Original Article

Ownership, Usage and Barriers to Long Lasting Insecticide Treated Nets Among Women Attending Antenatal Care in a Tertiary Health Facility in Ogun State

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ABSTRACT

Pregnant women are among the most vulnerable to malaria, a disease endemic in Nigeria. Untreated malaria in pregnancy causes a substantial increase in maternal, foetal and perinatal morbidity and mortality. Long-lasting insecticide-treated nets (LLINs) are essential for preventing malaria infection.This study assessed the ownership, usage and barriers to using LLINs among pregnant women attending antenatal care (ANC) in a tertiary health centre in Ogun State. A hospital-based descriptive cross-sectional study was conducted among pregnant women attending the antenatal clinic. Data was collectedfrom 297 women selected by systematic random sampling technique using a pretested interviewer-administered questionnaire after obtaining informed consent. Analysis was done using the IBM SPSS version 25, and results were presented in tables and charts. This study showed that out of the 297 respondents, a hundred and sixty-six (55.9%) had LLINs, and less than half 140 (47.1%) had ever used it in the index pregnancy. About 7 in 10 of respondents with the LLINs used it the previous night, and the major barriers identified were that LLINs are unnecessary 8 (30.8%), cause heat 10 (38.5%) and discomfort 4 (15.4%). In conclusion, the study showed that ownership and utilization of LLINs was suboptimal among pregnant women in Ogun State; hence, there is a need for more awareness campaigns to educate pregnant women and their spouses on the dangers of malaria and the benefits of using LLINs in addition to other preventive practices.

Keywords: Antenatal care, Barriers,Long Lasting Insecticide Treated Nets, Ownership, Usage, Women.

INTRODUCTION

Malaria is an acute febrile illness caused by Plasmodium Parasites, transmitted through the bites of infected female Anopheles mosquitoes. Nearly half of the world's population is at risk of malaria.[1] The latest World Malaria report revealed that there were 247 million malaria cases in 2021 compared to 245 million cases in 2020. The estimated number of malaria deaths stood at 619 000 in 2021 compared to 625 000 in 2020.[2] Of the four African countries that accounted for just over half of all malaria deaths worldwide, Nigeria had the highest figure of these deaths.[2]

Malaria is endemic in Nigeria, and pregnant women are among the most vulnerable groups.[3] If untreated, malaria in pregnancy causes a substantial increase in maternal, foetal and perinatal morbidity and mortality.[4] Throughout the world, 50 million pregnant women are exposed to malaria each year. In malaria-endemic regions, in which Nigeria belongs,

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one-fourth of all cases of severe maternal anaemia and 20 percent of all low-birth-weight babies are linked to malaria.[5]

Long-lasting insecticide-treated nets (LLINs) are essential for preventing malaria infection.[6] World Health Organization (WHO) recommends that countries aim for universal coverage with LLINs, to reduce malaria transmission.[7] This coverage is set at 80% by the Global Technical Strategy for Malaria 2016-2030.[8] The availability of LLINs within households is necessary, though this does not guarantee the effective use of LLINs.[6] Despite significant improvements in LLIN access and use over the past two decades, many malaria-endemic countries in sub-Saharan Africa have not yet reached global targets for universal coverage of LLINs.[6] Utilization of LLINs is low amongst pregnant women despite increased awareness of LLINs as an effective method of malaria prevention.[4,9-14.]

Studies have reported that discomfort especially dueto heat,[4,14] and reduced ventilation,[14] size not fitting to their beds,[14] non-acceptability by husbands,[4,14] unavailability and cost,[4] and conviction of non-effectiveness of LLIN,[14] are some barriers to the use of LLIN by pregnant women.

It has been reported that one of the effective measures of malaria prevention and control in pregnancy is the use of LLINs.[4] The utilization of LLINs is internationally recognized as one of the most efficient and effective malaria preventive tools.[15] It is, therefore, pertinent to assess LLINs ownership and use of LLINs as a Malaria preventive strategy among the pregnant women attending antenatal clinics in our facility. Also, it is important to determine the barriers to the use of LLINs. The findings from this study will help the development of health education programmes and also serve as a tool to improve the policies on malaria prevention. Therefore, this study assessed the ownership, usage and barriers to using LLINs among pregnant women attending Antenatal Care in Federal Medical Centre, Abeokuta, Ogun State, Nigeria.

