside the suffering imposed by malaria, there is a cost dimension to morbidity.According to the Nigeria Demographic and Health Survey, the percentage of children sleeping under insecticide treated nets in Nigeria is 23.82% (ICF Macro, 2008)

The use of ITNs to protect children from transmission of malaria parasite is one of the main strategies suggested by the Roll Back Malaria (RBM) organization. Unluckily, many children in Nigeria continue to die as a result of malaria as they do not sleep under Insecticide Treated Nets. A major objective of the (RBM) campaign is to have 80% of Children aged under-five sleep under ITNs by 2010 (Nketiah-Amponsah, 2010).Major recent effort of UNICEF to balance up the accessibility of Insecticide Treated Nets in Africa is yielding impressive result. By 2011, many countries worldwide had adopted the policy to give out nets to all persons at risk of malaria.

RESEARCH QUESTION

- What are the levels of ITN usage among under five children in Nigeria?
- What are the factors that influence the utilization of Insecticide Treated Nets among children under the age of five in Nigeria?

OBJECTIVES OF THE STUDY

General Objective

- To examine the factors influencing the utilization of Insecticide Treated Nets among children under the age of five in Nigeria.

Specific Objectives

- To identify the level of ITN usage among under five children in Nigeria

- To examinethe socio- economic factors(Age of mothers, Place of Residence, Educational attainment, wealth status, Ethnicity, Religion, Marital status, Occupation) that influences the utilization of ITN among children under the age of five in Nigeria.

HYPOTHESES TESTING

- There isno significant relationship between socio-economic factors (Age of mothers, Place of Residence, Educational attainment, wealth status, Ethnicity, Religion, Marital status, Occupation) and the utilization of Insecticide Treated Nets (ITN) among children under the age of five in Nigeria.

- H1: There is significant relationship between socio-economic factors (Age of mothers, Place of Residence, Educational attainment, wealth status, Ethnicity, Religion, Marital status, Occupation) and the utilization of Insecticide Treated Nets (ITN) among children under the age of five in Nigeria.

JUSTIFICATION OF THE STUDY

Nigeria bears up to 25percent of the malaria disease burden in Africa, hence contributing significantly to the loss of 1million lives per year in the region, which mostly consists of children and pregnant women. Malaria is endemic throughout Nigeria. The Sahel regions and the high mountain area of the plateau experience slightly lower rates of transmission(ICF Macro, 2013). Malaria currently accounts for nearly 110million clinically diagnosed cases per year, 60 percent

of outpatient visits, and 30 percent hospitalization. An estimated 300,000 children die of malaria each year. It is also believed tocontribute up to 11 percent maternal mortality, 25 percent infant mortality, and 30 percent under-fivemortality(ICF Macro, 2008)In addition to the direct health impact of malaria, there are also severe social and economicburdens on communities and the country as a whole, with about 132 billion Naira lost to malariaannually in the form of treatment costs, prevention, loss of work time, etc. (NPC&ICF MACRO, 2008). The transmission of malaria is determined by the environment in which they are living for example, those living in the riverine areas are more prone to malaria because female anopheles mosquitoes transmits malaria mostly in waterlogged areas or an environment where there is stagnancy of water. The cost of purchasing Insecticide Treated Nets may serve as hindrance even to the utilization of ITN who are vulnerable to malaria (those of them living in waterlogged areas). It can also be influenced by the knowledge (what they have heard about it), attitudes (in terms of usage or non-usage), perceptions (their own view about the utilization of ITNs, whether positive or negative due to what they have heard), and beliefs (in terms of ethnicity and religion)

This research want to examine the factors influencing the utilization of Insecticide Treated Nets in households with children under five years with a focus on the nature of household structure, family sleeping patterns and decision making in regard to who in the household determines who is to sleep in the ITN. The research also wants to examine the knowledge (what they have heard about it), attitudes (in terms of usage or non-usage), perceptions (their own view about the utilization of ITNs, whether positive or negative due to what they have heard), and beliefs(in terms of ethnicity and religion) of caregivers towards the usage of ITNs and determined the affordability of ITNs by households with children less than five years.   The purpose of this research is to appeal to programmers toorganize public education campaigns in malaria-endemic

areas and to encourage local ITN industries and social marketing schemes so that nets are available at a price everyone can afford; and get the most out of the potential of newly developed long-lastingtreated mosquito nets.

