

Knowledge, Ownership And Utilization Of Long Lasting Insecticide Treated Nets Among Parents And Caregivers Of Under-Five Years Children In Passo Community Of Gwagwalada Area Council Abuja, Nigeria

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Abstract – Malaria is a major public health problem in Nigeria and Sub-Saharan Africa. Long lasting insecticide treated nets (LLIN) have been shown to be cost-effective in the prevention of malaria, but the number of people that actually use these nets in this setting has remained generally low. The objective of this study is to assess the knowledge, ownership and utilization of LLIN among caregivers of under-5 children in Passo, a semi-urban community in the Federal Capital Territory, Abuja Nigeria.

A descriptive cross-sectional study was conducted and a structured questionnaire was used for data collection. The study population were 215 parents and care-givers of under-five children selected using multistage sampling technique.

More than half of the respondents had good knowledge of malaria and methods of its prevention. Despite high (80.5%) household ownership of at least one LLIN, overall utilization was only (43.3%). Amongst the respondents that did not own the LLIN, (11.9%) of them reported that they didn't need it, (43%) of them said they could not afford the financial cost while (19.5%) of them said the net was not readily available to buy. About (54.4%) of the respondents did not use LLIN the previous night for reasons ranging from: perceived adverse effects (32.6%) with its use, LLIN causes excessive heat (59%) and (54%) did not use the net for other reasons.

Utilization among this high-risk population remained far from 60% standard recommended by the Roll Back Malaria Programme, 2015 target. There is therefore the need to scale-up LLIN utilization in this setting through health promotion and education as well as the provision of the required LLIN.

Keywords – Long lasting insecticide treated nets; knowledge; ownership; parents, care-givers, under-five children.

I. INTRODUCTION

1.1 Background of study

Malaria is a devastating disease of a global scale and a very important public health problem found in nearly 100 countries and affecting the lives of 200 million people worldwide. According to the Center for Disease Control and Prevention, 3.5 billion people worldwide live in areas that place them at risk of malaria transmission and most of the affected countries are in Sub-Saharan Africa and South East Asia. [1]

There were an estimated 247 million episodes of malaria in 2006 of which eighty-six (86%) percent cases were in Africa region. [2] Thirteen (13) countries in Africa alone share eighty percent of the cases of which over half were in Nigeria, DR Congo, Ethiopia, Kenya and Tanzania. Nigeria currently is responsible for 25% of global malaria morbidity and mortality.¹ There were an estimated

881,000 malaria deaths in 2006; 91% were in Africa and 85% were children under five years of age. In Nigeria, malaria is responsible for 30% of under-5 mortality and 11% of maternal mortality rate. [2]

Malaria is caused by protozoa of the genus plasmodium; the common species include Plasmodium falciparum, P. ovale, P. vivax and P. malariae. Plasmodium Falciparum is the main specie that causes severe malaria and singly accounts for 90-95% of malaria infections in Nigeria. Mode of transmission is mainly through bites from infected vector: the female anopheles mosquito. [3] Transmission of malaria occurs throughout the year because of the longer rainy season that favours the breeding of mosquitoes. Malaria is therefore holo-endemic in Nigeria and therefore, everyone living in all parts of the country is at risk of malaria infestation. Factors that tend to predispose Sub-Sahara Africa (SSA) entirely to the plaque of malaria are high humidity, altitude, temperature, human factors such as poor environmental hygiene, low socio-economic status as well as a high population of anopheles mosquitos. [4,5]

Malaria attacks are more frequent in young children aged below five years who lack the protective immunity, and are therefore more likely to suffer from severe malaria and die from the disease. Severe malaria accounts for a third of all childhood deaths in Nigeria and morbidity and mortality accorded are fivefold more than HIV/AIDS, tuberculosis, leprosy and measles combined. [6] Severe malaria in young children could present with such life-threatening complications such as severe anemia, shock, acute renal failure, respiratory distress, repeated convulsions and coma. [5,6]

