

No	33	9.2
Number of LLIN received from the campaign		
1	62	19.1
2 – 3	193	59.4
> 3	70	21.5

The average number of LLIN per household = 2.59.

Table 4: LLIN usage

Variable	Frequency	Percent
Household member slept under the net the previous night		
Yes	115	35.4
No	210	64.6
LLIN usage per community		
Nando	10	8.7
Umuoba Anam	15	13.0
Aguleri	25	21.7
Umueri	15	13.0
Otuocha	17	14.8
Igbariam	12	10.4
Nsugbe	21	18.3

From the table above, 35.4% of the respondents slept under the net the previous night which is below the NMEP target of 80%. However, among the 7 communities under study, Aguleri has the highest percentage of LLIN usage (21.7) the previous night and Nsugbe has 18.3% while Nando has 8.7% usage of LLIN the previous night.

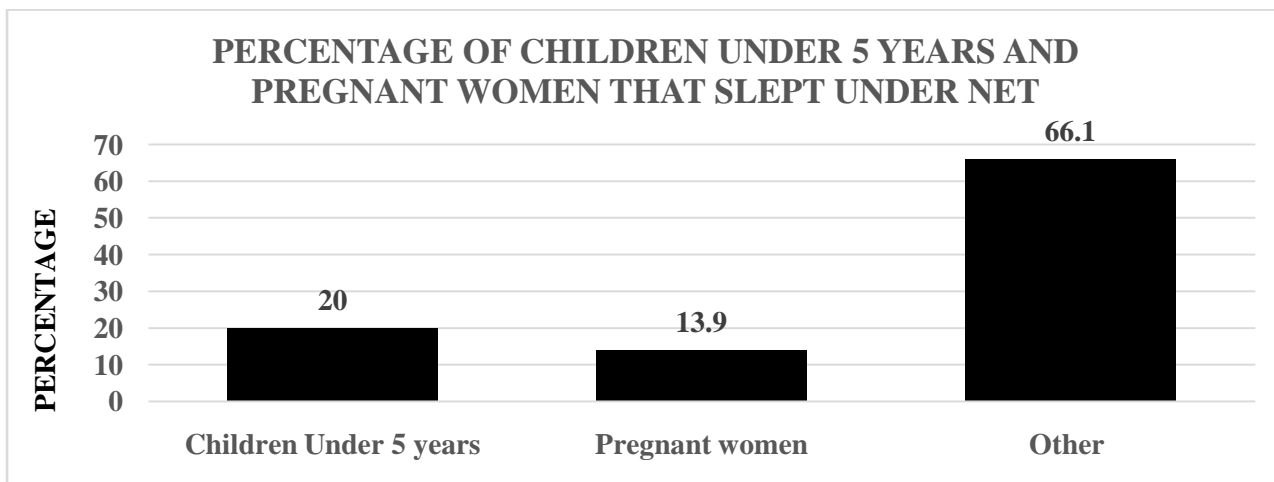


Figure 1: Percentage of children under 5 years and pregnant women who slept under the net the previous night

The above figure shows that of the 115 persons that slept under the LLIN the previous night, 23 (20%) were children under 5 years, 16 (13.9%) were pregnant women while 76 (66.1%) were other members of the household that are neither under 5 years nor pregnant.

Table 5: Association between LLIN Usage and Ownership, Age, Education Level, and Duration before handing

Variable	LLIN Usage		X ²	P-Value
	YES	NO		
Household ownership of LLIN				
Yes	115	210	17.203	0.001*
No	0	33		
Age				
21 - 30 Years	3	12	6.698	0.82
31 - 40 Years	23	36		
41 - 50 Years	41	52		
51 – 60 Years	48	110		
Household head ever attended school and received LLIN				
Yes	109	171		
No	6	39	11.108	0.001*
Highest level of education attained				
Primary	55	71	6.763	0.034*
Secondary	30	73		
Tertiary	24	27		
Duration of LLIN in the household before hanging				
Less than 1 week	115	196	8.012	0.018*
1 week - 1 month	0	13		
Have not hung the net yet	0	1		