OPERATIONAL DEFINITION OF TERMS

- **Insecticide Treated Nets (ITN**):An insecticide treated net is a net (usually a bed net), designed to block mosquitoes physically, that has been treated with safe, residual insecticide for the purpose of killing and repelling mosquitoes, which carry malaria.(Lengeler 2004)

- **MALARIA**:Malaria is a mosquito-borne infectious disease of humans and other animals caused by parasitic protozoans (a group of single-celled microorganism) belonging to the genus Plasmodium (W. H. O 2004 retrieved June 16, 2015).

- **INFANT MORTALITY**:Infant mortality rate (IMR) is the number of deaths of children less than one year of age per 1000 live births. The rate for a given region is the number of children dying under one year of age, divided by the number of live births during the year, multiplied by 1,000 (Andrews K. M *et al.* 2008)

- **NEONATAL MORTALITY**: Neonatal mortality is newborn death occurring within 28 days postpartum. Neonatal death is often attributed to inadequate access to basic medical care, during pregnancy and after delivery. This accounts for 40–60% of infant mortality in developing countries Norton M (2005).

- **CHILD MORTALITY**: Probability of dying between birth and exactly five years of age expressed per 1,000 live births (UNICEF 2005)

- **PLACE OF RESIDENCE**: This is the place where the users of the Insecticide Treated Nets lives
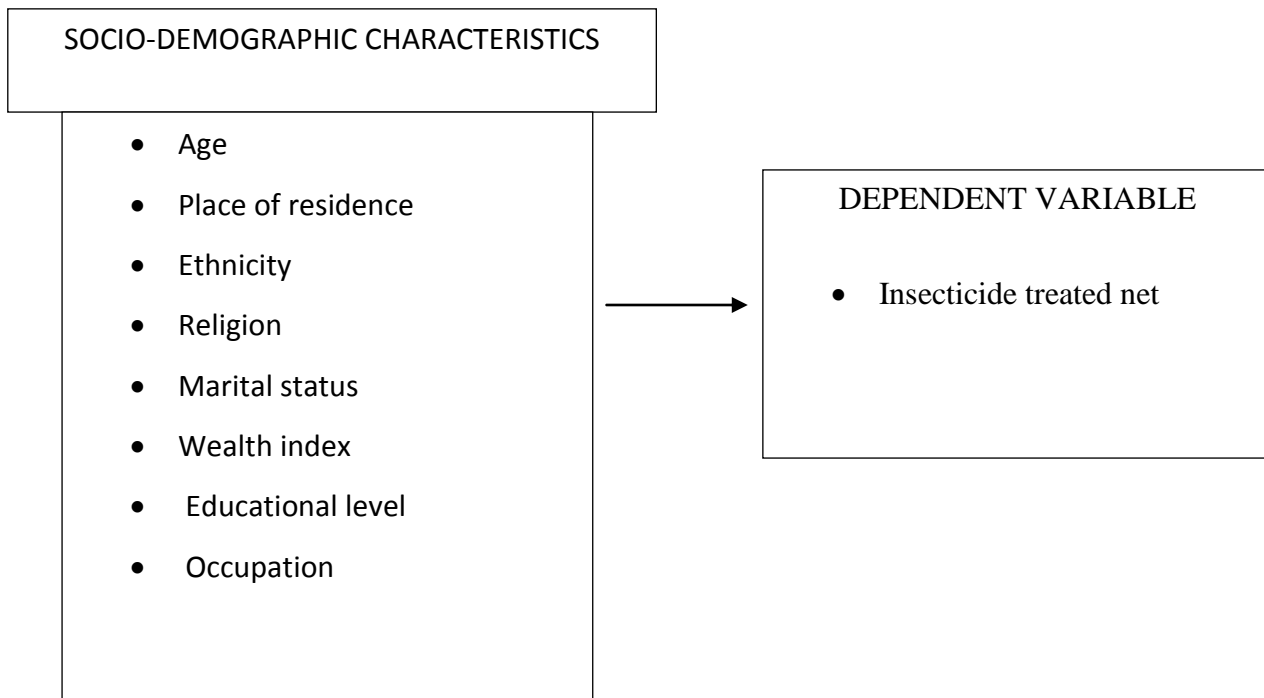
- **PERCEPTION:** The view of the people on the use of Insecticide Treated Nets among children under age five.

- **ATTITUDES:** The behavior reflecting the use of Insecticide Treated Nets among children under age five.

- **BELIEFS**: The conviction the people has on the usage of Insecticide Treated Nets among children under age five

- **AGE RANGE OF THE STUDY:** The study population is children under the age of five(i.e.0-4 years)

- **UTILIZATION**: The practical use of Insecticide Treated Nets among children under age five.