In the last few years malaria has become an international and domestic priority following its classification as a re-emerging disease even in areas where it has been endemic.⁷ Measures to prevent malaria, include the use of mosquito net, prophylactic use of antimalarial drugs, prompt diagnosis and early treatment which are very important in reducing the burden of the disease. [5] However, long-lasting insecticide treated net (LLIN) is an important strategy adopted and proven to be a highly useful and cost effective preventive measure for malaria. When properly used, LLIN can reduce malaria transmission by at least 60% and child deaths by 20%. [5,8]

The use of Insecticide Treated Nets in Nigeria was 29.1% in 2008, according to World Bank report published in 2009. [9] However, in South-Western Nigeria, a study among people visiting health facilities showed that 93.5% were aware of Insecticide Treated Nets, but only 20.9% had correct knowledge and 22.5% were using it in their homes.[10]

Several national surveys have shown persistently low levels of ownership and use of LLIN. The proportion of Nigerian households that owned at least one insecticide-treated net (LLIN) was 2.2% in 2003 and 8% in 2008 while the proportion of under-five children that used LLIN during the same period were 1.2% and 5.5% respectively. [11] Insecticide Treated Nets coverage in Africa is currently only 3% with rates in Nigeria reflecting these regional figures. [12]

This study is aimed at identifying the critical gaps in knowledge of malaria and LLIN use among parents and caregivers of under-5 children. It also aims to determine the level of LLINs ownership and utilization and the associated factors with LLINs ownership and utilization in households at Passo Community, in Gwagwalada-Abuja, Nigeria.

II. METHODOLOGY

2.1 Study Area

This study was conducted in Passo community under Gwagwalada Area council, FCT-Abuja, Nigeria. Gwagwalada is one of the 6 area councils that constitute the FCT-Abuja. Geographically, Passo is located North-West of Gwagwalada, between UATH (South) and Paiko (North), off Gwagwalada-Paiko road. Its geographic coordinates are 8° 96' 48'' North and 7° 05' 43'' East. It is located at an elevation of 210 meters above sea level. It occupies a total area of approximately 212.01 square kilometers. [13]

The average annual temperature is 27.2°C. About 1,271mm of precipitation falls annually with variation of 257mm between driest (December) and wettest (September) months with relative humidity of 86%. These profiles are in keeping with endemicity of the malaria parasites.

2.2 Study Population

Passo is populated by people of different ethnicities and religions. The predominant people are the Gbagy ethnic group who are the original settlers of the territory. Other ethnic groups are Hausas, Yorubas, Igbos, Ebiras, and nomadic Fulani people etc. They engage in various economic activities majorly civil service work, farming, animal rearing, trading, artisan and menial jobs. Both

Islamic and Christian religions predominate. The estimated population of Passo community was 7,213 based on the (2006) national census. Eligible respondents were defined as those who were guardians or parents of under-five children and lived in the household before the researchers' visit.

If there were both male and female caregivers for an under-5 child in a household, the female was selected for interview because of the perceived mother and child bonding and intimacy.

2.3 Inclusion and exclusion criteria

Inclusion criteria: Parents or caregivers of under-5 years children selected from different households in Passo Community during the study period and who accepted to participate in the study, were included.

Exclusion criteria: Non-permanent residents and households with children older than 5 were excluded. Also, households whose children were not available and caregivers who were seriously sick and unable to speak to us were also excluded from the study.

2.4 Study Design

A cross sectional descriptive cross-sectional study of households was conducted.

2.5 Study Size

The sample size was determined using the Leslie Kish formula:

$$N = \frac{(Z\alpha)^2 Pq}{d^2}$$

2.6 Sampling procedure

A multi staged sampling technique was used for the study in which Gwagwalada area council was selected from a list of 6 area councils in FCT through a simple random sampling technique. Then Quarter's ward was selected by simple random sampling technique from the 10 wards in Gwagwalada Area Council. Finally, Passo community was selected from the 4 main communities in the quarters ward as a cluster using simple random sampling method and all parents and caregivers of under-5 years children who gave written consents were studied.

