Assessment of the level of use of Long Lasting Insecticide Treated Nets among Pregnant women attending Antenatal Clinic in a Tertiary Health facility in Osun State, South-west Nigeria

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ABSTRACT

Background: Malaria in pregnancy is a serious health problem in tropical and subtropical regions of the world with dangerous consequences to the mother and threat to the unborn child. An approach currently used for its reduction is the utilization of Long Lasting Insecticide Treated Net (LLIN). Though LLIN has been found to be one of the cheapest and most effective interventions against malaria infection if used consistently and properly, the level of malaria among pregnant women in this region still calls for concern, and the impetus for this study. The purpose of the study was to determine the level of use of LLIN among respondents in Antenatal Clinic (ANC) of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria. This is to identify factors associated with the use or non-use of LLINs to establish its level of acceptance.

Methods: It was a descriptive cross-sectional study that used a pre-tested interviewer administered questionnaire to obtain information on the socio-demographic characteristics, gravidity, gestational age, use of LLIN, and factors associated with use or non-use of LLIN. Two hundred pregnant women who attended the ANC and met the inclusion criteria were recruited. The data was analysed using Statistical Package for Social Science (SPSS).

Results: A total of 200 respondents took part in this study and 65.5% of them were found to own LLIN. Among the respondents, 12.5% were consistent users of LLIN, 53.0% were occasional users while 34.5% were non-users. Among the consistent users, a major reason associated with the use of LLIN was the awareness that it could prevent malaria (85.7%). The non-users did not own LLIN and the main reasons given for not having was ignorance (42.0%) and use of doors and windows net (21.7%).

Conclusions: The study revealed that the level of use of LLIN among the study respondents was poor, therefore malaria preventive education is strongly recommended for malaria knowledge and adherence to LLIN use in pregnant women.

Keywords: Long Lasting Insecticide Treated Net, Pregnant women, Antenatal Clinic

INTRODUCTION

Malaria is a serious health problem in tropical and subtropical regions of the world.[1] Each year about 300-500 million malaria infections and 2.5 million malaria-related deaths are reported worldwide.[1,2] Twenty-five million pregnant women are at risk of malaria, which may indirectly contribute to about 25% of all maternal deaths.[3] Nigeria is currently rated as second to the last country on the Maternal Mortality Index Scale in Africa with the rate of 800 deaths per 100,000 live births and malaria-related death has been attributed.[4] Malaria is transmitted through the bite of an infected female Anopheles mosquito[5] and most victims are children less than 5 years and pregnant women.[6] The protection of pregnant women living in malaria endemic countries has been of particular interest to National Malaria Control Programmes (NMCP) because of the higher susceptibility and reduced immunity among pregnant women.[7] An approach currently used for malaria reduction programme is utilization of Long Lasting Insecticide Treated Nets (LLIN) to protect from mosquito bite.[8]

LLIN is a mosquito net that has been impregnated with an insecticide such as pyrethroid that repels, disables and/or kills mosquitoes coming into contact with the insecticide on the netting material.[9] Results of recent research suggested that LLIN use can reduce malaria

episodes by 48% to 50%,[10] and also reduces the incidence of low birth weight (LBW) by 23% in the first few pregnancies[10,11] and reduces the risk of foetal loss. LLINs have been shown to be beneficial and should be included in strategies being promoted to reduce the adverse effects of malaria in pregnant women in endemic areas of the world. The efficacy and cost-effectiveness of LLINs in reducing malaria related morbidity and mortality had led to massive efforts to distribute millions of free or highly subsidized LLINs to vulnerable population in Sub-Saharan Africa.[12] In South Western Nigeria, a study among 246 health workers showed that 93.5% were aware of LLINs, but only 20.9% had correct knowledge while only 22.5% were using it in their homes.[13] Also in a study to determine the proportion of mothers using LLINs for their children, awareness of LLINs was found in 184 (80%) of the 230 mothers interviewed, while only 48 (26.1%) used it for their children.[14] Two important core LLIN indicators for malaria control programmes are the proportion of households owning an LLIN and the proportion of vulnerable population sleeping under an LLIN. In order to be protected, household must not only own LLIN but also use them. Factors that contribute to non-use of LLIN are heat and the task of having to mount the net every night.[15] Other factors affecting use of LLIN included its high cost, perceptions of chemicals used to treat them as having dangerous effects on pregnancy, low utilization of antenatal care and husband's lack of interest in malaria prevention.[16]