THEORETICAL FRAMEWORK

The study was informed by the Health Care Utilization Model also referred to as the generic behavioral model established by Andersen. In Andersen's original behavioral model, there are three major categories of health service utilization determinants. These include; predisposing factors, enabling factors and need factors. The category of predisposing characteristics was used to reflect the fact that some individuals have a tendency to use services than other individuals. These characteristics include age, gender, occupation, ethnicity, religion, formal education, global health services and knowledge about the illness. The enabling factors reflect the fact that while the individual may be predisposed to use health services, he or she does not use them unless he or she is able. Enabling factors include; availability of services, financial resources to purchase services, health insurance and social network support. The need factors refer to the basic and direct stimulus for the use of health services. The individual must perceive some need

for use of health services. This depends on perception of severity, total number of days in bed, days missed from work or school and help from outside for caring (Babalola 2014)

2.3 CONCEPTUAL FRAMEWORK

SOCIO-DEMOGRAPHIC CHARACTERISTICS
• Age
• Place of residence
• Ethnicity
• Religion
• Marital status
• Wealth index
• Educational level
• Occupation

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DEPENDENT VARIABLE
• Insecticide treated net

DATA SOURCE

The data was gotten from the Nigeria Demographic and Health Survey(NDHS) 2013.

BACKGROUND OF THE STUDY AREA

Nigeria is often referred to as the "Giant of Africa", owing to its large population and economy. With approximately 174 million inhabitants, Nigeria is the most populous country in Africa and the seventh most populous country in the world. Nigeria has one of the largest populations of youth in the world. The country is viewed as a multinational state, as it is

inhabited by over 500 ethnic groups, of which the three largest are the Hausa, Igbo and Yoruba; these ethnic groups speak over 500 different languages, and are identified with wide variety of cultures (Otite O. 2015).

Health care delivery in Nigeria is a concurrent responsibility of the three tiers of government in the country, and the private sector (Rais Akhtar 1991).

Nigeria has been reorganizing its health system since the Bamako Initiative of 1987, which formally promoted community-based methods of increasing accessibility of drugs and health care services to the population, in part by implementing user fees (Users for Health 2006).The new strategy dramatically increased accessibility through community-based healthcare reform, resulting in more efficient and equitable provision of services. A comprehensive approach strategy was extended to all areas of health care, with subsequent improvement in the health care indicators and improvement in health care efficiency and cost.

The Nigerian health care system is continuously faced with a shortage of doctors known as 'brain drain', because of emigration by skilled Nigerian doctors to North America and Europe. In 1995, it was estimated that 21,000 Nigerian doctors were practicing in the United States alone, which is about the same as the number of doctors working in the Nigerian public service. Retaining these expensively trained professionals has been identified as one of the goals of the government (Chinedu, 2003).

According to the United Nations, Nigeria has been undergoing explosive population growth and has one of the highest growth and fertility rates in the world. By their projections, Nigeria is one of eight countries expected to account collectively for half of the world's total population increase from 2005–2050. By 2100 the UN estimates that the Nigerian population will be

between 505 million and 1.03 billion people (middle estimate: 730 million) (UN 2010) in 1950, Nigeria had only 33 million people (Kent, *et al.* 2015).

One in four Africans is a Nigerian. Presently, Nigeria is the seventh most populous country in the world. 2006 estimates claim 42.3% of the population is between 0–14 years of age, while 54.6% is between 15–65 years of age; the birth rate is significantly higher than the death rate, at 40.4 and 16.9 per 1000 people respectively (Federal Research Division. July 2008. Retrieved June 2015)

Nigeria's largest city is Lagos. Lagos has grown from about 300,000 in 1950(Mc Donald *et al.* 2010). To an estimated 15 million today, and the Nigerian government estimates that city will have expanded to 25 million residents by 2015. (Integrated Regional Information Networks. 5 September 2006. Retrieved June 2015)

TARGET POPULATION

The study focus on currently on mothers with children aged 0-4, which was collected by the Nigeria Demographic Health Survey (NDHS) 2013.

SAMPLE DESIGN

The sample for the 2013 NDHS was nationally representative and covered the entire population residing in non-institutional dwelling units in the country. The survey used as a sampling frame the list of enumeration areas (EAs) prepared for the 2006 Population Census of the Federal Republic of Nigeria, provided by the National Population Commission. The sample was designed to provide population and health indicator estimates at the national, zonal, and state levels. The sample design allowed for specific indicators to be calculated for each of the six

zones, 36 states, and the Federal Capital Territory, Abuja.The 2013 NDHS sample was selected using a stratified three-stage cluster design consisting of 904 clusters, 372 in urban areas and 532 in rural areas. A representative sample of 30,327 households was selected for the survey, with a minimum target of 943 completed interviews per state. A fixed sample take of 45 households were selected per cluster. All children age 0-4 who was either permanent residents of the households in the 2013 NDHS sample or visitors present in the households on the night before the survey were eligible to be interviewed. In a subsample of half of the households, all women age 15-49 who has a child that is within the age range of 0-4 that were either permanent residents of the households in the sample or visitors present in the households on the night before the survey were eligible to be interviewed (NPC&ICF MACRO).