MATERIALS AND METHODS

Study Area

Ogun state is one of the states in the Southwest Geopolitical zone of Nigeria. There are three tertiary health institutions offering ANC services in the state, these are Federal Medical Centre, Abeokuta (FMCA), Olabisi Onabanjo University Teaching Hospital, Sagamu (OOUTH) and Babcock University Teaching Hospital, Ilishan – Remo (BUTH).

This study was conducted at Federal Medical Centre Abeokuta (FMCA), Ogun State. FMCA is located in Abeokuta, which is also the State capital. Established on 21st April 1993, the facility is a referral centre and also offers ANC services to patients from Ogun state and neighbouring states. Patronage of the hospital is mainly due to the high quality of service rendered to patients, including ANC patients. The ANC is manned by specialist doctors in Obstetrics and Gynaecology assisted by specialist nurses and other healthcare workers with assigned roles. The ANC clinic runs on Monday, Tuesday and Thursday of every week, and each clinic has about 39 patients per clinic with an average monthly patient load of 554. The total number of patients seen in March was 623.

Study Design

A hospital base descriptive cross-sectional study among pregnant women attending the ANC clinic of FMCA.

Study Population

The study population were pregnant women attending the antenatal clinic at the Federal Medical Centre Abeokuta. All pregnant women who have had at least two visits at the clinic were included in the study, while those needing urgent medical attention or already in labour were excluded.

Sampling Size Calculation

The sample size was calculated using Fischer's formula.[16]

$n = Z^2pq / d^2$

n- Minimum sample size

Z-Standard normal deviation set at 1.96 for 95% confidence interval

P-prevalence of LLIN usage in a previous study among women attending ANC in Bayelsa state

(78%)[17]

q = 1-p

d- Desired level of precision (0.05)

$$n = \frac{(1.96)^2 \times 0.78 \times 0.22}{(0.05)^2}$$

n = 264

10% non-response = 264/0.9

= 293 ≈ 300

Sampling Technique

Respondents were recruited by systematic random sampling until the desired sample size was achieved. The sampling interval was determined by dividing the sample frame (total number of pregnant women in the ANC attendance register in the month preceding the study) by the sample size (300). According to records in the ANC 623 patients attended the clinic in the month of April; therefore, the k^{th} value was 623/300, which was 2.1. Consequently, every second woman who gave consent was recruited. The first respondent was selected using a table of random numbers. Respondents were recruited on the ANC days until the sample size was achieved.

Study Instrument

A pre-tested semi-structured questionnaire adapted from previous studies [17-22] was administered using the Open Data Kit (ODK) for the purpose of data collection. Pre-testing of the questionnaire was done at the OOUTH Sagamu, thereafter, identified errors in the questionnaire were corrected. Data were collected by trained research assistants.

Data Analysis

Collected data were checked for errors, and statistical analysis was done using the IBMSPSS version 25.0. Data analysis was done using descriptive and inferential techniques. Descriptive statistics of the data were presented in frequencies, percentages, means, and standard deviation, using tables. The Inferential statistics were done using the Chi-square test to check for association between variables and ascertain whether the associations were significant at $p < 0.05$.

Ethical Consideration

Ethical approval (FMCA/470/HREC/05/2023/11) for the study was obtained from the Federal Medical Centre, Abeokuta Health Research and Ethics Committee (HREC), while informed consent was obtained from the respondents before administering the questionnaires.

RESULTS

A total of 297 questionnaires was administered, giving a response rate of 99.0%

Table 1 shows that the mean age of the respondent was 31.1 ± 5.8 years, and the majority 144 (48.5%) of the respondents were within the 21 to 30 age group. Most 220 (74.1%) of the respondents were educated up to the tertiary level, and almost all 282 (94.9%) were married. Most 217 (73.1%) were in the third trimester of pregnancy, and nearly all 295 (99.3%) of the women had at most two children below five years old in the family.

Table 2 shows that a hundred and eighteen of the 297 respondents perceived the risk of malaria to be high; however, nearly all 284 (95.6%) of the respondents agreed that malaria can affect pregnancy. Slightly above half, 166 (55.9%), of the respondents had LLINs, out of which most 121 (72.9%) got it free from health facilities. About half 140 (47.1%) of the respondents reported using LLINs in the index pregnancy, out of which most 102 (72.9%) used it the previous night.

Table 3 shows that most 241 (81.1%) of the respondents had Sulfadoxine-Pyrimethamine for malaria prevention, and most of them reported having nets on windows 210 (70.7%) and the use of insecticides indoors 209 (70.4%).