2.7 Data collection instrument

This instrument was developed by the researchers. It's a semi-structured questionnaire that was administered by the researchers over a period of 12 days. We used interviewer assisted method to administer the questionnaires which comprises of 40 questions divided into five sections A to E for socio- demographic characteristics, knowledge of malaria and LLIN, household ownership of LLIN, utilization of LLIN and factors affecting utilization of LLIN respectively.

2.8 Data analysis

Data from the questionnaires were sorted and coded, prior to entry into the SPSS software version 23. In this study, the statistical significance level was chosen to be 5% (i.e., $p \text{ value} \leq 0.05$). Quantitative data was used to generate percentages, frequencies, mean, and standard deviation. Appropriate test statistics were used to ascertain associations between qualitative and quantitative variables. The knowledge section included one question each assessing the cause, symptoms, prevention of malaria, and knowledge of the risk of severe malaria and benefits of LLIN. Knowledge was assessed by giving one mark for a correct answer and no mark zero mark for a wrong answer. The knowledge scores were further classified into three categories: low, medium and high/good knowledge. Low knowledge was assigned to respondents who scored 0 to 3 marks, medium to those who scored 4 to 5 marks and high/good knowledge level was assigned to those who scored 6 to 8 marks. Ownership and utilization of LLIN were analyzed as proportions and percentages of study population as appropriate.

2.8 Ethical Consideration

Ethical approval was obtained from the health research ethics committee, UATH. The head of each household in the study stood as informants for their children and gave the written consent. Participation in the study was voluntary and those who decided to withdraw during the study were permitted to do so freely. The research was conducted at a time that was convenient for our

respondents preferably after school or work hours and weekends. Confidentiality of the information given by the respondents was ensured. Serial numbers were used to track each questionnaire and anonymity of respondents was maintained by avoiding the use of names.

III. RESULTS

3.1 Socio-demographic characteristics of the respondent

A total of 220 questionnaires were administered to caregivers of under-5 and 215 persons responded to the study which was a 98% response rate. In table 1 below, 77 (35.8%) of the respondents were between the ages 30-39 years. One hundred and sixty-four (76.3%) of the respondents were females and 133 (61.9%) who were mothers. With respect to the level of education of the respondents, 16.3% had no formal education; however, 29.3% attained tertiary education.

Table 1: Selected socio-demographic characteristics of the respondents

Variables	n (%)	χ^2	p-value
Age in years			
< 20	14 (6.5)		
20 - 29	71 (33.0)		
>29 –39	77(35.8)		
> 39-49	39 (18.1)		
>49	14 (6.5)		
Sex			
Male	51(23.7)		
Female	164(76.3)		
Ethnicity		81.2	<0.05
Gbagi	52(24.2)		
Hausa	22 (10.2)		
Igbo	28 (13.0)		
Yoruba	22 (10.2)		
Others	91(42.3)		
Religion			
Islam	75(34.9)		
Christian	137(63.7)		
Marital status		429.2	<0.05
Married	164(76.3)		
Single	22(10.2)		

Divorced	5(2.3)		
Widowed	10(4.7)		
Separated	14(6.5)		
Level of Education		75.5	<0.05
Nil	35(16.3)		
No formal education	6(2.8)		
Primary	32(14.9)		
Secondary	79(36.7)		
Tertiary	63(29.3)		
Occupation			
Housewife/unemployed/student	56(26.0)		
Farming	33(15.3)		
Trading	54(25.1)		
Civil servant	48(22.3)		
Artisan	24(11.2)		
Relationship to the child			
Mother	133(61.9)		
Father	39(18.1)		
Brother	4(1.9)		
Sister	5(2.3)		
Grandparent	19(8.8)		
Others	15(7.0)		
No of under-5 under care			
One	90(41.9)		
Two	89(41.4)		
Three	30(14.0)		
> three	6(2.8)		
No of rooms used for sleeping			
None	4(1.9)		
One	107(49.8)		
Two	85 (39.5)		
Three	16(7.4)		
>Three	3(1.4)		

(Statistically significant differences between categories (p-value<0.05))

3.2 Knowledge on malaria

Figure 1 below shows the categories of respondents' level of knowledge. Overall, about 99 (46%) had high/good knowledge while 56 (26%) had poor/low knowledge.

