Adoption of Insecticide Treated Nets By Rural Dwellers in Rivers State, Nigeria

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Abstract
The study examined the adoption of insecticide treated nets (ITN) among rural dwellers in Rivers State. The study was carried out in Ahoada-West and Opobo/Nkoro Local Government Areas. Structured interview schedule was used to elicit information from 200 respondents using the simple random sampling techniques. Data collected were presented using descriptive statistics. Findings from study established that majority (57.2%) of the respondents is males, between the ages of 30- 40 years (69.3%) and are married (49%). Also, majority (55.7%) of the respondents had a household size of 5-8, where 25.5% of them are one year old and the state of sanitation is poor (27.2%). All (100%) the respondents from the five communities in Opobo/Nkoro LGA were aware of the use of ITN and an average of 83% adopted it, while all (100%) of the respondents in Ahoada-East LGA were aware of ITN but an average of 41% adopted it. Poverty/hunger (x=2.90), inadequate information /education and communication (x=3.30), inadequate community Health extension workers (x=3.10), distance between Health centres and villages/Hamlets (x=3.20) and heat associated with sleeping with ITN (x=3.10) were considered as constraints to the adoption of ITN.

Introduction

A discussion of mosquito and malaria will suffice before delving into the issue of Insecticide Treated Nets (ITNs) which is used for prevention and control of malaria. The World Bank, World Health Organization (WHO) and other international agencies, while maintaining that good health is a human right, are also arguing that investing in health makes good economic sense, since improved health is a pre-requisite for development, especially sustainable development (Jaja, 2010). Ali-Dainar (2005) stated that many countries are moving forward with malaria control programmes, and even those with limited resources and a heavy burden now have a better opportunity to gain ground against this disease. However, proven interventions such as insecticide treated nets, and the latest artermisinin-based combination, therapies must reach many more people before we can have a real impact on malaria. A national household survey conducted in 2005 by the Malaria Control Programme in Nigeria assessed the progress made with respect to ITN ownership and use among pregnant women and children less than five years of age since 2000. The survey was the first nationally representative study of ITN use, assessing progress towards the Abuja target amongst vulnerable groups (Oresanya, Hoshen, and Sofola, 2008).

ITNs have been shown to avert around 50% of malaria cases making protective efficacy significantly higher than that of untreated nets which under ideal conditions usually provide about half the protection of nets treated with an effective insecticide. (Clarke *et al*, 2001). Trials of Insecticide – Treated Nets (ITN's) in the 1980s and 1990s showed that ITNs reduced deaths in young children by an average of 20% (WHO & RBM, 2002). Clarke *et al*, (2001) reported that ITNs thus work in this case as a vector control intervention for reducing malaria transmission. ITNs have been shown to avert around 50% of malaria cases, making protective efficacy significantly higher than that of untreated nets which under ideal conditions usually provide about half the protection of nets treated with an effective insecticide. One of the targets set at the Abuja Summit in April, 2000 was to have 60% of populations at risk sleeping under ITNs by 2005. This will require 32 million mosquito nets and a similar number of insecticide re-treatments each year. To achieve this, much work still needs to be done to make ITNs affordable, widely available and most importantly, appealing to the consumer (WHO & RBM, 2002).

In some areas where mosquito nets are already widely used, it has been estimated that less than 5% are re-treated to achieve their expected impact (WHO & RBM, 2002). World Health Organization (WHO) has worked with mosquito net and insecticide manufacturers to make re-treatment as simple as possible. However, the best hope lies with newly developed long-lasting treated nets which may retain their insecticidal properties for four to five years the life span of the net thus making re-treatment unnecessary (WHO & RBM, 2002). The acceptability of this ITN among the rural people needs to be looked into.

The rural areas are where most of the populace reside (Albert & Igbokwe, 2014). They are the most vulnerable areas because the literacy level is low, and poverty level is high. Therefore household income could

play vital role in the adoption and ownership of ITNs. Also, parting with the traditional ways of killing mosquitoes would pose a great challenges as people hardly change from what they are use to. Foregoing old habits can sometimes be difficult. This is particularly true in some traditional settings, where traditional practices, attitudes and beliefs can sometimes hamper the adoption of a new healthy behaviour like the use of ITNs. Furthermore, understanding people's perception of malaria and the factors which influence these perceptions like superstition, taboos, amongst others, must be a central part of mounting successful intervention of Roll Back Malaria Campaigns and the use of ITNs.