Table 4 shows that a third, 98 (33.0%) of the respondents have had a fever in the current pregnancy, of which most, 84 (85.7%) had malaria diagnostic tests done. Nearly all 78 (92.9%) of those who had the diagnostic test done tested positive for malaria, and majority, 47 (60.2%) of them, were treated using the Artemicillin-based combination therapy (ACT).

Table 5 shows that respondents' occupational status and malaria risk perception were the factors

associated with ownership of LLINs, while their age group, educational status, occupational status and numbers of under-fives were the factors associated with usage of LLINs. Among the occupational strata, students were least likely to have LLINs, 2 (15.4), and this was significant statistically (χ^2=10.95,*p=0.027). Also, respondents with either low 22 (42.3) or indifferent 6 (27.3) malaria risk perception were less likely to have LLINs compared to those with moderate 62 (59.0) and high 76 (64.4) risk perception; this was significant statistically (χ^2=15.1,p=0.002). Among the age groups, respondents ≤20 were least likely to use LLINs (χ^2=8.71,*p=0.023), while in the occupational group, students 0 (0.0) and those in the private sector 8 (20.0) were less likely to use LLINs, this was significant statistically (χ^2=9.74,*p=0.032f).

Figure 1 shows that some of the reasons mentioned by the respondents for not having LLINs were that it is not necessary 90 (68.7%), followed by not easily accessible 17 (13.0%).

Figure 2 shows that some of the reasons why respondents having LLIN were not using it were that LLINs cause heat 10 (38.5%), it is not necessary 8 (30.8%), and that LLINs cause discomfort 4 (15.4%)

Figure 3 shows that the effects of malaria on the mother and fetus reported by the respondents were miscarriage 171 (57.6%), maternal anaemia 155 (52.2%), prematurity 119 (40.1%) and fetal death 97 (38.4%).

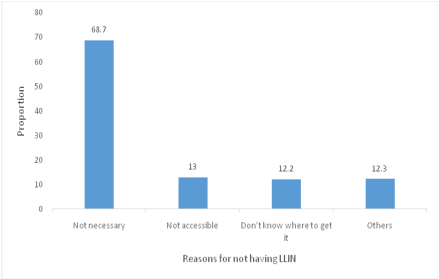

Figure 1: Reasons for not having LLINs n= 131 (multiple responses allowed)

Table1:Sociodemographic and Obstetric characteristics of respondents

Variables	Frequency(n=297)	Percent(%)
Age group		
18-20	4	1.3
21-30	144	48.5
31-40	134	45.1
≥41	15	5.1
Mean age(yrs)31.1±5.8		
Occupation		
Business/self -employ	133	44.8
Civil servant	95	32.0
Full-time housewife	36	12.1
Work with private employer	20	6.7
Students	13	4.4
Educational status		
Nil formal	1	.3
Primary	5	1.7
Secondary	71	23.9
Tertiary	220	74.1
Marital status		.
Single	8	2.7
Married	282	94.9
Separated	7	2.4
Family size		
≤6	292	98.3
≥6	5	1.7
Gravidity		
1-4	279	93.9
≥5	18	6.1
Parity		
0-4	296	99.7
≥5	1	.3
Gestational age		
Ist Trimester	14	4.7
2nd Trimester	66	22.2
3rd Trimester	217	73.1
No of Under Fives		

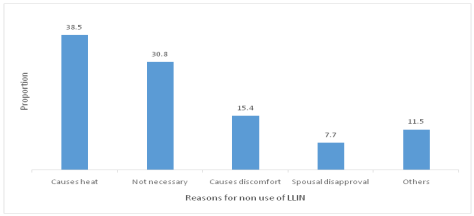

Figure 2: Barriers to use of LLIN among respondents with LLIN n = 26 (multiple responses allowed)

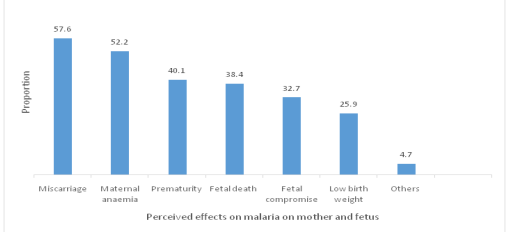

Figure 3. Perceived effects of malaria on mother and fetus n = 297 (multiple responses allowed)