VARIABLE DESCRIPTION AND MEASUREMENT

The variables to be used are classified into independent variables and dependent variables. The variables are discussed below:

Age of mothers: this is a nominal variable, it was measured from NDHS using the grouped age of respondents using five-year age group e.g. 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49.

Religion: Religion is measured in categories, and it includes; Christians, Islam, Traditional.

Level of Education: This is also measured in categories; it includes, no education, primary education, secondary education, higher education,

Place of Residence: place of residence is of two categories which are; Rural and Urban

Wealth Index: the wealth index is of three categories; poor, average, rich

Occupational status: this is of two categories; employed unemployed.

Marital status: this is used to measure the marital status of mothers with children aged 0-4 years. This is of six categories;never in union, married,living with partner, widowed, divorced, separated/no longer together.

Ethnicity: this is measured in categories; it includes Christianity, Islam, and Traditional.

DEPENDENT VARIABLE:

- Insecticide Treated Nets: Insecticide Treated Nets (ITN): An insecticide treated net is a net (usually a bed net), designed to block mosquitoes physically, that has been treated with safe, residual insecticide for the purpose of killing and repelling mosquitoes, which carry malaria.(Lengeler 2004).

ETHICAL CONSIDERATION

This study used study used secondary data in large part 2013 Nigerian Demographic and Health Survey has already taken care of ethical issues at the collection and collation stages, hence no risk of breaking any interviewee confidentiality. Therefore, this study relied on the ethical consideration of the ICF macro for the 2013 NDHS. Thus, this study pose no ethical threat to the

respondents as informed consent was taken at the time of the 2013 survey as well as privacy of the respondents were taken into consideration.

DATA MANAGEMENT

The data used for this study was downloaded from the Macro International website. Request to use the 2008 Nigerian Demographic and Health Survey was made to the macro international Incorporation and a written permission was granted through the macro international website. The Stata format of the data was downloaded because the analysis of the research would be done with the Stata package.

Having downloaded the dataset, the kids/children sub data was used for the analysis of the study. 16, 721variables were found in the kids/children sub data of the NDHS. However, from the variables in the kids/childrensub data about 10variables were chosen for the purpose of this study. The chosen variables were explained above in section 3.5.1.

For the purpose of proper analysis of this data, the Stata 12 statistical package was used to dropcertain variables and the variables needed for this study which include; age of mothers, current age of child, region, ethnicity, place of residence, mothers education, religion, wealth index, current marital status, and mothers employment status, was retained for the analysis of this study.

Those variables that were retained were renamed and categorized. Variable named 'insecticide treated nets was categorized into two categories; utilization for those who has some or all of their children slept under Insecticide Treated Nets last night and Non-utilization for mothers who does

not have nets in household and for mothers who have no child that slept under Insecticide Treated Nets last night. (NPC&ICF MACRO, 2013).

Ethnicity was recoded into three groups which are; Hausa =1, Igbo/Ibo =2, Yoruba=3.

Religion was also recoded and categorized into three; the catholic and other Christians were merged together as Christian=1, Islam was recoded =2, Traditionalist and others were merged together as traditionalist =3

Educational attainment were retained as no education=0, primary education=1, secondary education=2, higher education=3.

The wealth status were renamed and recategorized; the poorer and poorest were merged together as poor=1, middle was renamed as average =2, richer and richest were merged together as rich=3.

Occupational status was renamed and recategorized as employed=1, unemployed=2.

STATISTICAL METHODS OF DATA ANALYSIS

Analysis of the quantitative data was done using STATA 12.0 software and was done at three levels;

Firstly, a UNIVARIATE analysis which involved taking the percentage distribution and frequency count of the Socio-demographic characteristics of the respondents was carried out.

The Second analysis was a BIVARIATE analysis; The Chi-Square table was used to analyze some selected socio-demographic characteristics and the dependent variable.

The Third analysis was a MULTIVARIATE analysis; it involved using logisticRegression to analyze the effect of each level of the socio-demographic characteristics on the dependent variable.

RESULT AND DISCUSSION

RESULT

This study examined selected variables such as socio-economic characteristics mothers with children under the age of five –age, religion, level of education, wealth index, occupation, ethnicity, marital status, place of residence.

