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## Ownership and use of Insecticide Treated Nets in Gbarain Clan of Yenagoa Local Government Area of Bayelsa State

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### Abstract

**Background:** The use of Insecticide treated mosquito nets (ITNs) is one of the relatively new strategies deployed in the fight against malaria. Coverage targets have been set and interventions are ongoing to meet the targets.

**Objectives:** To determine the ownership and use of insecticide treated nets in Gbarain Clan in Yenagoa local government area of Bayelsa.

**Methods:** A cross-sectional study was conducted among 300 households in Polaku and Koroama communities in Gbarain clan using a pretested interviewer-administered questionnaire. Epi Info version 3.5.1 was used for data entry and analysis. The primary outcome measures were household net ownership, and utilization by under five children and pregnant women. The study also determined predictors of net use in the study area using multiple logistic regression.

**Results:** About three-quarter (72.3%) of the households had at least an ITN and 61.7% of respondents reported being given during the recent statewide net campaign. Use among under five children and

pregnant women were 29.4% and 25% respectively. Presence of an under five child and level of education of household head were predictors of net use in the area.

**Conclusions:** The study revealed a high net ownership in the area as a result of a recent LLIN campaign but use was relatively poor and falls short of the expected targets. Additional campaigns that will include training of household heads and enlightenment of the entire clan on the importance of ITNs are recommended.

**Key words:** Insecticide treated net, long lasting insecticidal net, household, ownership, use, Bayelsa

### Introduction

Malaria is one of the major diseases of public health importance in sub-Saharan Africa. Besides the high economic and social burden, it also accounts for a high incidence of morbidity and mortality amongst all age and sex with children under five and pregnant women being the most commonly affected (1-4). An estimated 3.3 billion people globally were at risk of malaria in 2011 and populations living in sub-Saharan Africa have the highest risk of acquiring malaria with about 80% of cases

and 90% of death estimated to have occurred in the WHO African region (1). The use of Insecticide treated mosquito nets (ITNs) is one of the relatively new strategies deployed in the fight against malaria. Several studies have proven ITNs to be highly effective in reducing malaria morbidity and mortality with evidence showing that with consistent use, morbidity in children under five years can be decreased by as much as 21-72% and mortality by about 20% (5-8). Beside prompt access to effective treatment, prevention and control of malaria in pregnant women, malaria epidemic and emergency response, the use of ITNs particularly by the vulnerable groups is another pillar of action of Roll Back Malaria (RBM) Initiative (9). At the international summit in Abuja, Nigeria in 2000, it was expected that by the year 2005 at least 60% of those at risk of malaria should be protected by ITNs (10). Subsequently, the World Health Assembly (WHA) in 2005 set a loftier goal of 80% coverage for the vulnerable groups to be attained by the end of 2010 (11). Following these regional and global consensual goals, many malaria endemic countries in Africa intensified efforts at achieving universal coverage seen as having one net for every two people at risk for malaria transmission (7, 12). The 2005 WHA also recommended free distribution of ITNs among other strategies to rapidly scale up net coverage(11) and many malaria endemic countries had conducted such exercises with varying results (13-16). In Nigeria, country-wide mass net distribution campaign aimed at delivering two long lasting insecticidal nets (LLINs) per household started from May 2009 (17). The campaign took place in Bayelsa in August/September 2011 where 611,108 nets were reportedly delivered to the state and 576, 192 were distributed to the eight LGAs, leaving 34, 916 for subsequent distribution at health facilities after the campaign (18).

Various reports after the expiration of both timelines showed that while ownership of ITNs has increased in many countries, coverage still fell short of expectation (1, 19, 20). More worrisome is the fact that there exist a discrepancy between the possession and use of ITNs (21-24). A clear description of this scenario in the report of the 2008 Nigeria Demographic and Health Survey (NDHS) (25), is that with national household ownership of at least an ITN being 8%, use among household with ITN by under-five and pregnant women were 49.8% and 44.4% respectively. Furthermore, while ownership of ITNs were more among the urban population and those in the highest wealth quintile, the converse were found in the use of these nets (26).