* = Significant

Table 5 above shows that there is a statistically significant association between net ownership and its usage ($X^2 = 17.203$, $P = 0.001$). Also, out of the 280 respondents that ever attended school and received LLIN, 109 respondents used the LLIN the previous night and there is a statistically significant association between the net usage and school attendance ($X^2 = 11.108$, $P = 0.001$) and the highest level of education attended by the respondent ($X^2 = 6.763$, $P = 0.034$). Lastly, there is a statistically significant association between net usage and the duration before hanging ($X^2 = 8.012$, $P = 0.018$) as most respondents that hung their net initially made use of the nets. However, the table shows that there is no statistically significant association between the age of the respondent and net usage ($X^2 = 6.698$, $P = 0.82$).

Table 6: Reasons for non-adherence to net usage

Variable	Frequency	Percent
Reason for non-adherence to use of LLIN		
No mosquito	37	17.6
Too hot	123	58.6
Net too old or torn	47	22.4
Too tired	3	1.4

The table above shows that the major reasons for non-adherence to LLIN usage are due to the climate condition which caused the nets too hot during usage (58.6%). Other reasons for non-adherence to net usage include the physical integrity of the net (22.4%), perception of no mosquito in the house (17.6%) and respondents were too tired (1.4%) to hang the LLIN the previous night.

DISCUSSION

The study showed that the education level of the study population has 85.5% of respondents with formal education which is similar with the NDHS 2013 that showed high percentage of school attendance in the southeast geopolitical zone in Nigeria compared with the Northern region.¹⁷ and the study of Ifezulike CC. in 2015 showed that majority the respondents in Aguleri attained secondary levels.³¹ The registration rate for the distribution campaign was high which led to the 90.8% registration of respondents which is close to other distribution campaigns in Anambra and Nasarawa States that recorded 80% and 72.4% respectively.^{15,24}

The free distribution campaign has contributed significantly to the coverage and ownership of LLIN in the households and has led to equity in ownership of nets for the range of 1–5 nets per household.³² The increase in the percentage of household with at least one LLIN from 45.4% in NDHS 2013 to 90.8% in the study population negates the Global Malaria Action Plan of rapid scale-up to universal population coverage for all people at risk for malaria.^{5,18} Although ownership of LLIN in the study population was below the National Malaria Elimination Programme target of 100% which is similar to the findings of the World malaria report² and the NDHS 2013¹⁷ which showed that Nigeria and Anambra State have 47% and 45.4% LLIN ownership respectively. However, when this study is compared to the previous evaluation of the LLIN distribution campaign in Anambra State¹⁵; it showed an improvement in household ownership of at least one LLIN from 84.9% to 90.8% and this can be attributed to the free distribution campaign was done for all the general population. Also, the study showed that there was an average of 2.59 LLIN per household, which was an increase compared with the average of 0.7 LLIN per household in Anambra State and an average of 1 LLIN per household according to NDHS 2013.¹⁷ These findings are in line with Aderibigbe et.al.³ where there was a statistically significant difference in the proportion of households with two or more LLIN post-campaign. The retention of the long lasting insecticide-treated nets in Anambra East LGA remains as high as 84% three years after distribution campaign. This was determined by the number of nets that were observed in the households and it is in line with previous post-distribution surveys in Nigeria which reported a high retention rate of LLIN in households.

The hanging rate of LLIN showed that 95.7% of households hung at least one LLIN from the campaign within one week of receiving it and 55.6% of campaign nets were found hanging over the beds at the time of the study. This trend of depreciation in hanging rates over time is similar to the Evaluation of the Distribution Campaign of Long-Lasting Insecticidal Nets in August 2009, Anambra State, Nigeria. by Kilian et.al.¹⁵ which reported that 77% of households LLINs were hung within one week of distribution and a reduction in the proportion of LLINs found hung during the survey to 61.1%.

