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Ownership and Utilization of Insecticide Treated Nets in Cross River State, Nigeria

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Vector control through the use of Insecticide Treated Nets (ITNs) has been identified as a major component of malaria prevention and control. The study examined ownership and utilization of Insecticide Treated Nets (ITNs) in malaria high risk areas of Cross River State, Nigeria. Data were obtained through the administration 351 copies of structured questionnaire to care-givers of households in four malaria endemic areas where free distribution of Insecticide Treated Nets has been concluded. The result of Pearson's correlation indicated a low positive and significant association between ownership and utilization of Insecticide Treated Nets (ITNs)(r-Value = 0.12;$p< 0.05$), whereas, the Multiple Regression result depicted that 5% of those who used ITNs were influenced by age (x_1) , gender (x_2), household size (x_3) and education (x_4). Out of the four predictor variables, gender (0.51) and education (0.078) were statistically significant while age (0.037) and household size (-0.055) were insignificant. The study revealed that sex differential and education constituted the prominent factors that influenced the utilization of Insecticide Treated Nets (ITNs). The study concluded that although not all households surveyed owned ITNs, nevertheless, the utilization of ITNs among net owning households was impressive, mostly by the vulnerable group. The study recommended continuous free distribution, periodic household survey and expanding public knowledge on the benefits of ITNs utilization.

Key words: Ownership, distribution, utilization, insecticide treated nets

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INTRODUCTION

Attempts to prevent malaria through anti-malaria drugs and insecticides are threatened due to the emergence and spread of drug resistant malaria parasites and insecticides resistant vector mosquitoes. This together with the increasing incidence of the disease heightened the need for the use of Insecticide Treated Nets (ITNs) as one control method. Studies show that the proper use of ITNs can reduce mortality mostly among children (Zimmerman and Voorham, 2003). However, there is evidence that relatively few people in high-risk regions access and use them (Binka *et al*., 1998). Similarly, studies have attributed the failure to use the ITNs to the following: it is perceived to be expensive, not hanged due to the size of the beds, net too small, a cause of heat and lack of enough air when slept under it. Ewa *et al.* (2012) contended that the low coverage of health centers, especially in the vast majority of rural communities, cultural preferences, low income, lack of awareness about the benefits of ITNs, low staffing levels, poor infrastructure and limited demand creation efforts have hampered progress, as well as the high levels of poverty in the communities. As government and other sponsoring agencies intensify efforts to create easier access to ITNs, the extent to which the general population residing in high-risk areas own and utilize this medical commodity remains unknown. This study examined ownership and utilization of Insecticide Treated Nets (ITNs) in malaria high risk areas, with a view to determining the extent of coverage and levels of utilization among vulnerable rural population.

MATERIALS AND METHODS

Study area: This study was conducted in Yakurr Local Government Area, Cross River State, Nigeria. Yakurr Local Government Area is located approximately between latitude 5°45' and 5°55' north of the equator and longitude 8°11' and 8°20' East of the Greenwich meridian and 120 km (75 miles) North West of Calabar, the capital of Cross River State. The people share their Northern and Eastern boundaries with Obubra Local Government Area and Republic of Cameroon, the Southern boundary with Biase Local Government Area and the Western boundary with Abi Local Government Area. The area is situated on a relatively undulating area drained by the numerous streams, which subsequently empty into the Cross River. The area has one urban center (Ugep) and comprises four fast growing villages namely; Idomi, Nko, Mkpani and Ekori and three smaller villages; Assiga, Nyima and Agoi (Fig.1). The people exhibit a very high degree of social homogeneity with strong political, cultural religious and linguistic affinity. It has a population of 196,450 persons and a land mass of about (4,800 hectare) that is 48 km^2. The people were originally farmers but now have significant population of civil servants and traders due to current transition from agricultural to non agricultural services. Majority of the people are literate enough to understand the debilitating effect of malaria and the benefits of sleeping under Insecticide Treated Nets (ITNs). Growing population and competing demands for the available land resources have continued to generate unresolved conflicts in the area. This is aided by the patrilocality of marriages and strong patriarchy in family system. The people practice the peasant systems of agriculture which includes shifting cultivation, mixed cropping and livestock farming. The market place is the focus for petty trading with few shops located within each community. Outside the daily market organized by each community, there is also a seven days market cycle observed by the different communities.