LLIN function as a physical and chemical barrier and is proven to be an effective means of preventing malaria infection if used consistently and properly. It offers protection from malaria, and if used in enough household (at least 60-80% in an affected area), it will assist in breaking the malaria transmission cycle, thus reducing the risk for all who live nearby. The net provides protection at night, when individuals are vulnerable and most likely to contract the disease. LLINs are safe for children, simple to hang up and offer lasting protection. It is also safe for use as a personal protection method during pregnancy. Women should start using them as early in pregnancy as possible, and continue their use throughout pregnancy and in the postpartum period for both mother and child. With the burden of malaria in this environment, there is a need to assess the level of use of LLINs among pregnant women attending Antenatal Clinic (ANC) of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile- Ife.

Methods

The study was undertaken in Ile-Ife where the climate is tropical with two seasons: the rainy and dry seasons. The study was conducted at the ANC of Obstetrics and Gynaecology Department. The study population were pregnant women that presented for booking at the ANC of OAUTHC during the study period. The sample size was determined using the prevalence of malaria in pregnancy derived from a study carried out in South West Nigeria (Osogbo) which was 13%.[17] The minimum sample size was 174 and adding 10% attrition, the total number of pregnant women recruited was 191. The sample size was however rounded up to 200 (for more robust data). It was a descriptive cross-sectional study that used a pre-tested interviewer administered questionnaire to obtain information on the socio-demographic characteristics, gravidity, gestational age, use of LLINs, and possible factors associated with the use or non-use of LLINs. LLIN use was measured in three categories; consistent users were respondents who adhere to daily use of LLINs, occasional users were respondents who used the net the previous night[18] or any night during the week of the study, while non-users were respondents with non-use of LLINs during the week of the study or those who never used the net at all. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0.19 Summary statistics using mean, median and standard deviation for continuous variables such as age and gestational age. Frequency/percentages for categorical variables was generated for socio-demographic characteristics of the respondents, the level of use of LLINs by age, residence, socio-economic status, education & parity. Chi-square was used to examine the relationship between use of LLINs and socio-demographic characteristics of the respondents.

Ethical consideration

The study was reviewed by the Ethical committee of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife. After the purpose of the study was explained to the respondents, written informed consent was obtained prior to asking any questions.

Results

Table 1 Distribution of respondents by socio demographic characteristics (N=200)

Socio-demographic characteristics	F (n)	(%)	Mean±SD
Age			
<20	3	1.5	30.03±4.97
20-34	163	81.5	
35-49	34	17	

Ethnicity		
Yoruba	172	86
Others (Igbo, Hausa)	28	14
Marital Status		
Single/Co-habiting	8	4
Married	192	96
Education		
Primary	7	3.5
Secondary	35	17.5
Tertiary	158	79
Occupation		
Civil servant/Professional	67	33.5
Self-employed/Trader/Artisan	87	43.5
Others (Unemployed, housewife, student)	46	23
Residence		
Rural	52	26
Urban	148	74
Religion		
Christianity	165	82.5
Islam	35	17.5
Socio-economic status		
High	147	73.5
Middle	37	18.5
Low	16	8
Household size		
< 5	165	82.5
5 – 9	32	16
>=10	3	1.5
Gravidity		
Primigravidae	61	30.5
Multigravidae	139	69.5
Trimester		
1st	22	11
2nd	178	89