Table 2: Malaria risk perception, ownership and use of LLIN of the respondents

Variables	Frequency(n=297)	Percent(%)
Risk perception		
Indifferent	22	7.4
Low	52	17.5
Moderate	105	35.4
High	118	39.7
Can malaria affect pregnancy?		
No	13	4.4
Yes	284	95.6
Ownership of LLINs		
No	131	44.1
Yes	166	55.9
Source of LLINs (N= 166)		
Purchased	9	5.4
Free fr om the health facility	121	72.9
Free from other sources	35	21.1
Others	1	0.6
LLINs usage among all respondents		
No	157	52.9
Yes	140	47.1
LLINs usage among respondents that has it (N= 166)		
No	26	15.7
Yes	140	84.3
Frequency of use (N= 140)		
Rare ly	3	2.1
Sometimes	50	35.7
Always	87	62.2
Used LLINs the previous night (N= 140)		
No	38	27.1
Yes	102	72.9
Other family members access to LLINs (N=297)		
No	193	65.0
Yes	104	35.0

Table 3: Practices of other Malaria preventive strategies among the respondents

Variables	Frequency (n=297)	Percent(%)
Use Sulfadoxine-pyrimethamine (SP)		
No	56	18.9
Yes	241	81.1
Number of doses of SP used (n= 241)		
1	80	33.2
2	74	30.7
3	68	28.2
4	19	7.9
Have nets on windows		
No	87	29.3
Yes	210	70.7
Use insecticides indoor		
No	88	29.6
Yes	209	70.4
Bush clearing		
No	89	30.0
Yes	208	70.0
Cleaning drainages		
No	94	31.6
Yes	203	68.4
Application of mosquito repellent		
No	204	68.7
Yes	93	31.3
Wearing protective clothing		
No	191	64.3
Yes	106	35.7

Table 4: Malaria history among the respondents

Variables	Frequency	Percent(%)
History of fever in index pregnancy (n=297)		
No	199	67.0
Yes	98	33.0
Number of times respondents had fever (n=98)		
Once	87	88.8
Twice	8	8.2
Thrice and more	3	3.0
Had test for malaria(n=98)		
No	14	14.3
Yes	84	85.7
Method of diagnosis(n=84)		
RDT	34	40.5
Microscopy	39	46.4
Not sure	11	13.1
Test result(n=84)		
Negative	6	7.1
Positive	78	92.9
Antimalaria used(n=78)		
ACT	47	60.2
Quinine	4	5.1
Injections	25	32.1
Others	2	2.6

Table 5: Association between ownership/use of LLIN and sociodemographic characteristics among the respondents

Variables	Has LLIN		[a]Test statistic,(p-value)	Use LLIN		[a]Test statistic,(p-value)
	No	Yes		No	Yes	
	n=131	n=166		n=26	n=140	
Age group						
≤20	1(25.0)	3(75.0)	χ^2=2.65,(p=0.45)f	2(66.7)	1(33.3)	χ^2=8.71,*(p=0.023)
21-30	67(46.5)	77(53.5)		11(14.3)	66(85.7)	
31-40	59(44.0)	75(56.0)		9(12.0)	66(80.0)	
≥41	4(26.7)	11(73.3)		4(36.4)	7(63.6)	
Educational status						
Nil formal	0(0.0)	1(100.0)	χ^2=1.68,(p=0.761)f	0(0.0)	1(100.0)	χ^2=8.52,*(p=0.026)f
Primary	3(60.0)	2(40.0)		2(100.0)	0(0.0)	
Secondary	29(40.8)	42(59.2)		4(9.5)	38(90.5)	
Tertiary	99(45.0)	121(55.0)		20(16.5)	101(83.5)	
Occupation						
Full time house wife	13(36.1)	23(63.9)	χ^2=10.95,*(p=0.027)	2(13.3)	21(86.7)	χ^2=9.74,)
Civil servant	37(38.9)	58(61.1)		6(10.3)	52(89.7)	*(p=0.032)f
Business/self employed	60(45.1)	73(54.9)		14(19.2)	59(80.8)	
Work with private employer	10(50.0)	10(50.0)		2(20.0)	8(20.0)	
Students	11(84.6)	2(15.4)		2(100.0)	0(0.0)	
Marital status						
Single	6(75.0)	2(25.0)	χ^2=3.11,(p=0.232)f	0(0.0)	2(100.0)	χ^2=0.41,)
Married	122(43.3)	160(56.7)		26(16.3)	134(83.7)	(p=1.0)f
Separated	3(42.9)	4(57.1)		0(0.0)	4(100.0)	
Gravidity						
1-4	123(44.1)	156(55.9)	χ^2=0.001,(p=0.976)	22(14.1)	134(85.9)	χ^2=4.77,(p=0.052)f
≥5	8(44.4)	10(55.6)		4(40.0)	6(60.0)	
Parity						
≤4	131(44.3)	165(55.7)	χ^2=0.792,(p=1.0)f	25(15.2)	140(84.8)	χ^2=5.42,(p=0.157)f
≥5	0(0.0)	1(100.0)		1(100.0)	0(0.0)	
Family size						
≤6	128(43.8)	164(56.2)	χ^2=0.521,(p=0.658)f	25(15.2)	139(84.8)	χ^2=1.81,(p=0.29)f
≥6	3(60.0)	2(40.0)		1(50.0)	1(50.0)	
Gestational age						
1st Trimester	9(64.3)	5(35.7)	χ^2=5.86,(p=0.053)	0(0.0)	5(100.0)	χ^2=1.81,(p=1.0