Yakurr is located within the equatorial forest region of the tropics and falls within the malarious environments. The soil is dark in colour but rich in humus and limes, influencing the cultivation of food and cash crops in the area. The area is characterized by high temperature, rainfall and humidity. Rainfall has two peaks, which are controlled by the movement of Inter Tropical Convergence Zone (ITC'Z), which ranges from 300-350 mm annually. The rainfall types commonly experienced are convectional rainfall, which is usually torrential accompanied with lightning and thunderstorms. The temperature is often high with an annual average of 27°C. The highest temperatures are recorded after midday; this climate pattern has serious effects on the abundance and seasonal distribution of malaria vectors. Higher tropical rainfall combined with high CO_2 concentrations may offset greater evaporation at higher temperatures, so that both factors tend to increase surface water available for breeding of disease vectors in the area.

Sampling procedure and data collection: The data was collected using standardized questionnaire which were pre- tested in the study area for appropriateness before the actual field survey. The information was collected from household heads, mothers, care givers or members of household whose age is 18 years old and above and less than 80 years. Inspection of nets was done to ascertain net owning households, the type of net, condition of the net and proper utilization of nets by households. Direct observation of members of households who had slept under bed net was done by the researchers with consent from heads of households early

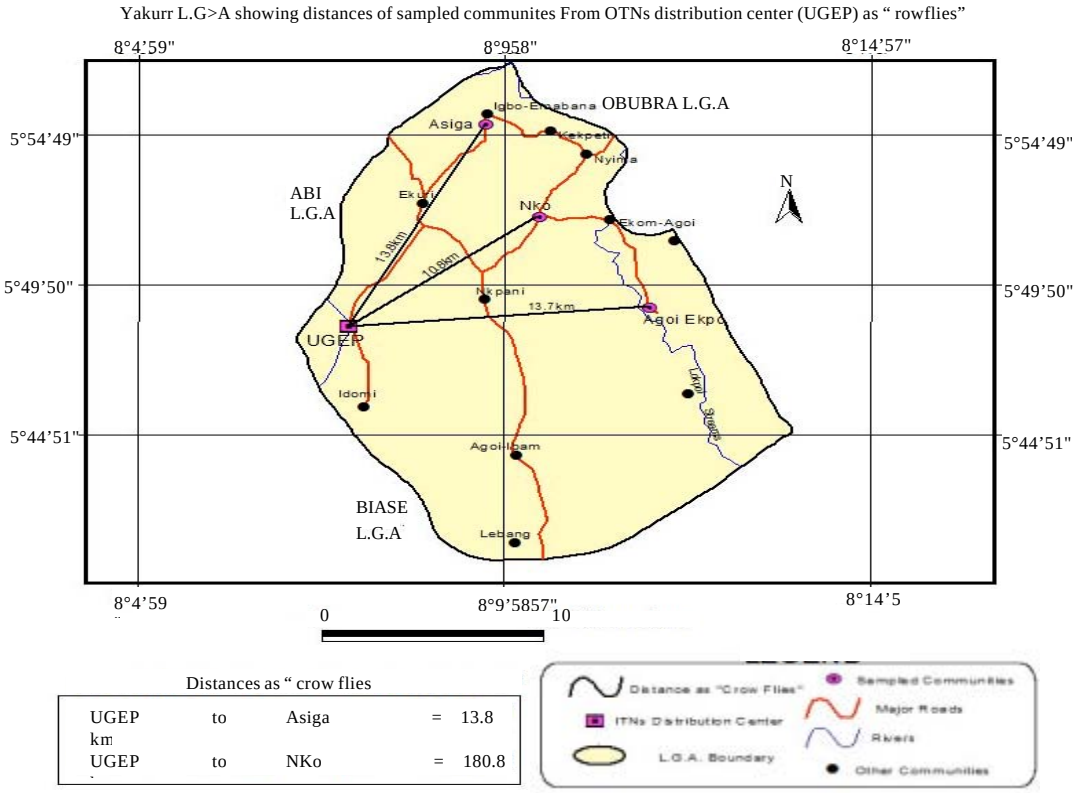

Fig. 1: Yakurr Local Government Area showing sampled communities

in the morning (from 5.30-7.00 a.m.) before the members of the households go out of their beds. The fieldwork was conducted the same time of year for all the communities to control for seasonal variation and data were collected during the rainy season when malaria transmission is highest and shortly after second quarter free distribution of ITNs in the area.