A total of two hundred (200) respondents were recruited and pregnant women aged 20-34 years constituted a majority (81.5%). Since the study was conducted in a Yoruba dominated community, majority of the respondents were Yoruba (86.0%) with a few from other ethnic groups. As expected, most of the study respondents were married (96.0%) while others were singles or co-habiters (Table1). The level of education and socio-economic status of the respondents was relatively high with 79.0% having tertiary education and 73.5% in the high socio-economic class. The civil servants and professionals constituted 33.5% of the respondents, while 43.5% were either self-employed, traders or artisans. Others which were unemployed, housewife or students constituted 23.0% of the respondents. As expected, majority (74.0%) of the respondents resided in the urban areas since the study location was in an urban area. Also most (69.5%) of the pregnant women were multigravidae, lived in households with less than five persons (82.5%) and were in their second trimester (88.5%).

Table 2: The level of LLIN ownership and use among the pregnant women

Variables	Frequency (n)	Percentage (%)
Ownership of LLINs (200)		
Have	131	65.5
Do not have	69	34.5
Frequency of LLIN use in the previous week (200)		
Consistent	25	12.5
Occasional	106	53
Non-use	69	34.5
Raining season	94	71.8
Both raining and dry season Dry season	37	28.2
season Dry season	0	0
Husband influence on use of LLIN (131)		
Supports and encourages use of net	71	54.2
Indifferent	54	41.2
Does not like sleeping under the net	6	4.6

Level of LLIN Ownership and Use

In table 2, most 131(65.5%) of the study respondents owned LLIN while only 25(12.5%) slept under it every night. Majority 94 (71.8%) of the users do consider season in their usage and in most of the women, their husbands either support 71(54.2%) or are indifferent 54 (41.2%) to LLIN use.

Relationship between Socio-demographic Characteristics and Consistency of LLIN Use

In table 3, it was observed that religion showed a significant relationship with consistency of LLINs use among the respondent ($p<0.05$). Proportion of consistent users was higher among the Muslims (25.7%) compared to the Christians (9.7%). Among the urban dwellers, 20(13.5%) were consistent users of LLIN while 20(12.7%) of those with tertiary education also used LLIN consistently. It was also observed that 19(12.9%) of those in the higher socio-economic class used LLIN consistently but these relationships were not statistically significant.

Table 3: Factors associated with consistent use of LLINs among pregnant women

Socio-demographic characteristics	Consistency of LLINs use: Non-use (N=69)	Occasional (N=106)	Consistent (N=25)	Total	χ2	df	p-value
Age Groups	**n(%)**	**n(%)**	**n(%)**				
< 25 years	10 (40.0)	11 (44.0)	4 (16.0)	25	0.960LR	2	0.619
≥ 25 years	59 (33.7)	95 (54.3)	21 (12.0)	175			
Residence							
Rural	23 (44.2)	24 (46.2)	5 (9.6)	52	3.018	2	0.221
Urban	46 (31.1)	82 (55.4)	20 (13.5)	148			
Education							
Secondary or lower	16 (38.1)	21 (50.0)	5 (11.9)	42	0.305	2	0.859
Tertiary	53 (33.5)	85 (53.8)	20 (12.7)	158			
Socio-economic Status							
High	50 (34.0)	78 (53.1)	19 (12.9)	147	1.319LR	4	0.858
Middle/Low	19 (35.8)	28 (52.8)	6 (11.3)	53			
Ethnicity							
Yoruba	56 (32.6)	94 (54.7)	22 (12.8)	172	2.058	2	0.357
Others (Hausa, Igbo)	13 (46.4)	12 (42.9)	3 (10.7)	28			
Marital Status							
Unmarried (Single/co-habiting)	3 (37.5)	5 (62.5)	0 (0.0)	8	2.197 LR	2	0.333
Married	66 (34.4)	101 (52.6)	25 (13.0)	192			
Religion							
Christianity	61 (37.0)	88 (53.3)	16 (9.7)	165	7.613	2	0.022
Islam	8 (22.9)	18 (51.4)	9 (25.7)	35			
Occupation							
Civil Servant/Professional	16 (23.9)	39 (58.2)	12 (17.9)	67	7.486	4	0.112
Self-employed/ Trader/Artisan	32 (43.2)	34 (45.9)	8 (10.8)	74			
Others (unemployed, housewife)	21 (35.6)	33 (55.9)	5 (8.5)	59			
Household size							
< 5	56 (33.9)	87 (52.7)	22 (13.3)	165	0.673LR	2	0.714
≥ 5	13 (37.1)	19 (54.3)	3 (8.6)	35			
Gravidity							
Primigravidae	27 (44.3)	30 (49.2)	4 (6.6)	61	5.146	2	0.076
Multigravidae	42 (30.2)	76 (54.7)	21 (15.1)	139			
Gestational Age							
1st trimester	5 (22.7)	14 (63.6)	3 (13.6)	22	1.546	2	0.462
2nd trimester	64 (36.0)	92 (51.7)	22 (12.4)	178			