It is in view of the above observation that this study was conceived to assess the adoption of insecticide treated nets in selected Local Government Areas of River State. Specifically the study sought to: determine the Socio-economic characteristics of households who use ITN; determine the level of awareness; ascertain the level of adoption of insecticide treated nets among rural households and challenges to the adoption of the insecticides treated bed nets in the study areas.

Methodology

The study was carried out in Rivers State, Nigeria. Rivers state is one of the most industrialized of the 36 states in Nigeria and also one of the country's largest producers of oil and gas. Two Local Government Areas (LGAs) were randomly selected from the two senatorial districts of Rivers State namely Ahoada East and Opobo/Nkoro LGAs. Secondly, five communities were randomly selected from each of the selected LGAs, giving a total of 10 communities. While twenty households' heads were randomly selected from each of the selected 10 communities, giving a total of 200 respondents that were used for the survey. Data for the study were obtained primarily using structured interview schedule to collect information relevant to the stated objectives. Data collected were analysed using mean scores. Objective 1 was presented with frequency and percentages; objective 2 and 3 were achieved using mean scores. A four point Lekert – type scale with options; highly agree =4, agree=3, disagree=2, and high disagree=1were use to determine the awareness level, adoption level and challenges to the adoption of ITH in the study areas.

The hypotheses which states that the adoption of ITN is not influenced by the socio-economic characteristics of rural households and there is no difference between people awareness and adoption of INT were tested using the multiple regression Ordinary Least Square (OLS) with three functional model- linear, semi-log and double-log at 0.05 level of significance and t-test. The model specification of the regression analysis is shown thus: Liner regression model

$$Qdf = ax_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + e \text{----------} (1)$$

Where: Qdf = adoption of INT

X_1 = age
X_2 = sex
X_3 = educational level
X_4 = marital status
X_5 = income level
X_6 = house hold size
X_7 = occupation
X_8 = environment
e_i = stochastic error term

X_1, X_2, X_3, X_4------- X_8 = Regression coefficient

Semi-log model

$$Qdf = b_o + b_1 1_n x_1 + b_2 1_n x_2 + b_3 1_n x_3 + b_4 1_n x_4 + e_i \text{ ..... } (2)$$

Where: Qdf = adoption of INT

b_o = Intercept

1_n = log to base e of socio-economic variables

X_1 = age
X_2 = sex
X_3 = educational level
X_4 = marital status
X_5 = income level
X_6 = house hold size

X_7 = occupation
X_8 = environment
e_i = stochastic error term
X_1, X_2, X_3, X_4------- X_8 = Regression coefficient
Double-log model
$LnQdf = b_o + b_1 1_n x_1 + b_2 1_n x_2 + b_3 1_n x_3 + b_4 1_n x_4 + e_i$ …… (3)
Where: Qdf = adoption of INT
b_o = Intercept
1_n = log to base e of socio-economic variables
X_1 = age
X_2 = sex
X_3 = educational level
X_4 = marital status
X_5 = income level
X_6 = house hold size
X_7 = occupation
X_8 = environment
e_i = stochastic error term
X_1, X_2, X_3, X_4------- X_8 = Regression coefficient
Dependent variable = adoption of INT
Independent variable = age, sex, education, income, household size, number of children below 5years, sanitation and occupation.

Results and Discussion

Socio-Economic Characteristics of Households Who Use ITN

Table 1 established that more than half (57.2%) of the respondents are males, between the ages of 30- 40 years (69.3%) and were married (49%). This implies that males dominated the use of ITN in the State who have the responsibility of providing for their family and they are vibrant active youths who are in their productive stage. Also, a higher number (27.9%) of the respondents were civil servants, earning between N25000 and N30000 (39.3%) per month and were degree holders from tertiary institutions (39.3%) and secondary school (39.3%), implying that they are literate men and earns above the minimum wage of N18000 fixed by the Federal government. Furthermore, majority (55.7%) of the respondents had a household size of 5-8, where 25.5% of them are one year old while 33.1% had no child and they live in an environment where the state of sanitation is poor. This implies that the respondents had a large household size and the children are must or vulnerable susceptible to malaria attack resulting from mosquitoes bite.