RESEARCH QUESTION 1: What is the level of ITNU among under five children in Nigeria?

TABLE 1: THE FREQUENCY DISTRIBUTION AND PERCENTAGE OF THE STUDY VARIABLES.

VARIABLES	FREQUENCY	PERCENT
CURRENT AGE OF CHILD		
0	3,343	22.21
1	3,079	20.46
2	2,863	19.02
3	2,957	19.65
4	2,808	18.66
TOTAL	15,050	100.00

PLACE OF RESIDENCE		
URBAN	7,070	42.28
RURAL	9,651	57.72
EDUCATIONAL ATTAINMENT		
NO EDUCATION	8,177	48.90
PRIMARY	2,948	17.63
SECONDARY	4,374	26.16
HIGHER	1,222	7.31
WEALTH INDEX		
POOR	7,521	44.98
AVERAGE	2,775	16.60
RICH	6,425	38.42
ETHNICITY		
HAUSA	9,925	59.36
IGBO/IBO	3,369	20.15
YORUBA	3,427	20.50
RELIGION		

CHRISTIAN	5,288	31.62
ISLAM	11,352	67.89
TRADITIONALIST	81	0.48
OCCUPATIONAL STATUS		
Unemployed	4,627	27.67
Employed	12,094	72.33
CURRENTMARITAL		
STATUS	200	1.20
NEVER IN UNION	15,754	94.22
MARRIED	311	1.86
LIVING WITH PAR	193	1.15
WIDOWED	169	1.01
DIVORCED	94	0.56
NO LONGER		
REGION	854	5.11
NORTH-CENTRAL	1,333	7.97
NORTH-EAST	8,382	50.13

NORTH-WEST	2,754	16.47
SOUTH-EAST	342	2.05
SOUTH-SOUTH	3,056	18.28
SOUTH-WEST		
AGE IN 5-YEARS AGE	738	4.41
GROUP	2,944	17.61
15-19	4,718	28.22
20-24	3,863	23.10
25-29	2,672	15.98
30-34	1,274	7.62
35-39	512	3.06
40-44		
45-49		
	13,305	79.57
ITNU	3,416	20.43
NON UTILIZATION	16,721	100.00
UTILIZATION		
TOTAL		

SOURCE: NDHS 2013

The study revealed that almost 21 percent of the under-five children slept under Insecticide Treated Nets. More than one-half of the respondents 57.72% are rural dwellers while 42.29% are

urban dwellers. Percentage of under-five is lowest among children aged 4 (18.66percent) and highest among children age 0 (22.21 percent). Under-five children who belong to the Islam religion has the highest percentage (67.89 percent), and under-five who has the lowest percentage are those who belongs Christian religion. Looking at zonal variations, the percentage of under- five childrenis lowest in south-south (2.05percent) and highest in North-West (50.13percent).The percentage of under-five children is higher among those who their mothers are married(94.22percent) and lower among those who their mothers are no longer together with their partner /separated(0.56percent). Mothers aged 25-29 who has children who are under-five has the highest percentage (28.22percent) while those mothers aged 45-49 with children under age five has the lowest percentage (3.06percent).

RESEARCH QUESTION 2: What are the factors that influence ITNU among children under the age of five in Nigeria?

Both table 2 and 3 were used to answer research question 2. However, table 2 shows the relationship between the independent variables individually and the dependent variable, while table 3 shows the collective influence of the independent variables on ITNU adjusting for confounding effects.

TABLE 2: RELATIONSHIP BETWEEN SOCIO-DEMOGRAPHIC FACTORS AND THE UTILIZATION OF INSECTICIDE TREATED NETS AMONG CHILDREN UNDER THE AGE OF FIVE IN NIGERIA.

VARIABLES	NON-UTILIZATIO	UTILIZATION	TOTAL

22

AGE IN 5-YEAR			
15-19	576(4.33)	162(4.74)	738(4.41)
20-24	2,292(17.23)	652(19.09)	2,944(17.61)
25-29	3,776(28.38)	942(27.58)	4,718(28.22)
30-34	3,099(23.29)	764(22.37)	3,863(23.10)
35-39	2,149(16.15)	523(15.31)	2,672(15.98)
40-44	996(7.49)	278(8.14)	1,274(7.62)
45-49	417(3.13)	95(2.78)	512(3.06)
Pearson chi2(6) = 11.8552 Pr = 0.065			
CURRENT AGE OF CHILD			
0	2,618(21.91)	725(23.39)	3,343(22.21)
1	2,454(20.53)	625(20.17)	3,079(20.46)
2	2,239(18.73)	624(20.14)	2,863(19.02)
3	2,360(19.75)	597(19.26)	2,957(19.65)
4	2,280(19.08)	528(17.04)	2,808(18.66)
Pearson chi2(4) = 10.9359 Pr = 0.027			
TOTAL	11,951(100.00)	3,099(100.00)	15,050(100.00)
REGION			
NORTH-CENTRAL	696(5.23)	158(4.63)	854(5.11)
NORTH-EAST	1,084(8.15)	249(7.29)	1,333(7.97)