The study subjects were systematically chosen from four villages that were at risk of malaria transmission. These four communities were randomly selected using table of random numbers. This gave each endemic community equal chance of being selected for the study. The systematic sampling technique was then applied in the distribution of the questionnaire. Applying this method, three houses were skipped along transect after a household has been sampled. A total 351 copies of questionnaire were distributed, retrieved and subsequently used for analysis. Ownership of ITNs was measured in terms of number of nets owned by households and how members of households obtained nets. Utilization of nets was related to individual-level characteristics such as age, gender, household size and education. Others were reasons for utilization and non- utilization of ITNs, rates or frequency of utilization and members of households sleeping under a net.

Data analysis: Data obtained from the questionnaire were analysed using descriptive and inferential statistical tools. Descriptive statistical tools such as frequency distribution and simple percentages were used for analysis and presentation of results. The inferential statistics, namely, the Pearson's Product Moment Correlation (PMC) were used to establish the relationship between ownership and use of Insecticides Treated Nets (ITNs), while Multiple Regression Analysis was used to predict the effects of Socio-economic variables such as age, gender, household size, and education on the use of Insecticides Treated Nets (ITNs). The data were encoded in a computer and analyzed through SPSS. Version.17.0. For closed-ended questions of the questionnaire replies of equivalent meaning were pooled into different categories during analysis and percentages were computed for different options. The tests were carried out at varying levels of significance and at the appropriate degrees of freedom and the results are discussed.

RESULTS AND DISCUSSION

Socio-economic characteristics of insecticide treated nets users: Table 1 gives information on the socio-economic characteristics of respondents. A total of 351 care givers were involved the study. The table shows that majority (56.98%) of the Insecticide Treated Nets (ITNs) users were females while 43.02% were males. The age distribution of persons sleeping under Insecticide Treated Nets (ITNs) shows that 26.13% were less than 20 years of age, 98 of the persons representing 17.9% ranged from 20-25 years old, 25.77% were between 26-31 years whereas 27 persons representing 12.37% were between 32-37 years and only 33 (17.4%) were between 38 years and above. The age-sex distribution pattern of ITNs users reveals that the vulnerable group, mostly women and respondents less than 20 years of age were found sleeping under ITNs. The assessment on the educational attainment of the care-givers reveals that 10.17% of them have successfully completed their primary education and