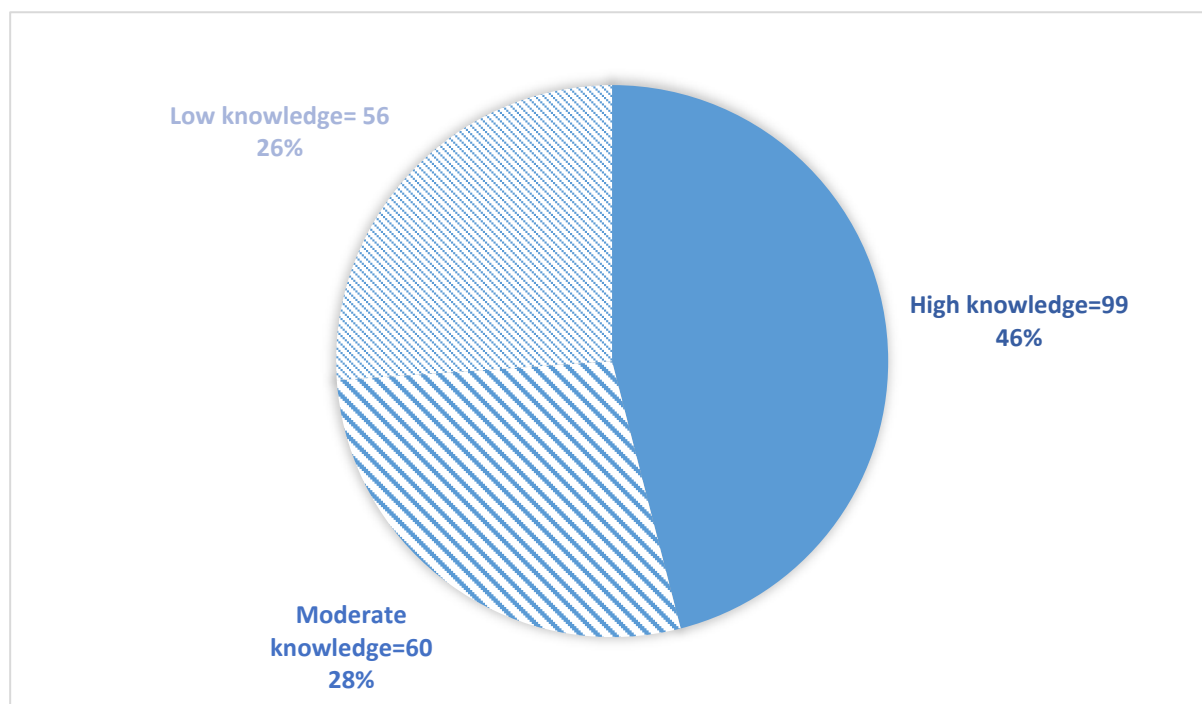


Fig 1: Knowledge score: Respondents' general knowledge of malaria

Table 2 below displays the various aspects of knowledge on malaria and its preventive measures. It was reported that 67 (31.2%) of the respondents associated malaria with the female *anopheles* mosquito, while 16 (7.4%) mentioned exposure to cold weather. The use of the LLI nets was frequently mentioned as a major method of prevention of malaria; 128 (59.5%) while 5.6% of respondents resorted solely to prayers as a preventive measure. About 82.3% of respondents indicated that malaria is preventable and 80 (37.2%) agreed that plasmodium causes malaria; while 140 (65.1%) reported that under-5 children were at a high risk of severe malaria.