Test of Hypothesis

Null hypothesis (Ho_1): adoption of ITN is not influenced by the socio-economic attributes of respondents. Multiple regression of three functional model namely; linear, semi-log and double-log was used to test the hypothesis as shown below in Table 2. The semi-log showed a better fixing among the three models with R^2 of 1.455. However, none of the variables was significant at 5% significance level. The linear had an R^2 of 0.2333 at f-ratio of 0.6052 and household size, occupation and environment were significant at 5%. Implying that people living at poor sanitation environment and whose household size is large adopted the use of INT more. Hence the null hypothesis (Ho) is rejected; and the alternative (H_1) is therefore accepted, which states that adoption of ITN is significantly influenced by the socio-economic attributes of the respondents such as occupation, household size and environment.

Table 1: Socio-Economic characteristics of ITN users

Variables	**Socio-economic Characteristics**	**No of Respondents**	**%**
SEX	Female	124	42.8
	Male	166	57.2
MARTIAL STATUS	Single	104	35.9
	Married	142	49.0
	Divorced	16	5.5
	Separated	0	0
	Widowed	28	9.6
AGE	Below 30	6	2.1
	30 – 40	201	69.3
	40 – 50	56	19.3
	50 – 60	18	6.2
	60 & above	9	3.1
EDUCATIONAL LEVEL	Primary	36	12.4
	Secondary	114	39.3
	Tertiary	114	39.3
	None	26	9.0
HOUSEHOLD SIZE	1 – 4	78	27.0
	5 – 8	162	55.7
	9 – 12	48	16.6
	13 & above	2	0.7
MONTHLY INCOME (₦)	3,000 – 7,000	0	0
	7,500 – 15,000	43	14.8
	15,500 – 20,000	48	16.6
	20,500 – 30,000	114	39.3
	Above 30,000	85	29.3
OCCUPATION	Farmer	18	6.2
	Fisher folk	44	15.2
	Civil Servant	81	27.9
	Private Sector Employee	37	12.8
	Self Employed	70	24.1
	Unemployed	40	13.8
CHILDREN UNDER 5 YEARS	One	74	25.5
	Two	58	20.1
	Three	34	11.7
	4 & above	28	9.6
	None	96	33.1
SANITATION	Very good	41	14.1
	Good	53	18.3
	Fairly good	55	19.0
	Poor	79	27.2
	Very poor	62	21.4

Table 2: Multiple regression result of the socio-economic characteristic of respondents

Model Summary & Fitness	Parameters	Linear	Semi-log	Double-log
	Multiple R Square (R2)	0.2333	-1.455	-0.162
	f-ratio	0.6052*	-0.1881**	-0.725*
	P-value of the f. ratio	0.0044	-5.4261	-0.7344
Coefficients estimates	Variables	70.17	4.2509	0.628
B0	Intercept	-0.101(-1.0)NS	-2,29(1.32)*	-3.36(-1.53)**
X_1	Age	7.65(0.29)*	2.034(-2.3)*	0.308(-1.11)ns
X_2	Sex	0.52(0.02)*	-0.64(-0.10)*	-0.188(-0.07)ns
X_3	Educational level	-34.8(-1.35)ns	-3.54(0.65)ns	-0.55(0.02)ns
X_4	Marital status	-2.91(-0.11)ns	-1.06(-0.23)ns	-0.02(-0.12)ns
X_5	Income level	-11.01(-0.42)ns	-2.39(-1.06)ns	-0.38(0.10)
X_6	Household size	31.38 (1.22)**	3.44(1.32)*	0.53(-1.0)*
X_7	Occupation	21.85(0.85)**	3.08(1.65)*	0.48(-2.1)*
X_8	Environment	20.70(0.81)**	2.73(1.05)*	0.43(-1.5)*

Figures in parentheses are t ratios
****=Significant difference (P<0.05)**
NS=Not significant (P>0.05)

Level of awareness and adoption of ITN

Table 2 revealed that in Opobo/Nkoro, all (100%) the respondents from the five communities were aware of the use of ITN and between 75% and 90% adopted (an average of 83%). This implies that the respondents were aware of the use of ITN and they adopted it. However, in Ahoada-East LGA, all (100%) the respondents were aware of ITN but between 40 and 45 (an average of 41%) adopted it. The adoption at Ogbo community was 15%, wish was very low but fairly high at Abarikpo with 65%. The awareness of people on a particular innovation or technology aids or accelerates the adoption of that technology. Albert and Isife (2014) and Albert and Okidim (2014) opined that because people were aware of adaptive measures toward the prevention of effects of climate change, it was easy for them to adopted the mitigating technologies.