Table 1: Socio-economic characteristics of respondents

	Respondents gender					
Location variables	Male (%)		Female (%)			Total
Ugep	97 (45.26)		104 (51.74)			201
Nko	48 (45.00)		52 (52.00)			100
Agoi	11 (55.00)		9 (45.00)			20
Assiga	23 (76.67)		7 (23.37)			20
Aggregate	179(56.98)		172(43.02)			351
	Age of respondents					
Location	<20 years (%)	20 -25 years (%)	26-31 years (%)	32-37 years (%)	38 years and above (%)	Total
Ugep	33 (16.42)	76 (37.81)	61 (30.35)	13 (6.95)	18 (8.95)	201
Nko	60 (60.00)	17 (17.00)	18 (18.00)	3 (3.00)	2 (2.00)	100
Agoi	-	-	8 (40.00)	2 (10.00)	10 (50.00)	20
	Educational attainment of respondents					
Location	Primary education	Secondary education	ND/NCE	HND/B.Sc	Others specify	Total
Ugep	4 (1.99)	49 (24.38)	64 (31.84)	75 (37.31)	9 (4.48)	201
Nko	7 (7.00)	70 (70.00)	9 (9.00)	12 (12.00)	2 (2.00)	100
Agoi	5 (23.00)	5 (25.00)	8 (40.00)	1 (5.00)	1 (5.00)	20
Assiga	2 (6.67)	8 (26.66)	10 (33.33)	10 (33.33)	-	30
Aggregate	18(10.17)	132(36.64)	91(28.54)	98(20.7)	12(2.9)	351
	Source of income					
	Variables					
Location	Farming		Trading		Civil service	Total
Ugep	36 (17.91)		61 (30.35)		104 (51.74)	201
Nko	42 (42.00)		31 (31.00)		27 (27.00)	100
Agoi	13 (65.00)		4 (20.00)		3 (15.00)	20
Assiga	13 (43.33)		9 (30.00)		8 (26.66)	20
Aggregate	104 (42.07)		192 (30.1)		142 (27.8)	351
	Household size of respondents					
	Variables					
Location	1-2		3-6	6-9	>10	Total
Ugep	60 (29.85)		83 (41.29)	48 (23.88)	10 (4.98)	201
Nko	21 (21.00)		49 (49.00)	24 (24.00)	7 (7.00)	100
Agoi	7 (35.00)		8 (42.00)	4 (20.00	1 (6.00)	20
Assiga	11 (36.66)		11 (36.66)	7 (23.33)	1 (3.33)	30
Aggregate	99(30.63)		151(41.74)	83(22.80)	19(4.83)	351
	No. of nets found in net owning households					
	Variables					
Locations	None (%)	One (1) (%)	2-3(%)	4-6(%)	7-10(%)	10 and above (%)	Total
Ugep	66 (32.84)	77 (32.31)	47 (23.35)	10 (4.98)	1 (0.50)	-	201
Nko	36(36.00)	40 (40.00)	13 (13.00)	10(10.00)	2 (2.00)	-	100
Agoi	15 (25.00)	2 (10.00)	2 (10.00)	1 (5.00)	-	-	20
Assiga	19 (63.3)	6 (20.00)	2 (6.60)	2 (6.66)	1 (3.33)	-	30
Aggregate	136 (51.8)	125(27.08)	64(13.28)	23(6.66)	3(1.21)	-	351

Source: researcher's field work, 2010

had their first school leaving certificate, secondary school leavers accounted for 36.64% while holders of ND/NCE and HND/B.Sc constituted 28.54 and 20.7% , respectively. Only a handful of 2.9% of the respondents had post graduate education/training. Farming is the major source of income for majority (42.07%) of the respondents. This was followed by civil service accounting for 30.1%, while only 28.8% of the respondents were traders. The spatial distribution of occupational groups shows that Ugep had the highest number of civil servants 104 (12.94%) and traders 61 (7.59) while Agoi had the lowest with a proportion of 6.75% (civil servants) and 3.75% (traders) respectively. Most of the households had extended family sizes due to the practice of polygamy. For instance, majority of the respondents had family sizes of 3-6 representing 41.74% of the study subjects, 30.63% had family sizes of 1-2 while 22.80% of the respondents had household sizes of 6-9 members. Only 4.83% of the persons interviewed confirmed having household members of more than ten (>10).

Level of ownership and utilization rates of insecticide treated nets (ITNs): The analysis on the ownership of ITNs by respondents suggests that majority 136 (51.8%) of the respondents do not own ITNs. A proportion of 27.08% reported that they own at least one ITN. Similarly, 13.28% of the respondents replied owning 2-4 ITNs while 23 of the respondents representing 6.66% own up to 6-8 insecticide treated net and only 1.21% indicated that they own beyond 10 ITNs at home. The study subjects also reported procuring ITNs from many sources. For instance, 43.96% bought their ITNs from the social market. Although some of the respondents representing 21.62% reported that ITNs were given to them by friends and colleagues, 34.43% of the respondents obtained ITNs free from government officials and institutions. Table 2 also

Table 2: Utilization of insecticide treated nets

	No. of household members sleeping under a net the previous night of survey				
Location	1-3	4-7	7-10	None	Total
Ugep	89 (44.28)	6 (2.98)	8 (3.98)	98 (48.76)	201
Nko	10 (10..00)	1 (1.00)	1 (1.00)	88 98.00)	100
Agoi	2 (12.00)	- -	- -	18 (90.00)	20
Assiga	3 (10.00)	1 93.33)	- -	26 (86.67)	30
Aggregate	104 (18.57)	8 (1.80)	9 (1.25)	230 (78.33)	351