Table 2: Knowledge and misconceptions on malaria

Variables	n (%)	χ^2	p-value
Mode of transmission of malaria:		291.4	<0.05
Female mosquito	67 (31.2)		
Male mosquito	14 (6.5)		
Any mosquito	92 (42.8)		
Others	42 (19.5)		
Symptom of malaria:		310.1	<0.05
Fever	128 (59.5)		
Vomiting	43 (20.0)		

	Body weakness	16(7.4)		
	Loss of appetite	17(7.9)		
	Rashes	7(3.3)		
	Body swelling	4 (1.9)		
Choice of treatment:			230.1	<0.05
	Health facility	92 (42.8)		
	Local chemists	102 (47.4)		
	Herbs	16 (7.4)		
	Spiritualist	4(1.9)		
	Not necessary	1(0.5)		
Form of protection against malaria:			231.5	<0.05
	Mosquito net	128 (59.5)		
	Insecticides	47 (21.9)		
	Smoke from cow dung	8(3.7)		
	Prayer	12(5.6)		
	Others	20(9.3)		
Benefit of mosquito net:			241.6	<0.05
	Kill mosquito	19 (8.8)		
	Avoid mosquito bite	106(49.3)		
	Prevent malaria	66 (30.7)		
	protect nuisance insects bite	20 (9.3)		
	For fishing	3(1.4)		
Malaria is preventable disease?			94.5	<0.05
	Yes	177 (82.3)		
	No	15(7.0)		
	Do not know	23 (10.7)		
Uner-5 child more at risk of severe malaria?			87.9	<0.05
	Yes	140 (65.1)		
	No	20(9.3)		
	Do not know	55 (25.6)		

**Statistically significant difference between right and wrong answers ($p<0.05$)*

3.3 LLIN ownership

Table 3 shows reported household ownership of LLINs. About (80.5%) of respondents had at least one ITN in their household while 55 (31%) of the respondents reported that their nets were kept unused in a safe place. Seventy-four (42.8%) of the respondents

got their nets from government facilities while 52 (30%) purchased the LLIN privately. About (64%) of the respondent got their nets within the last 3 years from any source.

Table 3: Ownership of LLIN among respondents

	N	%
Ownership of LLIN		
Yes	173	80.5
No	42	19.5
No of mosquito net within household		
One	73	42.2
Two	57	33.0
Three	30	17.3
Four	10	5.8
Five	3	1.7
Sources of the net		
Bought	52	30.0
Free from Govt. facilities	74	42.8
NGO	37	21.4
Others	10	5.8
State of the mosquito net		
Kept unused in a safe place	55	31.8
Hanging on the bed unused	98	56.6
Torn	20	11.6
Got the net in the last 3 years		
Yes	112	64.7
No	54	31.2
Do not know	7	4.1

The reason for not owning the LLINs are shown in table 4 below of which majority; 12 (28.6%) of the respondents said that they could not afford the mosquito nets.

Table 4: Reasons for not owning LLI net

	N (respondents)	%
Not affordable	12	28.6
Not accessible	6	14.3

Not available	8	19.0
Causes discomfort	5	11.9
No mosquito	4	9.5
Don't need it	5	11.9
Others	2	4.8
Total	42	100.0

3.4 Utilization of LLIN

Figure 2 below showed that 93 (43.3%) of the surveyed parents and caregivers used LLIN for their under-5 children the night prior to our interview.