Table 2: Level of awareness and adoption of ITN

LGAs	COMMUNITIES	AWARENESS		ADOPTION	
		Frequency	%	Frequency	%
OPOBO/ NKORO	OPOBO TOWN	20	100	18	90.0
	KALA IBIAMA	20	100	15	75.0
	QUEEN TOWN	20	100	12	80.0
	IWOAMA NKORO	20	100	17	85.0
	NKORO TOWN	20	100	17	85.0
	Total (Opobo / Nkoro)	**100**	**100**	**79**	**83.0**
AHOADA - EAST	OGBO	20	100	3	15.0
	ABARIKPO	20	100	13	65.0
	IHUAJE	20	100	8	40.0
	ODIABIDI	20	100	9	45.0
	ULA EHUDA	20	100	8	40.0
	Total (Ahoada)	**100**	**100**	**41**	**41.0**
TOTAL	**10**	**200**	**100**	**167**	**58.0**

Testing of Hypothesis

Null hypothesis (Ho_1): there is no significant relationship between awareness of ITN and its adoption by rural people. Results from the t-test established t-cal (6.4202)>t-tab (1.7291). The null is rejected and the alternative accepted. So there was a significance difference between adoption and awareness. When people are aware of a technology, skills or idea, there is the possibility of the adoption of that technology, skill or idea if it would positively affect their life.

Table 4: t-test result of significance difference between awareness and adoption

Group	N	Mean	SD	Df	t-Value
Awareness	15	96.2	11.15		$t\text{-}_{cal}$ = 6.4204
Adoption	15	55.06	18.24	67	$t\text{-}_{tab}$ = 1.7291

P-value=0.00001.8

Constraints to adoption of ITNs

Table 3 shows the constraints to adoption of ITN among rural dwellers. Using a mean score of 2.50 as the decision rule, poverty/hunger (x=2.90), inadequate information /education & communication (x=3.30), inadequate community Health extension workers (x=3.10), distance between Health centres and villages/Hamlets (x=3.20), heat associated with sleeping with ITN(x=3.10) and design (x=3.30) were considered as constraints to the adoption of ITN. While cultural taboos/superstition, exorbitant price, religious prohibitions, scarcity and high transport cost as constraints to adoption of ITN were not seen as constraints. This implies that money to acquire or buy ITN and human factor were the major constraints to adoption of ITN in the study areas.

Table 3: Mean distribution of constraints to adoption of ITN

Constraints	**Highly Agree**	**Agree**	**Disagree**	**Highly Disagree**	**Average weighted mean**	**Decision**
Poverty/hunger	122	73	47	49	2.90	Agreed
Cultural taboos / superstition	4	98	66	122	1.90	Disagreed
Exorbitant Price	122	73	47	49	2.20	Disagreed
Religious Prohibition	0	30	154	107	1.60	Disagreed
High Transport Cost	24	69	104	93	2.10	Disagreed
Scarcity of ITNs	41	94	96	58	2.40	Disagreed
Inadequate Information/ Education & Communication	141	112	26	11	3.30	Agreed
Inadequate number of Community Health Extension Workers	99	142	35	15	3.10	Agreed
Distance between Health Centres and Villages/Hamlet	20	24	118	128	3.20	Agreed
Heat associated with sleeping with ITN	102	139	38	11	3.10	Agreed
Design	148	87	38	17	3.30	Agreed

Conclusion

Insecticides Treated Nets (ITN) is a well accepted technology in the country. The rural people are aware of the technology and have adopted the technology by using the nets because of its usefulness. However, how to adapt to sleeping under the net is a challenge. Also, the rural people still have the challenge of inadequate information /education & communication, and inadequate community Health extension workers.

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