	Members of household utilizing ITNS					
Location	Babies %	Children-years old	Pregnant women	Every member	None	Total
Ugep	88 (43.78)	28 (13.93)	72 (35.82)	4 (1.99)	9 (4.48)	201
Nko	47 (47.00)	21 921.00)	2 (2.00)	- -	30 (30.00)	100
Agoi	2 (10.00)	1 (5.00)	1 (5.00)	-	16 (80.00)	20
Assiga	6 (20.00)	3 (10.00)	1 (3.33)	-	20 (66.67)	30
Aggregate	143 (30.20)	53 (12.48)	76 (11.54)	4 (0.50)	75 (32.79)	351

	Reasons for non-utilizing of ITNS						
Location	Cause of heat	Net too small	Tacking problem	Disturbs sleep	Cultural belief	Not distributed	Total
Ugep	60 929.55)	26 912.94)	78 938.81)	26 912.94)	- -	11 (5/47)	201
Nko	20 (20.00)	15 (15.00)	33 933.00)	32 932.00)	- -	- -	100
Agoi	2 910.00)	- -	1 95.00)	2 910.00)	- -	15 (75.7)	20
Assiga	19 (63.33)	2 (6.67)	6 920.00)	3 10.00)	- -	- -	30
Aggregate	101 (30.80)	43 (8.65)	118 (24.20)	63 (16.24)	- -	36 (21.36)	351

	Reasons for not owning ITNS				
Location	Lack of information	High cost of ITNs	Not distributed by the Government	Use of alternative malaria prevention	Total
Ugep	56 (27.86)	30 (19.93)	100 (49.75)	15 (7.46)	201
Nko	17 (17.00)	8 (8.00)	56 (56.00)	19 (19.00)	100
Agoi	-	-	13 (65.00)	7 (35.00)	20
Assiga	2 96.62)	1 (3.33)	21 (70.00)	6 920.00)	30
Aggregate	75 (12.83)	39 (6.57)	190 (60.19)	47 (20.37)	351

	Frequency of itns use by households				
	Utilization of ITNS				
Locations	Once a week	Twice a week	Every night	Others specify	Total
Ugep	41 (20.40)	56 (27.86)	31 (15.42)	73 (36.32)	201
Nko	26 (26.00)	37 (37.00	7 (7.00)	30 (30.00)	100
Agoi	2 (10.00)	-	2 (10.00)	16 (80.66)	20
Assiga	-	2 (6.67)	2 (6.67)	26 (86.66)	30
Aggregate	69(14.10)	95(17.88)	42(9.77)	145(58.15)	351

Source: Researcher's field work, 2010

suggests that a proportion of 30.20% of the respondents believed that babies are the first to utilize ITNs. A proportion of 12.48% of the respondents indicated that children of 1-5 years utilized nets at home, 11.54% reserve available nets at home exclusively for pregnant women, while 32.79% of the respondents indicated that none of their household members was utilizing ITNs. Only 0.50% showed that every member of their household utilize ITNs. This may be small household size families.

Concerning rates of utilization of ITNs, a proportion of 18.57% of the respondents cited 1-3 members of their households sleeping under ITNs the previous night of survey, 1.80 and 1.25% of the respondents replied that 3-6 and 6-9 of their family members slept under a net the previous night of investigation. While majority of the respondents, representing 78.33% indicated that none of their household members slept under a net the previous night. The assessment done on the reasons for non-utilization of ITNs among net owning households shows that 30.80% of the respondents said that sleeping under ITN causes increased heat, 8.65% attributed non-utilization of ITNs to small net size, whereas 96.81% identified the problem of tacking, 16.24% replied that ITNs disturbs sleep while only 36 persons representing 21.36% complaint of non-ownership of nets and none of the respondents attributed non utilization of ITNs to cultural factor. Lack of information was cited by 12.83% of the respondents as a reason for non-owning of ITNs, 6.57% indicated high cost of ITNs, while 60.19% don't own ITNs on grounds that government and other sponsoring agencies have not yet distributed ITNs in their localities. However, a proportion of 20.37% of the respondents cited the use of alternative malaria prevention and mosquito control other than ITNs.