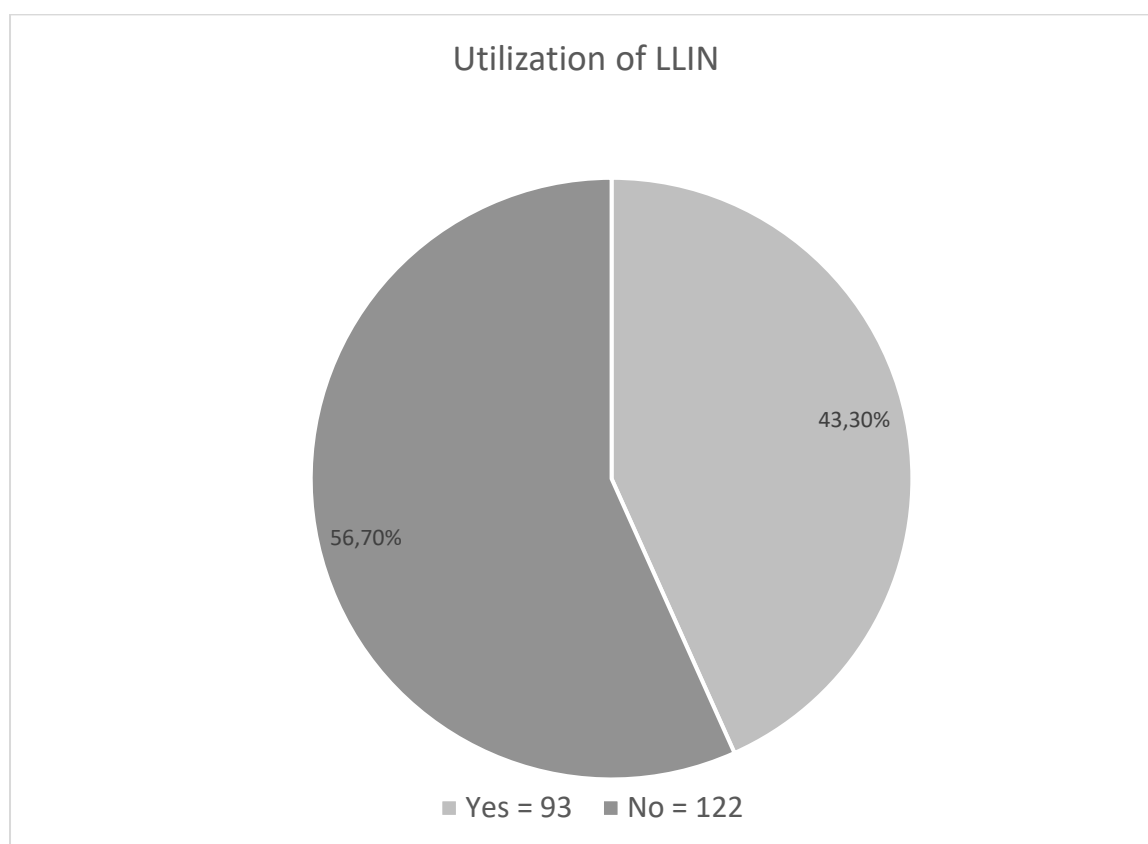


Fig 2. Pie chart of children who slept under net last night prior to interview

3.5 Factors associated with uses of LLIN

In table 5 below, 39 (18.1%) respondents reported discomfort experienced with LLIN as barrier to utilization; while 9 (4.2%) were afraid of unforeseen side effects of the chemical used to treat the nets.

Table 5: Reason for non-utilization of LLIN

	(n)	(%)
Regular users	79	36.7
Irregular/non users		
Don't Have Net	32	14.9
Forgot to use it	25	11.6
No mosquitos	11	5.1
Adverse effect	9	4.2
Causes discomfort	39	18.1
Others*	20	9.4*
Total	215	100.0

* No space to hang it, some members of the household don't like it, it is not effective etc.

In table 6 below, about 84 (40%) of the respondents indicated having problem in acquiring the net and the major problems pointed out were unaffordability (43%) and inaccessibility (31%).

Table 6: Barriers to acquiring the net

	Having problem acquiring LLIN?	
	Yes (%)	No (%)
The barriers		
Unavailable	16(19)	0
Unaffordable	36(43)	0
Inaccessible	26(31)	0
Others	6(7)	0
Total	84(40)	

$X^2=246.1$, statistically significant difference between Yes and No answers (p -value < 0.05)

Table 7 shows that 115 (54.0%) caregivers of under-5 don't like using it in certain period of season of which 71 (61.7%) reported dry season, 29(25.2%) harmattan and 15 (13.1%) rainy seasons.