DISCUSSION

This study assessed the ownership and utilization of LLINs among pregnant women attending the antenatal clinic in a tertiary health facility in Southwest Nigeria. The 55.9% ownership of LLINs among the respondents in this study was suboptimal as it was a far cry from the 100% target set by the Global Technical Strategy for Malaria 2016-2030,[8] and the national malaria program to achieve coverage for all at-risk populations.[17] This figure is also lower compared to findings in other studies in Bayelsa state, Nigeria - 84.2%,[17] Myanmar - 96%,[22] and Ethiopia - 99.6%.[23]

Furthermore, having LLINS does not necessarily translate to using it, as observed in our study, with as many as 16% of respondents who had the LLINs not using it. Among the respondents that had the LLINs and reported using it, 6 in 10 used it consistently, and 7 in 10 used it the previous night. Overall, less than half (47.1%) of our study's respondents reported using LLINs in the index pregnancy, which falls short of the recommended 80% target for utilization.[17] The utilization rate of LLINs in this study is higher compared with the 34.4% reported in Oshogbo, also in Southwest Nigeria,[27] but however lower when compared to the 78% reported in Bayelsa State, Southsouth Nigeria,[17] 78.5% in Uganda,[24] 74.3% in Ethiopia,[23] and 69% in Mozambique.

The suboptimal ownership and utilization observed in this study pose a threat to achieving the WHO vision of a world free of malaria by 2030.[8] A major factor that could have contributed to the low ownership and utilization of LLINs among respondents in this study was their poor malaria risk perception, the higher the risk perception in a population, the higher their likelihood of taking prevention seriously. Therefore, this study's suboptimal utilization and ownership is not surprising, as less than half of our respondents had high malaria risk perception, which may explain why some of the respondents believed using LLINs was unnecessary. This is similar to findings in a review on ownership and use of LLINs in pregnancy in Sub-Saharan Africa, where it was reported that pregnant women found not to have the LLINs either complained of not knowing where to get them or not seeing the need for it.[18] Therefore, pregnant women need continuous enlightenment on the menace of malaria and why it is essential to use preventive measures such as the LLINs.

Despite the poor risk perception of malaria in this study, most of the women had Sulfadoxine-pyrimethamine as prophylaxis(IPTp) for malaria, and the majority practised environmental and other entomological control measures recommended as part of the multi-strategy approach to malaria prevention by WHO, even though this may not be done purposely for preventing malaria in pregnancy. For instance, sulfadoxine-pyrimethamine, a routinely administered drug given to women attending antenatal clinics immediately after quickening, could have been taken like any other routine drug without knowing its importance in preventing malaria in pregnancy. Hence, there is a need to continuously educate pregnant women attending the antenatal clinic on the dangers of malaria in pregnancy and the various strategies to preventing it

Barriers to the usage of LLINs reported by respondents in this study were that it causes heat and discomfort, some respondents did not see the need for it, and others complained of spouse disapproval of its use; similar findings were reported in studies Maiduguri, Nigeria,[11] Enugu Nigeria,[12] Bayelsa Nigeria,[17] and Mozambique.[6] This underscores the significance of educating both partners on the risk of malaria in pregnancy and the role of LLINs in protecting pregnant women and children.

CONCLUSION

This study showed that the ownership and utilization of LLINs were suboptimal, which may be attributed to poor risk perception for malaria among respondents. The significant barriers to ownership and utilization clearly show that many of the respondents lack adequate knowledge of the importance of LLINs coupled with spousal disapproval. Therefore, there is need for more awareness campaigns to educate pregnant women and their spouses on the dangers of malaria and the

benefits of using LLINs in addition to other preventive practices. Also, the government at all levels should adopt innovative approaches to ensure equitable access to LLINs for all women, irrespective of where they live.

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