This study aimed to determine the ownership, use and predictors of the use of insecticide treated nets in Gbarain Clan in Yenagoa local government area of Bayelsa state as a way of assessing progress being made towards achieving universal coverage of ITNs. To our knowledge no independent evaluation of the campaign has been done to assess the impact of the campaign on net coverage and utilization in the state. The primary outcome measures are household net ownership, and utilization by under five children and pregnant women.

## **Materials and Methods**

### **Study Area**

Gbarain clan is located in Yenagoa local government area (LGA) of Bayelsa State and is about 30 minutes' drive from Yenagoa, the headquarters of the LGA and the capital city of the state. The clan occupies three political wards (wards 7, 8 and 9) out of the 15 wards that make up the LGA and comprises 10 villages viz: Agbia, Nedugo, Ogboloma (ward 7); Asaigbene, Osiamia, Okotiamia, Okolobiri, Obunagha (ward 8), and Koroama and Polaku (ward 9). The predominant occupations of the people are trading, farming and fishing. The clan hosts the Niger Delta University Teaching Hospital (NDUTH), four health

centres and a private hospital. The estimated number of households in the clan was 3,930 (18)

### **Study design:**

A cross-sectional study design was used. The study population comprised all the households in Polaku and Koroama communities in Gbarain clan.

### **Sample size calculation and Sampling methodology:**

The minimum sample size was estimated using the formula for prevalence study with the correction factor for a finite population (27). From the 2010 malaria indicator survey (17), 45.2% of households in the South South owned at least a mosquito net and at 95% confidence level, a sample size of 296 was obtained and rounded up to 300. Using the balloting technique, one ward (ward 9) was randomly selected from the three wards that make up the clan. Using the proportionate sampling method, the selected number of households per community was based on the number of those eligible relative to the required sample size. Systematic random sampling method was further deployed in administering the questionnaires using a sampling fraction of 1:2.

### **Data collection**

Data was collected from May 24th to June 7th, 2012 using a pretested interviewer-administered questionnaire. The questionnaire elicited information about the socio-demographic characteristics of respondents (heads of household) and their households, occurrence of fever in a household member in the previous two weeks, net ownership, source of net owned, net use amongst household members and reasons for not using nets in net-owning households. For the purpose of this survey, an *insecticide-treated net (ITN)* was considered as either a factory-treated net that does not require any further treatment (LLIN) or a pretreated net obtained within the past 12 months or a net that has been

soaked with insecticide within the past 12 months (17). Similarly, *use of net* is assumed for those that slept under the net the night prior to the survey (17)

### **Data analysis**

Data entry, cleaning and analysis were done using the Epi Info 3.5.1. Frequencies were generated from variables while multiple logistic regression was used to determine predictors of net use. Results are then presented using tables and charts.

### **Ethical consideration**

Ethical clearance for the conduct of the study was obtained from the Ad-hoc Ethics Committee of the College of Health Sciences of the Niger Delta University. Communal consents were obtained from the leaders of the two communities and informed verbal consent was obtained from the individual respondents who were made to understand the voluntariness of their participation. They were assured of confidentiality of the information requested of them.

### **Results:**

Three hundred questionnaires were administered in all - 125 (41.7%) to households in Polaku and 175 (58.3%) to households in Koroama.

### **Characteristics of respondents and households**

Table 1 shows the socio-demographic characteristics of respondents. Their mean age was  $32.2 \pm 10.3$  years and most of them were females (63.7%), married (73.7%) and had attained secondary education (57%). Respondents were mainly traders (27.7%) and farmers (19.0%), while 26.0% of them reported being unemployed. Majority of respondents (95.3%) were Christians. The household characteristics are shown in table 2

### **Household net ownership and utilization**

Two hundred and seventeen (72.3%) of the households had at least one net, while 182 (60.7%) of them had more than one net. Coincidentally all the nets owned were

LLINs. Figure 1 shows the proportion of the vulnerable groups and other household members that used ITN the previous night. Absence in the community during the LLIN campaign was the main reason given by respondents (57.8%) for not owning nets. Other reasons included lack of interest in nets (18.1%) and the fact that nets cause heat (14.5%). Table 3. Among net-owning households, table 4 shows that heat (51.0%), absence of mosquito in the room (16.6%), windows having being screened (14.6%) and discomfort (8.9%) were the main reasons for not sleeping under the net.