Table 7: Effects of the seasons on LLIN utilization

	Use Net?	
	Yes	No
	n (%)	
The period of year		

Dry season	71(62)	0
Rainy season	15(13)	0
Harmattan	29(25)	0
Total	115(54)	

$\chi^2=277.1$, statistically significant difference between Yes and No answers ($p\text{-value} < 0.05$),

Table 8 showed that 70 (32.6%) believed LLIN causes side effects such as rashes (47%), cough (22%), catarrh (14%) among others.

Table 8: Perceived adverse effects of LLIN utilization

		Is an adverse effect of LLIN?		
		Yes	No	Don't know
		(%)	(%)	(%)
Considered Adverse effects:				
	Rash	47	0	0
	Cough	22	0	0
	Catarrh	14	0	0
	Red eyes	10	0	0
	Fever	7	0	0
	Total	(100)		

IV. DISCUSSION

The socio-demographic characteristics of the 215 caregivers of under-5 children in Passo Community, Gwagwalada area council indicated that respondents were aged 15-53 years with a mean age of 31.5 years and this signifies an active reproductive age group.

From the findings, (61.9%) reported caregivers were mothers to the under-5 while 33 (18.1%) were fathers. The results on demography also showed that most of the caregivers were married (76.3%). It was also found that a greater number of respondents were Christians (63.7%) while Muslims were only (34.9%). This multi-ethnic and religious profile was typical of FCT and it is a pointer to apparent show of socialization among the respondents. [14]

About (15.3%) were subsistence farmers while a quarter of the respondents were petty business owners (25.1%); and civil servants which could have contributed to the good knowledge of LLIN among respondents. Also, most of the trades (77.6%) are considered as “unskilled or menial”, so therefore most of these individuals find themselves in a cycle of poverty and unable to afford the LLIN.

Concerning the respondents' level of education, (14.9%) had primary education, (36.7%) had secondary education and (29.3%) had tertiary levels respectively. Only 16.3% of the respondents had no formal education background and therefore cannot read or write. The educational level probably influenced the knowledge on malaria as well as ownership and benefits of the use of LLIN. This is in keeping with the survey conducted in South-Eastern Nigeria [15,16]

Our study showed that more than half of the respondents (59.1%) had at least two children under his or her care and (41.9%) had only one and this is a reflection of the typical African family [14]. This however, had no bearing on both ownership and utilization pattern of LLINs. Our finding is in contrast to reports by Ashikeni MA and colleagues where the number of children per family were higher. [17] Other studies conducted in South-Western Nigeria demonstrated that socio-demographic characteristics such as level of education, size of the family and religion had a significant bearing on the number of children and LLINs utilization. [18]

The good knowledge of our respondents could be as a result of the level of information they had prior to and during LLIN distribution campaigns and at the antenatal clinics (ANCs) or immunization clinics and this is similar to findings from studies conducted in South-Eastern Nigeria and also with works of Syed in Uganda. [19,20] In our study, more than half (65.1%) of the respondents agreed that under-5 children were more at risk of severe malaria. Only half (59.5%) of the respondents identified fever as a major symptom of malaria and these findings were in accord with a similar survey conducted in Ethiopia. [20]

Our study revealed that most respondents (98.2%) understood the benefits of LLI nets in the prevention of malaria but this is contrast to findings of a study in southern Ethiopia in which only 38.5% of the respondents recognized the benefits of the LLIN. [20] In this study, those who had good knowledge of malaria and the benefits of sleeping under the net every night were more likely to own LLINs. This finding is in agreement with the study in South-eastern Nigeria in which the knowledge of prevention of malaria was associated with household ITN ownership. [19]

Our study revealed some misconceptions about the cause of malaria and its prevention and these were associated with non-utilization of LLINs and are in keeping with similar observations in the studies conducted in malaria prone Sub-Saharan Africa. [16,22,23]