Table 4: The reasons for use of LLIN among the pregnant women

Reasons for consistent use (25)	Frequency (n)	Percentage (%)
Prevent malaria	22	88.0
Habit formed from school	2	8.0
Husband insists	1	4.0

Reasons for Use of LLINs

Table 4 shows the reasons for consistent use of LLIN among the study respondents. Majority 22(88.0%) used LLIN consistently because they believed it prevents malaria.

Reasons for not having LLINs

In Table 5, the main reasons given for not having LLIN among the study respondents was ignorance 29(42.0%) and because doors and windows are fitted with nets 15(21.7%).

Table 5: The reasons for not having LLIN among the pregnant women.

Reasons for not having LLIN (69)	Frequency (n)	Percentage (%)
Ignorance	29	42.0
Because Doors/windows are fitted with net	15	21.7
For other reasons (space, mounting)	10	14.5
Don't know about it	6	8.7
Cannot afford the price	5	7.2
Don't know where to get one	3	4.4
Design of bed does not fit	1	1.5

Discussion

Pregnant woman are particularly at risk of malaria because of the reduction in immunity. The use of LLIN by pregnant women is a strongly recommended approach to malaria prevention in pregnancy as it ensures not only the prevention of malaria in the mother but also in the fetus.[20] This study purposed to assess the level of use of LLINs among pregnant women and determine the possible reasons for the trends observed. The study revealed that the level of use of LLIN among the study respondents was poor.

Level of LLIN Ownership and Use among the Pregnant Women

The present study observed that although 65.5% of the study respondents owned LLIN, only 12.5% slept under it every night. This infers that ownership of LLIN does not necessarily translate to its use. A similar trend was observed in a cross-sectional study done by Atenchong et al in 2016 in Rivers State where 71.2% of the respondents owned LLIN while 15.5% of them slept under it every night.21 Also, in a cross-sectional study done by Ukibe et al in 2014 in Anambra State, it was discovered that although 60% of the study respondents owned a LLIN, only 23% of them slept under it every night.[22]

However contrary to the findings of this present study, a cross-sectional study done by Nyamngee et al in 2014 in Ado Ekiti revealed that despite free donation of LLIN to all (385) the study respondent, 54% of them slept under it every night.[23] Also Sangare et al in Jinga, Uganda, observed in a cross- sectional study done in 2012 that of the 72% respondents that owned LLIN, 56% of them slept under it every night.[24] Though the rates found in these previous studies are higher than that obtained in the present study, just as in this study they are still short of the World Health Assembly (WHA) target of 80% use of LLIN among pregnant women.[25] Majority (53.0%) of the respondents in this present study slept under LLIN occasionally. This implies that a great proportion of the pregnant women were at risk of malaria by sleeping under LLIN only occasionally. Contrary to these findings, Atenchong et al[21] reported 14.1% while Ukibe et al[22] and Nyamngee et al[23] reported 21% respectively slept under LLIN occasionally. This study finding, when compared to other studies, can largely be explained by lack of malaria preventive education with emphasis on benefits of its use. It should also be emphasized that efficacy of LLIN is guaranteed only when consistently used.[11,26]