NORTH-WEST	6,738(50.64)	1,644(48.13)	8,382(50.13)
SOUTH-EAST	2,063(15.51)	691(20.23)	2,754(16.47)
SOUTH-SOUTH	249(1.87)	93(2.72)	342(2.05)
SOUTH-WEST	2,475(18.60)	581(17.01)	3,056(18.28)
Pearson chi2(5) = 58.1106 Pr = 0.000			
PLACE OF RESIDENCE			
URBAN	5,598(42.07)	1,472(43.09)	7,070(42.28)
RURAL	7,707(57.93)	1,944(56.91)	9,651(57.72)
Pearson chi2(1) = 1.1518 Pr = 0.283			
EDU.ATTAINMENT			
NO EDUCATION	6,591(49.54)2,279(17.13)	1,586(46.43)	8,177(48.90)
PRIMARY	3,498(26.29)	669(19.58)	2,948(17.63)
SECONDARY	937(7.04)	876(25.64)	4,374(26.16)
HIGHER		285(8.34)	1,222(7.31)
Pearson chi2(3) = 21.3947 Pr = 0.000			
ETHNICITY			
HAUSA	7,990(60.05)	1,935(56.65)	9,925(59.36)
IGBO/IBO	2,527(18.99)	842(24.65)	3,369(20.15)
YORUBA	2,788(20.95)	639(18.71)	3,427(20.50)

Pearson chi2(2) = 55.1762 Pr = 0.000			
MARITAL STATUS			
NEVER IN UNION	1\61(1.21)	39(1.14)	200(1.20)
MARRIED	12,524(94.13)	3,230(94.56)	15,754(94.22)
LIVING WITH PART	245(1.84)	66(1.93)	311(1.86)
WIDOWED	156 (1.17)	37(1.08)	193(1.15)
DIVORCED	139(1.04)	30(0.88)	169(1.01)
NO LONGER TOGE	80(0.60)	14(0.41)	94(0.56)
Pearson chi2 (5) = 2.9842 Pr = 0.702			
CURRENTLY WORKING			
NO	3,683(27.68)	944(27.63)	4,627(27.67)
YES	9,622(72.32)	2,472(72.37)	12,094(72.33)
Pearson chi2(1) = 0.0030 Pr = 0.957			
WEALTH INDEX			
POOR	6,013(45.19)	1,508(44.15)	7,521(44.98)
AVERAGE	2,074(15.59)	701(20.52)	2,775(16.60)
RICH	5,218(39.22)	1,207(35.33)	6,425(38.42)
Pearson chi2(2) =			

51.1939 Pr = 0.000			
RELIGION			
CHRISTIAN	4,076(30.64)	1,212(35.48)	5,288(31.62)
ISLAM	9,164(68.88)	2,188(64.05)	11,352(67.89)
TRADITION	65(0.49)	16(0.47)	81(0.48)
Pearson chi2(2) = 29.5187 Pr = 0.000			
TOTAL	13,305(100.00)	3,416(100.00)	16,721(100.00)

SOURCE: NDHS 2013

The table above showing Pearson chi2(4) = 10.9359 andPr = 0.027 shows that there is a significant relationship between the current age of child and ITNU. Also, the table showing Pearson chi2 (5) = 58.1106 and Pr = 0.000 revealed that, there is a significant relationship between the region of under-five children and ITNU. The table above showing Pearson chi2 (1) = 1.1518 andPr = 0.283 shows that there is no significant relationship between the place of residence of under-five children and ITNU. The table above showing Pearson chi2 (3) =21.3947 and Pr = 0.000 shows that there is a significant relationship between the educational attainment of mothers' with under-five children and ITNU. The table above showing Pearson chi2 (2) =55.1762 andPr = 0.000 shows that there is a significant relationship between the ethnicity of mothers' with under-five children and ITNU. Furthermore, the table above showing Pearson chi2 (5) = 2.9842 andPr = 0.702 shows that there is no significant relationship between the marital status of mothers' with under-five children and ITNU. The table above showing Pearson chi2 (1) =0.0030 and Pr = 0.957 shows that, there is no significant relationship between the occupational

status of mothers' with under-five children and ITNU. The table above showing Pearson chi2 (2) =51.1939 and Pr = 0.000 shows that there is a significant relationship between the wealth index of mothers' with under-five children and ITNU. Lastly, the table above showing Pearson chi2 (2) =29.5187 and Pr = 0.000 shows that there is a significant relationship between the religion affiliation of mothers' who has a child/children under age five and ITNU.