The study results indicate that 35.4% of the respondents slept under the LLIN the previous night before the study. This is less the universal utilization target of 80% as reported in studies carried out in Anambra, Abia and Cross River States and Ethiopia.^{16,28,33,34} Other surveys that show a low utilization rate in line with this study include NDHS 2013 (9.5%) and WHO and NMSP reports (13%)^{6,7,16}. However, the utilization rate of 35.4% from the index study was much higher than that reported in the NDHS 2013 for Anambra State (9.5%) and the World Malaria report (13%).

The previous study shows that malaria in pregnancy is still a major health issue in Nigeria, accounting for about 33% of the cause of maternal death²⁵. Among the pregnant women in the study area, 13.9% of pregnant women slept under the LLIN the previous night which is similar to the NDHS 2013 report that 13.8% of pregnant women in Anambra State used LLIN the previous night. Despite the free distribution of LLIN during antenatal clinics, the 13.9% usage of LLIN among pregnant women is less compared with the 16% and 19.2% usage among pregnant women as reported by the World malaria report² and Ezire et.al.²⁵ respectively. However, when compared with the study by Aribodor DN³⁵ in Onitsha which reported 79.4% usage among pregnant women, the difference could be attributed to the public enlightenment on the use of LLIN during ANC visit.

Furthermore, the study showed that 64.6% of respondents that received LLIN did not use it the previous night before the study and 58.6% of such respondents reported that the reason for non-adherence to usage was because the net was too hot to sleep under. This is similar to the reason for 44.7% non-adherence to LLIN usage.²⁸ Also, 22.4% said that the net was too old and torn while 17.6% did not sleep under the net because they believed there were no mosquitoes in their homes. The proportion of respondents that stated that the nets were too hot to sleep in were much higher in this study (58.6%) compared to a similar study by Ezeigbo O. in Abia State in 2016 which showed 44.7% stated that the nets were too hot. This could be attributed to the duration of the study as the index study was done during the dry seasons which are generally hotter.

Education level of the respondents and the duration of LLIN in the households before hanging are some of the potential factors that have statistical significant association ($P < 0.05$) with the usage of LLIN in the study area which is in line with the Evaluation report in 2009.¹⁵ This correlates with Ifezulike C. 2015³¹ study that 85% of their studied group in Anambra East LGA used nets because of the positive influence of their educational level. Also, a statistically significant association was found between increasing levels of educa-

tion and adequate utilization of the ITN among caregivers of children under 5 years in Kuje Area council of the Federal Capital Territory Abuja, Nigeria.³⁶

Finally, there is a statistically significant association between net ownership and usage in the study is contrary to the report by Ezire et.al²⁵ that owning more than one LLIN per household was not significant in the use of an LLIN by pregnant women due to the low utilization rate among pregnant women.

Conclusion

It is evident that the long lasting insecticide-treated net distribution campaign in 2014 contributed significantly to the increase in proportion of households that own LLIN in Anambra East LGA and the LLIN usage have statistically significant association ($P < 0.05$) with LLIN ownership despite the decrease in the level of its usage among households members after 3 years distribution campaign. The factors that affect the LLIN usage among households in Anambra East LGA especially children under 5 years and pregnant women include the LLIN ownership, education level of household head and caregivers and the duration of LLIN in households before hanging. Finally, lack of motivation, climate condition, the physical integrity of the LLIN and perception of the respondents that there is no mosquito at night are reasons for non-use or inconsistent use of LLIN among households in Anambra East LGA.

It is recommended that LLIN should be readily available in all health facilities and distributed free of charge as this is likely to encourage the large population to own and use it. This is evident by the fact that usage of LLIN in the study area was dependent on LLIN ownership ($P < 0.05$) and there is need for continuous sensitization and awareness of the general population through behavioural change and communication on the anti-malarial significance of LLIN and its usage of LLIN during the wet season and dry season respectively. There is an urgent need for further research and more studies especially the community-based content on the barriers to sustained use and acceptability of LLIN by households in various parts of the country and the quality control over the durability of the LLIN.

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