#### Source of nets owned by households

Almost all the nets (99.5%) owned by households were obtained free and 61.7% of these free nets were obtained during the LLIN campaign, while 30% were from health facilities and the remaining 8.3% from non-governmental sources.

#### Predictors of household ownership and use of ITN

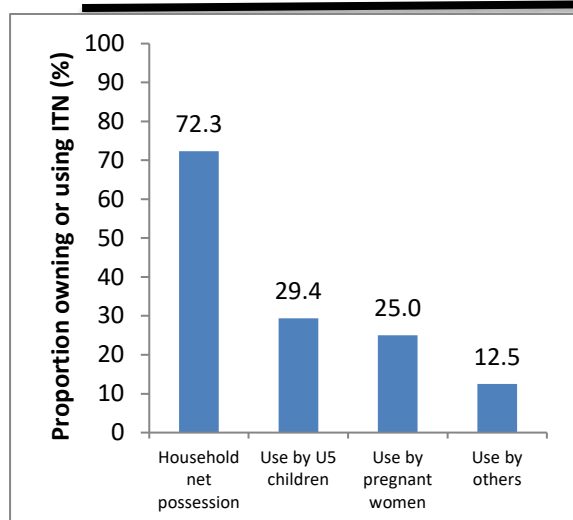
The presence of under-five child in a household (OR=2.21, p=0.004) is predictive of ownership of ITN by the household (table 5) and also predictive of ITN use by the household ((OR = 2.73, p = 0.004) (table 6). The significant association with education shows that the higher the level of education, the less likely the use of ITN (table 6).

**Table 1:**  
Socio-demographic characteristics of main respondents in the household

Characteristic	Frequency (N=300)	Percentage (%)
<b>Sex</b>		
Male	109	36.3
Female	191	63.7
<b>Marital status</b>		
Single	62	20.6
Married	221	73.7
Divorced/Separated	9	3.0
Widow	8	2.7
<b>Education</b>		
No formal	24	8.0
Primary	61	20.4
Secondary	172	57.3
Tertiary	43	14.3
<b>Occupation</b>		
Civil service	43	14.3
Farming	57	19.0
Fishing	10	3.3
Trading	83	27.7
Unemployed	78	26.0
Others	29	9.7
<b>Religion</b>		
Christian	286	95.3
Muslim	7	2.3
Traditional	5	1.7
Others	2	0.7

**Table 2: Household characteristics**

Total number of household surveyed	300
Total number of persons in the households visited	1316
Total number of persons who slept in the households the night prior to the survey	1237
No of under five children who slept in the households the night prior to the survey	211
No of pregnant women who slept in the households the night prior to the survey	40
Others who slept in the households the night prior to the survey	986
Total number of nets owned by households	495
Mean number of nets per household	1.65 ± 0.9



**Figure 1:** Ownership and utilization of treated nets by household members

**Table 3:** Main reasons for non-ownership of nets in households

Main reason for non-ownership	Frequency (n=83)	Percentage (%)
Absent during public distribution	48	57.8
Just do not like having a net	15	18.1
Net causes heat	12	14.5
Use of other preventive measure	4	4.8
Nets are too expensive	2	2.4
Worry about the insecticide	1	1.2

**Table 4:** Main reasons for not using net the previous night

Main reason	Frequency (n=157)	Percentage (%)
There was too much heat	80	51.0
Absence of mosquito in the room	26	16.6
The windows are screened	23	14.6
It was not comfortable sleeping under it	14	8.9
I did not remember to hang it	6	3.8
The net was used as window net	4	2.5
The insecticide is harmful	3	1.9
I used other preventive measure	1	0.6

**Table 5:** Predictors of household ownership of ITN

Predictor	Odds Ratio	95% CI	P-value
Presence of under-five in household	2.21	1.29 – 3.79	0.004
Presence of pregnant woman in household	1.10	0.50 – 2.41	0.811
Fever in a household member in the previous 2 weeks	0.83	0.48 – 1.42	0.489
Knowledge of mosquito as the cause of malaria	1.12	0.38 – 3.29	0.842
<b>Education of respondent</b>			
No formal	1.00		
Primary	1.16	0.40 – 3.39	0.785
Secondary	1.16	0.44 – 3.07	0.158
Tertiary	0.85	0.28 – 2.53	0.771