Table 3: LOGISTIC REGRESSION OF FACTORS INFLUENCING THE UTILIZATION OF INSECTICIDE TREATED NETS AMONG CHILDREN UNDER THE AGE OF FIVE IN NIGERIA.

ITNU CURR. AGE OF CHILD	ODD.RATIO	P|Z|	CONF.INTERV UPPER LIMIT	LOWER LI
0 (RC)	1.00			
1	.9214978	0.186	.8162826	1.040275
2	1.018762	0.766	.9014382	1.151356
3	.9355396	0.291	.8266951	1.058715
4	.8615443	0.023*	.757613	.9797332
REGION NORTH-CENTRAL (RC)	1.00			
NORTH-EAST	.9144309	0.582	.6652405	1.256965
NORTH-WEST	.9595864	0.781	.7172185	1.283857
SOUTH-EAST	1.157081	0.303	.8763748	1.527697
SOUTH-SOUTH	1.413973	0.043*	1.010492	1.97856

SOUTH-WEST	1.076866	0.507	.8651837	1.34034
AGE IN 5-YEAR GROUPS				
15-19 (RC)	1.00			
20-24	.9356255	0.531	.7599627	1.151892
25-29	.803651	0.036*	.655222	.9857039
30-34	.7918593	0.029*	.6418566	.9769179
35-39	.7790922	0.025*	.6262033	.9693094
40-44	.9409698	0.619	.7402342	1.196141
45-49	.7530062	0.072	.5527593	1.025796
PLACE OF RESIDENCE				
URBAN (RC)	1.00			
RURAL	.9047345	0.057	.8161879	1.002887
EDU.ATTAINMENT				
NO EDU (RC)	1.00			
PRIMARY	1.166265	0.023	1.021866	1.33107
SECONDARY	1.046733	0.564	.8963909	1.222291
HIGHER	1.450851	0.000*	1.182285	1.780424
WEALTH INDEX				
POOR (RC)	1.00			
AVERAGE	1.167191	0.012*	1.034842	1.316466

RICH	.7058462	0.000*	.6120039	.8140779
ETHNICITY				
HAUSA (RC)	1.00			
IGBO/IBO	1.097008	0.588	.7850379	1.532953
YORUBA	.8901618	0.454	.6565779	1.206846
RELIGION				
CHRISTIAN (RC)	1.00			
ISLAM	.933483	0.449	.7809769	1.11577
TRADITIONALIST	.7600634	0.344	.4303596	1.342357
MARITAL STATUS				
NEVER IN UNI(RC)	1.00			
MARRIED	1.375545	0.096	.9447183	2.002844
LIVING WITH PART	1.353162	0.200	.8519308	2.14929
WIDOWED	1.078459	0.781	.633477	1.836016
DIVORCED	1.168443	0.591	.6620542	2.062154
NO LONGER/SEPAR	.9786927	0.951	.4911678	1.950127
OCCUPATIONAL.STAT				
UNEMPLOYED (RC)	1.00			
EMPLOYED	1.016375	0.735	.9252294	1.1165

*p<0.05

Table 3 shows that children aged 4 are 0.86 less likely to utilize ITN compared to children aged

0 (RC). Also, children who belong to the south-south region of Nigeria are 1.41 percent more

likely to utilize ITN compared to children from the North-central region of Nigeria. Mothers aged 25-29 with children under the age of five are 0.86 percent less likely to utilize ITN compared to those who belong to the age range 15-19(RC). Mothers aged 30-34 with children under age five are 0.79 percent less likely to utilize ITN compared to those of the age range 15-19(RC). Furthermore, mothers aged 35-39 are 0.78 percent less likely to utilize ITN compared to those of the age range 15-19(RC).Mothers with children under age five who has higher educational attainment are 1.45 more likely to influence ITN compared to mothers with no educational attainment. Mothers with children under age five with the average wealth index are 1.17 percent more likely to influence ITN compared to mothers with children under age five who belong to the poor wealth index. Also, mothers with children under age five who belong to the rich wealth index are less likely to utilize ITN compared to mothers with children under age five who belongs to the poor wealth index.

DISCUSSION

The study sets out to examine the factors influencing the utilization of insecticide treated nets among children under the age of five in Nigeria.Overall, Almost 21 percent of the under-five children slept under Insecticide Treated Nets.