The survey also reveals that only 69 (14.10%) of the respondents indicated sleeping under ITN once a week. A few of them, representing 17.88% replied that they sleep under a net twice a week. Although 9.77% of the respondents admitted that they sleep under a net every night, majority of the respondents (58.15%) affirmed that they do not sleep under a net at all. The high level of inconsistent use of ITNs may be due to the absence of nuisance biting mosquitoes in some quarters and the belief that ITNs cause heat and disturbs sleep.

Analysis of the influence of age, gender, education and household size on itns utilization: The effect of the independent variables (age, gender household size and education) on the dependent variable (ITNs use) was tested using multiple regression analysis. The model is mathematically presented as:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4$$

Where:

Y = Utilization of Insecticide Treated Nets (ITNs)
x = Age of Insecticide Treated Nets (ITNs) users
x_2 = Sex of Insecticide Treated Nets (ITNs) users
x_3 = Household size
x_4 = Educational background of care-givers
b_1-b_4 = Regression coefficients
a = Y-intercept

The results of the multivariate regression analysis are presented in Table 3-5. From Table 3, the result shows there is a weak multiple correlation (0.23) between age (x_1), sex (x_2), household size (x_3) and education (x_4) of care-givers and the utilization of Insecticide Treated Nets

Table 3: Test result on the coefficients of multiple determination

Model	R	r-square	Adjusted R square	Standard error the estimate	Dubin watson
1	0.223	0.050	0.039	0.48249	1.629

*Predictors (constant), education, age, gender, household size, *Dependent variable: ITN use, researcher's fieldwork, 2010

Table 4: Test result on the analysis of variance

Model	Sum of square	Df	Mean square	F	Sig.
Regression	4.2223	4	1.056	4.535	0.0011
Residual	08.546	346	0.233		
Total	84.769	350			

*Predictors (constant); education, age, gender, household size, *Dependent variable: ITN use; researcher's fieldwork, 2010

Table 5: Test result on the contributions of age, gender, household size and education to change in itns use

	Unstandardized coefficient		Standardized coefficient		
Model	B	Standard error	Beta	T	Level of significance
1.(constant)	1.1363	0.123	0.084	9.227	0.000
Age	0.037	0.023	0.132	1.591	0.113
Gender	0.051	0.022	-0.105	2.335	0.020
Household size	-0.055	0.030	0.142	-1.857	0.64
Education	0.78	0.29		2.659	0.008

Source: researcher's fieldwork, 2010, computed from SPSS Window Output Version 17.0

(ITNs). The coefficient of multiple determination (R^2) indicates that 5% of the changes in the utilization of Insecticide Treated Nets (ITNs) is accounted for by the combination of the above set of socioeconomic variables of care-givers. The F-ratio 4.535 as shown in Table 3 was significant at the 1% level and indicates that the model has a good fit while the Standard Error (SE) of the regression model was 0.48249 of the overall estimates.

In order to show the overall significance of the model, Analysis of Variance (ANOVA) was used and the result obtained is shown in Table 4. From Table 4, irrespective of the low percent (5%) utilization of ITNs, the ANOVA result above shows that the calculated F-ratio of 4.535 is greater than the tabulated F-value of 3.38 at 0.01 level of significance, implying that socio-economic variables (age, gender, household size and education) have significant influence on the use of ITNs. Hence, the null hypothesis was rejected in favour of the alternative hypothesis that socio-economic variables (age, gender, household size and education) influence the use of ITNs in the study area.

Table 5 gives information on the significance of the predictor variables in influencing utilization of ITNs. Among the four set of predictor variables, only sex of care-givers ($t = 2.335$, $p<0.05$) and education ($t = 2.659$, $p<0.05$) happened to be significant in influencing ITNs utilization among net owning households, this means that education directly influences the utilization of ITNs, as the utilization of ITNs tends to increase with increasing level of education. That is, knowledge about the benefits of ITNs which comes in different form such as education influences the decision to use ITNs. In addition, sex differential reveals that the utilization of ITNs increases with increasing care- giving to children who are perceived to be the vulnerable group, and vice versa. The remaining variables individually contributed to variation in the utilization of ITNs but insignificant in influencing ITNs use. The t-values for these set of predictor variables are age ($t = 1.591$, $p>0.05$) and household size ($t = -1.857$, $p>0.05$).