Our study showed that most of the respondents (80.5%) reported having at least one LLIN in their households. This high level of LLIN ownership was in line with National, roll back malaria (RBM) initiatives to reduce malaria burden with target of at least 80% of household LLIN ownership by 2015. [5] More than half (57.5%) of the respondents owned more than one LLIN with a total ownership of 332 nets reported and this in line with WHO delivery strategies of LLINs to ensure the availability of one LLIN for every two people. [8] The findings from this study agree with that of household survey in Ekiti State, Southwest Nigeria which reported (95.3%) of households had at least one LLIN and western Kenya with 71% ownership of LLIN. [24,25] The level of LLIN ownership among households in this study was however, far higher than in the studies conducted in Tanzania (63.5%) and Ogun State Nigeria (32.3%). [26,27] This high level of ownership was probably due to the fact that Passo Community is easily accessible by several non-governmental organizations (NGOs) and a nearby large University of Abuja Teaching Hospital (UATH).

When asked of the sources of their LLINs, about (42.8%) of the respondents said it was given to them by government hospitals during antenatal clinics or immunization clinics while (30%) purchased the LLIN, (21.4%) got it from NGO distribution around their various residences. This is in line with the fact that in Nigeria, mass distribution campaigns are the main distribution channels for mosquito nets. About (60.5%) of the mosquito nets in Nigeria were obtained through mass distribution campaigns.[23]

It was also found that about (19.5%) of the respondents did not own at least one LLIN and (28.6%) of them said that they could not afford buying the mosquito nets. Other reasons given were: inaccessibility and unavailability of the nets and these are similar to findings of Eyong AK et al. [28] Also, substantial numbers (39.3%); of the respondents didn't own the LLIN because of evasions hinged on reasons like: I don't like it; no mosquito in the house and it causes discomfort. These beliefs are harmful with respect to malaria prevention and control and is in accord with several studies conducted in some parts of Nigeria. [23,29]

Studies have shown that ownership of ITNs does not guarantee the use of it and this in agreement with our findings. [26] We reported that only (43.3%) of the surveyed caregivers used LLINs for their under-5 children the night prior to the interview. This is slightly less than findings from studies conducted in Kenya (58%), Uganda (52%), Ekiti State, Nigeria (59%) and FCT-Abuja (57%). [24,25,28,30] We also gathered that only (53%) of all the respondents who reported owning a net used it the night before the survey despite high ownership of LLIN of 80.5%. However, our report is higher than the findings of a similar household survey conducted in Calabar Metropolis Nigeria which reported household LLIN utilization rate of (41%).[28]

Our study suggests that ownership of the LLIN tend to improve utilization and this is in agreement with a study conducted in Uganda which linked ownership of LLIN to its consistent usage. [15]

Seasonality was also a factor reported that affect regular uses. More than half of eligible respondents do not like using the net during certain seasons of the year; such as dry season (61.7%), harmattan (25.2%) and rainy season (13.1%). Reasons given for non-utilization during certain seasons were presence of heat, no mosquito and nets not effective in preventing mosquito bites and these are in agreement with studies in many SSA countries such as in Makueni District, in Kenya and Imo state, Nigeria. [19, 30]

V. CONCLUSION

Non-availability and unaffordability of LLIN as well as ignorance and misconceptions about malaria are major factors undermining ownership and utilization of the LLIN among caregivers of under-5 children in this community. Thus, utilization of LLINs among caregivers of under-5 children in general remains low (43.3%); and below the 60% recommendation by the Roll Back Malaria (RBM) Program despite laudable high level (80.5%) of ownership of LLIN. More work needs to be done as this is far too short of the Abuja and global target of 60% utilization of LLINs (since 2015). Moreover, meeting the World Health Organization general assembly target of zero deaths from malaria by 2030 should be our target.

RECOMMENDATIONS

We recommend the scaling-up of LLINs utilization in this setting through health promotion and education as well as the provision of the required LLIN. Also, improvements in the general condition of living of Passo community including housing, electricity supply and environmental sanitation would be very helpful in controlling malaria.

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