It was noted that those that do not own a LLIN among the respondent in the present study were 34.5%. Also these were the same proportion of women who did not use LLIN in the study. This shows the importance of making LLIN accessible to those that do not have to encourage its use. However, 57.8% of non-users was reported by Atenchong et al[21], Ogbeide et al[26] observed that 20% of the study respondents never slept under a LLIN while Sangare et al[24] revealed that 11% of the study respondents never slept under it. The pattern of non-use of LLIN in the previous studies emphasizes the need for behavioural change through malaria preventive education.

The relationship between the socio-demographic characteristics of the study respondents and consistent use of LLIN was investigated during the study. In this present study, it was observed that the proportion of consistent users was higher among the Muslims compared to the Christians. This is likely to be due to the larger proportions of Christians among the study population. However, Sangare et al discovered that Muslim women were less likely to consistently use a LLIN compared to Christian women in their study.[24] Apart from religion, no other socio-demographic variable showed a significant relationship with consistency of LLINs use among the study respondents ($p < 0.05$).

The Reasons for Use of LLIN among Pregnant Women

Among the 12.5% of the study respondents who slept under LLIN every night, majority (85.7%) of them did so because they believed it could prevent malaria. This is similar to the findings of Runsewe et al who also discovered 72.2% of their study respondents used LLIN consistently due to belief in its ability to prevent malaria.[27] Similarly, a population based study done in 18 Nigerian states by Ezire et al in 2015 revealed that confidence to hang the LLIN and the awareness that its consistent use can protect a pregnant woman from malaria, facilitated its use.[28] Therefore, it can be

inferred from the present and previous studies that increased awareness of the benefits of LLIN can actually facilitate its use.

The Reasons for not having LLIN among Pregnant Women

In the present study, the main reasons given by the respondents for not having LLIN was ignorance (42.0%) and because doors and windows are fitted with net (21.7%). It was quite interesting that pregnant women attending ANC of a tertiary hospital were ignorant of the benefits of LLIN. It was expected that such respondents should have been well informed. However, contrary to this, a study done by Ndubuisi in Enugu state observed that the most significant reasons for not having LLIN among their study respondents was inability to afford the price and not knowing how to get it.29

Also, Belay et al in a study done in Ethiopia noted that lack of access to LLIN (68.3%) and the perception that nets could not prevent malaria (27%) were the main reasons for non-ownership of LLIN.30 The findings of this study when compared to others shows there is a need to increase the awareness of LLIN benefits among the study respondents. Limitations of this study are mainly attributed to its cross-sectional nature and the possibility of information bias based on self- reporting on the use of LLIN.

Conclusion

These findings suggest that the use of LLIN by pregnant women was poor and this can be improved through malaria preventive education with emphasis on the benefits of LLIN. Messages given should persuade women on importance of LLINs as a tool for malaria prevention and control.

Recommendation

There is a need to strengthen the policy of malaria preventive education as an integral component with distribution of free LLIN in primary health care setting to enhance utilization. Understanding malaria preventive measures by pregnant mothers is an essential element in malaria control thus Family Physicians should intensify appropriate behavior change interventions that emphasize the efficacy of consistent use of LLIN for malaria prevention in pregnancy. The government and other funding agencies should ensure improvement in the availability of LLIN in order to enhance it utilization. The ANC home-visit team to ensure adherence to consistent use of LLIN might also be appropriate for pregnant women.

Conflict of interest: We the authors declare that we have no financial or personal relationship(s) which may have inappropriately influenced us in writing this paper.

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