The strength of contribution of each selected factors are ranked using the product of standardized regression coefficients (Beta), from these results, mother's education has the greatest contribution (0.078) to the utilization of ITNs, followed by sex of care-givers (0.051), Age (0.037) and household size (-0.055). This further implies that a unit increase in education holding every other variables constant, will result in 0.078 or 7.8% unit increase in the utilization of ITNs by the vulnerable group; also a unit increase in sex differential in care delivery holding other variables constant, will result in 0.051 or 5.1% unit increase in the utilization of ITNs and so on for predictor variables with positive signs. However, predictor variables with negative signs indicate an inverse relationship with the utilization of ITNs, for instance, a unit increase in household size of care givers holding every other variables constant, will result in -0.055 or -5.5 percent unit decrease in the utilization of ITNs.

Age showed a weak and insignificant relationship on the utilization of ITN with a coefficient of determination of .037, implying that age does not contribute more to the utilization of ITNs in the area. Clearly, age of the respondents influenced the use of ITNs, though not significant but appropriately signed. The non-significance of age to the changes in ITNs use may be ascribed to the fact that only vulnerable group like children and pregnant women may use ITNs, since the older group believed they have built up immunity against malaria (Table 5). The result is in line with the findings of Zimmerman and Voorham (2003) who reported that majority of the respondents (81.5%) in the area where their study was conducted used ITNs daily. Their findings also reveal that about 48% of the respondents thought that the first to use ITNs should be children below five years old, followed by children between 4 and 15 years old (22.2%), then adults (22.6%) and pregnant women who are among the most vulnerable are reported to be the lowest users (1.9%).

Gender was significant at the 5% level and appropriately signed. Gender has a significant impact on the use of ITNs in the area with a beta coefficient 0.051. The result also showed that gender significantly influenced the use of ITNs. Women are more likely to sleep under ITNs than men. This is because they are closer to the children and both children and pregnant women are believed to be vulnerable to malaria infection. Women are more likely to use ITNs than men. The WHO (2000) and Ibor *et al.* (2011) uncovered that women especially pregnant women are more vulnerable to malaria than men and so should regularly sleep under ITNs to prevent malaria and other disease such as malaria-related maternal anemia, low-birth weight and premature delivery during pregnancy. David (2001) precisely pointed out that it is not the household but different members of the household who produce health; each of their contribution to a large extent, depend on gender. The study concludes that headship is often closely associated with the acquisition, ownership and use of ITNs.

Household size was not significant though with the sign in the reversed order. Household size of the inhabitants in the study area influenced the utilization of ITNs with a beta coefficient of -0.005. This implies that the lower the family size, the lower the use of ITNs and the larger the household size, the higher the household

members sleeping under ITNs. However, since the distribution of ITNs is not based on household size, utilization by members of households may vary. This was confirmed by the Chief Medical Officer in the General Hospital that only two nets are given to each household. Thus, an increase in household size has the tendency of reducing the use of ITNs. In the meantime, only children and pregnant women are given ITNs and are advised to sleep under ITNs to avoid mosquito bite. This is because they are conceived to be the most vulnerable group. Household size was not significant and implies that the larger the household size, the lower the number of ITNs use. In other words, ITNs use decreases with increasing family size. In the study area, due to the old belief that having many children is a source of wealth and the practice of polygamy, most households had extended family sizes of 6 and above, meanwhile, ITNs are not distributed based on members of household. The implication of this is that utilization of ITNs may decrease with increasing household members. David (2001) maintained that households play an important role in day-to-day health production. He proceeded more precisely that it is not the household but different members of the household who produce health.