Findings from the study reveals that more than one-half of the respondents 57.72% are rural dwellers while 42.29% are urban dwellers.Percentage of under-five is lowest among children aged 4 (18.66percent) and highest among children age 0 (22.21 percent). According to religion, under-five children who belong to the Islam religion has the highest percentage (67.89 percent), and under-five who has the lowest percentage are those who belongs Christian religion. Looking at zonal variations, the percentage of under- five children is lowest in south-south (2.05percent)

and highest in North-West (50.13percent). The percentage of under-five children is higher among those who their mothers are married (94.22percent) and lower among those who their mothers are no longer together with their partner /separated (0.56percent). Mothers aged 25-29 who has children who are under-five has the highest percentage (28.22percent) while those mothers aged 45-49 with children under age five has the lowest percentage (3.06percent).

It also shows that majority of the respondents interviewed can be categorized as low in terms of wealth index. The religious affiliation of the respondents shows that Islam constitutes 68.26% of the respondents while 0.51% were adherents to traditional religion. More than one-half of the respondents (72.16%) reported working as at the time of the survey. For education, the proportion of respondents with Higher education is (100.00%)

The bivariate analysis shows a significant relationship between respondents ethnicity, educational attainment, wealth index, religionand the utilization of insecticide treated nets at p<0.05.

The multivariate analysis further shows that mothers aged 35-39 in relations those mothers aged 30-34 and 45-49 are less likely to utilize insecticide treated nets by 24% (OR=0.755, P<0.05) compared to mothers within the age range 15-19(RC). Also, with respect to education, mothers with higher education in relation to mothers with primary education are more likely to utilize insecticide treated nets by 57% (OR=1.57, P<0.05) compared to mothers with no education (RC).In support to Dr. Ijemba C. Nbubuisi (2010). Mothers that belong to the rich wealth index in relation to those who belong to the average wealth index are less likely to utilize insecticide treated nets by 21% (OR=0.799, P<0.05) compared to those of the poor wealth index in support

to Yibelta et al 2013 that wealth index is significantly related to ITNU among children under age five in Nigeria (Yibeltal , Kasahun , Alemayehu , & Zemichale, 2013).

Also, mothers from the Igbo/Ibo ethnic group in relation to mothers from the Yoruba ethnic group are more likely to utilize insecticide treated nets by 71%(OR=1.71, P<0.05) compared to mothers from the Hausa ethnic group (RC).

Mothers that belong to the rich wealth index in relation to those who belong to the average wealth index are less likely to utilize insecticide treated nets by 21% (OR=0.799, P<0.05) compared to those of the poor wealth index.

CONCLUSION

Utilization of ITNs by under- fives was low regardless of high level of awareness. Factors such as place of residence, marital status and occupation significantly affected ITNs utilization in Nigeria. Although the government with support from other sponsors have recently embarked on large scale supply of nets in high unsafe regions, interventions to address non-compliance to proper utilization of nets are also needed. There is also need for intensive education emphasizing on their proper and consistent use. Scaling up proper use of ITNs along with other initiatives can contribute expressively in reducing malaria. The government should sensitize parents aged 20-24, 25-29, 40-44 with children under the age of five to make use of Insecticide Treated Nets effectively and not to use it abusively. Governments should also provide the programmes to enlighten mothers on how they can maximize it.In order to bridge the gap between possession and use of insecticide treated nets, rigorous efforts are required to change behaviour by providing accurate information, most particularly by convincing people that mosquitoes are the only source of malaria, although recognizing that there are other diseases with similar symptoms,

caused in other ways. The medical message must emphasize and encourage the mothers to allow the sleeping of children less than age five under insecticide treated nets if morbidity and mortality is to be reduced in this age group. Also, governments should access mothers living in the rural areas.

LIMITATION OF THE STUDY

One of the major limitations of this study is the use of quantitative data solely obtained from the Nigeria and Demographic Health Survey 2013. Use of ITNs in households is influenced by many factors of which are not captured in the data set, who is most likely to sleep under an ITN, perceptions and attitude on use of ITNs, sleeping arrangements in the households are believed to play an important role but obtaining such information requires a lot of qualitative interviews with household heads. As a result, the study failed to provide rich information as far as the factors affecting use of ITNs by under-fives is concerned. It is suggested that further studies should be conducted using primary data so as to capture as many variables of interest as possible that are likely to influence use of ITNs. Another limitation of this study is that the data used for analysis were the responses of the mothers, fathers as household heads should also interviewed. It is a cross sectional study, therefor the information is limited to appoint in time. So, other studies that will examine it overtime such as a cohort study can be done in future research.

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