**Table 6:** Predictors of household use of ITN

Predictor	Odds Ratio	95% CI	P-value
Presence of under-five in household	2.73	1.37 – 5.45	0.004
Presence of pregnant woman in household	1.60	0.67 – 3.87	0.292
Fever in a household member in the previous 2 weeks	1.16	0.61 – 2.22	0.650
<b>Education of respondent</b>			
No formal	1.00		
Primary	0.63	0.18 – 2.20	0.468
Secondary	0.15	0.04 – 0.50	0.002
Tertiary	0.05	0.01 – 0.30	<0.001

## Discussion

This study assessed ownership and use of ITNs in a clan in Yenagoa local government area of Bayelsa state six months after a free statewide universal net distribution campaign aimed at ensuring possession of at least two nets by every household in the state. The household net possession of 72.3% observed was higher than the national and regional coverage reported in the 2010 Malaria Indicator Survey- a survey done when most states had conducted their LLIN campaign (17). The coverage was also higher than the rates reported in post-campaign studies in some malaria endemic areas in Africa (13) but lower than that reported in other areas (14,

15). The differences can be attributed in part to the distribution criteria. For instance, only households having under five children were targeted for the free distribution and each household was entitled to only one net in Mozambique (13) instead of two given to all households in the distribution in Nigeria. Virtually all the nets owned by the households were obtained gratis and the main reason for non-ownership of nets was absence of the mother or male head of the household during the LLIN campaign. For more than half (61.7%) of the households, the LLIN campaign was their source of net, and another 30% obtained theirs from health facilities which could have been part of the campaign nets or nets given to encourage attendance for immunization or antenatal care by under-five and pregnant women respectively. This finding suggests very low coverage prior to the campaign and lack of net culture in the area. Furthermore, the fact that demand for ITNs was yet to be created among the households can pose a challenge for sustainability as it implies that without free nets households were either not willing to buy nets or the nets were not available for those who may want to buy. Free distribution of nets as done during the LLIN campaigns are unlikely to be sustainable and the people have to be made to realize the importance and the need for it. Therefore, the nets should be widely available and affordable for people to acquire.

The low use of nets in the area is of great concern. Even among the vulnerable groups, the use of ITNs was way below the Abuja target of 60% (10) and far from the WHA target of 80% (11). This finding compares with reports from previous studies that ITN possession does not translate to use (17, 21-23). The major reasons given by respondents for non-use of owned nets can form the basis for the development of strategies toward encouraging use and achieving the goal of reduction in morbidity and mortality from malaria. These strategies may include training of household heads (28) and

provision of incentives for compliant households (29, 30). Reasons given for low usage also shows that factors beyond the people may need to be addressed to improve net usage as with the existence of stable power, people can use their fans or air conditioners and this would encourage many more people to sleep under the nets. Predictors of net use in this study include presence of an under five child in the household, similar to findings from previous studies (31, 32). Even though overall net use was poor, it is comforting to know that more of the under five children are protected. On the contrary, the presence of a pregnant woman in the household was not associated with net use, implying that efforts need to be intensified to promote use among pregnant women in household with ITNs. In this study, higher education of respondents is associated with lower use of nets by household members. This is similar to the report in the national survey among pregnant women with ITNs (25) but a contrast to other reports where higher education was predictive of possession and use (31) and where no significant association was found (33). This finding of low usage among more educated people may be due to the fact that those with higher education had higher income and could afford to use other preventive methods including screening of their windows, thereby avoiding the discomfort of net use. This study has some limitations. First, the study area was purposively selected and is not representative of the entire state thereby limiting generalization to the whole of Bayelsa State. Second, data collection took place during the rainy season, a period associated with higher use of nets (34). Conducting the study during the dry season may give a lower coverage. Third, the study population was not divided into socioeconomic strata and this may hide probable differences that may exist across the different strata.

## Conclusion and recommendation

The study revealed that the LLIN campaign considerably increased ownership and use of insecticide treated nets in the area, however, the coverage still falls short of the expected targets. Use among under five children was higher than in the rest of the population. In order to sustain the coverage and to achieve the set targets, additional campaigns that will include training of household heads and enlightenment of the entire clan on the importance of ITNs are recommended. The authors recommend a larger study that would involve all the eight LGAs for an adequate assessment of net coverage in the state.

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