Education was positively significant at the 1% level of significance. This implies that as people become increasingly educated, the level of awareness about the benefits of ITNs increases resulting in increasing utilization. This shows that an educated group could make use of ITNs than uneducated group. Similarly, education was significant and posits that enlightened group could make use of ITNs than unenlightened people. Educated people are more likely to use ITNs than uneducated people because they have knowledge about the benefits of sleeping under a net. The results further suggest that education increases ITNs use. Education was significantly associated with ITNs utilization at both individual and household level. As education increases, there is increased awareness about the benefits of sleeping under a net. Several studies have tried to link ITNs use with education. For instance; Rhee *et al.* (2005) found that ITNs use increased when individuals received health promotional education about ITNs while David (2001) reported that ITNs educational interventions have effects on uses.

Analysis of the effect of ownership on the utilization of insecticide treated nets: The result of Pearson's correlation is presented in Table 5. From the table, the r-value indicates there is a low positive association between ownership and utilization of Insecticide Treated Nets ITNs (0.12) which is significant ($p<0.05$) at 5% level of significance. The result further implies that ownership and utilization of ITNs are directly related in that an increase in one variable (ownership) would bring about a follow-on increase in the other (ITNs utilization) and vice versa. What this implies is that though ownership of ITNs from the result had a weak relationship with utilization of ITNs, but it shows a positive significant relationship actually exists even if the magnitude of impact is low. Clearly, ownership of ITNs increases the likelihood of utilization among households in the study area. In other words, utilization of ITNs increases with increasing ownership, and an increase in utilization may lead to a proportional increase in protected individuals. The weak correlation, however, may be attributed to the poor distribution system of ITNs occasioned by the remoteness of some of the highly endemic areas and apparent lack of sensitivity of the benefits of sleeping under ITNs. The result posits that net ownership was low and uneven among households in the study area. The result is in line with the findings of Tulu (1993) who observed that ITNs was identified as a weapon in the fight against malaria, but, there is evidence that relatively few people in high-risk regions own and use them.

CONCLUSION

Although, the distribution of ITNs to ensure access has been improving, though rapidly but uneven with increasing utilization among socio-economic groups, free distribution has not translated into open equitable access as increases in utilization have not translated into proportional increase in protected individuals due to low ownership and inconsistent use of ITNs. The study has shown that access to ITNs may increase the likelihood of utilization among socio-economic groups. The members of households sleeping under ITNs has been growing, albeit slowly. The pace of ownership was slow with increasing utilization. Although not all households surveyed owned ITNs, nevertheless, utilization of nets by net owning households was impressive across the Yakurr community but mostly by the vulnerable group.

REFERENCES

Binka, F., F. Indome and T. Smith, 1998. Impact of spatial distribution of permethrin impregnated bed nets on child mortality in rural northern Ghana. Am. J. Trop. Med. Hyg., 59: 80-85.

David, A., 2001. Meeting the malaria challenge in Africa. Health, 24: 15-18.

Ewa, E.E., C.J. Lasisi, S.O. Maduka, A.E. Ita, U.W. Ibor and O.A. Anjorin, 2012. Perceived factors influencing the choice of antenatal care and delivery Centres among childbearing women in ibadan north south-western, Nigeria. Ethiopian J. Environ. Stud. Manage., 5: 373-383.

Ibor, U.W., O.A. Anjorin, A.E. Ita, M.A. Otu and T.I. Bassey, 2011. Utilization of antenatal care in Ibadan North Local Government Area, Oyo State, Nigeria. Trends Med. Res., 6: 273-280.

Rhee, M., M. Sissoko, S. Perry, W. McFarland, J. Parsonnet and O. Doumbo, 2005. Use of insecticide-treated nets (ITNs) following a malaria education intervention in Piron, Mali: A control trial with systematic allocation of households. Malaria J., 10.1186/1475-2875-4-35

Tulu, A.N., 1993. Malaria. In: The Ecology of Health and Disease in Ethiopia, Zein, Z.A. and H. Kloos (Eds.). 2nd Edn. Westview Press, USA., pp: 341-352.

WHO, 2000. The Abuja Decleration and Plan of action for malaria prevention and control: An extract from African summit on Roll Back Malaria. WHO/CDS/RBM/200117, Geneva.

Zimmerman, R.H. and J. Voorham, 2003. Use of insecticide impregnated materials for malaria control in the Americas. Rev. Panam Salud Publica., 2: 23-34.