



## Utilization of Insecticide Treated Nets among Pregnant Women Attending Antenatal Clinic in a Suburban Referral Hospital, North-East Nigeria

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### Authors' contributions

All the authors collaborated and worked together. Author SMI performed study design, data collection and preparation of the initial draft of the manuscript. Authors NIU and NAG performed the statistical analysis and final drafting of the manuscripts. Authors HAU, BGB and BI performed the reviewing of the final manuscript. All authors read and approved the final manuscript.

Short Communication

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### ABSTRACT

**Aim:** The aim of this study was to assess the knowledge and usage of ITNs among pregnant women attending antenatal clinic in a referral health facility in Nigeria.

**Materials and Methods:** This was a cross-sectional study carried out at the antenatal clinic of the Federal Medical Centre Azare, North-East Nigeria between October and December 2012. A structured questionnaire was administered on consenting consecutive pregnant women until the sample size was reached. Data obtained were analysed and associations were compared using  $\chi^2$  and Fisher's exact test where applicable, with P-value <0.05 considered significant.

**Results:** A total of 197 pregnant women were recruited and interviewed. The maternal age ranged from 17-45 years with mean age of 24.2±5.5 years while the parity ranged from 0-11 with multipara constituting 95 (48.22%) and grand multipara, 29 (14.72%).

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While only 31 (15.74%) of the respondents had tertiary level of education, 64(32.49%) and 15(7.61%) of them had secondary and primary levels of education respectively. Twenty five (12.69%) had no formal education. Majority of the clients, 162 (82.23%) were unemployed, 14 (7.11%) were civil servants and 17 (8.63%) were petty traders. Although most of the women, 189 (95.94%), had knowledge of ITNs, only 132 (67.01%) owned them and much less, 97 (49.24%), used them. Para 5 and above were significantly more likely to use ITNs than para 1-4 and para 0 ( $\chi^2=21.118$ ;  $P=0.03$ ). Age, educational status, occupation, ethnic groups and religion ( $\chi^2=1.084$ ;  $P=0.30$ ) did not influence the use of ITNs.

Thirty two (32.00%) and 23 (23.00%) of the ITN non-users gave heat and poverty respectively, as reasons for non utilization.

**Conclusion:** Only few of the clients studied utilized ITNs mainly because of heat and poverty. Education of pregnant women to correct the myths associated with the use of ITNs will improve compliance rate.

*Keywords: Insecticide-treated bed net; Nigeria; pregnancy; utilization.*

## 1. INTRODUCTION

Malaria can be life-threatening but it is preventable [1]. It is a major public health problem in pregnancy in the tropical and sub-tropical regions of the world [2], with over 30 million pregnancies threatened throughout Africa each year [3]. It accounts for 11% of maternal mortality and 12-30% of under 5 mortality in Nigeria, the worst hit country in Africa [4]. The effects of malaria in pregnancy depend on the intensity of *Plasmodium* load and the level of immunity of the pregnant woman [5,6].

The burden of malaria, its prevention and control remain a challenge despite the existence of effective technologies [5]. The use of ITNs during pregnancy reduces the overall risk of morbidity and mortality among pregnant women and their infants by reducing numbers of infective mosquito bites by 70-90% in various geographical settings [7,8]. The WHO's Roll Back Malaria (RBM) initiative launched in 1998 was targeted at the prevention and management of malaria during pregnancy using insecticide treated nets (ITNs), among other measures [9]. In realization of the effectiveness of ITNs against malaria, there have been improvements in its production. Between 2008 and 2010, a cumulative total of 289 million ITNs were delivered to sub-Saharan Africa, enough to cover 76% of the 765 million persons at risk [10]. Unfortunately, the utilization of ITNs in Nigeria is below the global targets with only 16% of households owning at least one ever-treated mosquito net and only 5% of pregnant women utilizing them [11,12].

Compliance with the use of ITNs has been poor in sub-Saharan Africa including Nigeria [13,14]. Studies in Nigeria and other parts of sub-Saharan Africa showed that the reasons for non-compliance with the use of ITNs included poor awareness, poverty and indifference [15,16]. Evidence suggests that malaria prevention and treatment choices are affected by knowledge of the problem [17,18].

The aim of this study was to assess the knowledge and usage of ITNs among pregnant women attending antenatal clinic in a suburban referral health facility in the Northeast Nigeria.

## 2. MATERIALS AND METHODS

This was a cross-sectional study carried out at the antenatal clinic (ANC) of the Federal Medical Centre (FMC) Azare, North-East Nigeria between October and December 2012. Ethical approval from the research and ethic committee was obtained. Sample size of 197 was calculated based on the utilization rate of insecticide treated nets (ITNs) of 13% reported from Sokoto [13]. A structured questionnaire was administered on consenting consecutive pregnant women until the sample size was reached. Data obtained and analysed using SPSS 14 software (SPSS, Chicago Ill., USA) included maternal socio-demographic characteristics and level of awareness and usage of ITNs. Associations were compared using  $\chi^2$  and Fisher's exact test where applicable and  $P$ -value  $<0.05$  was considered significant.

## 3. RESULTS

A total of 197 pregnant women were recruited and interviewed. Table 1 showed the sociodemographic characteristics of the respondents. The maternal age ranged from 17 to 45 years with mean age of  $24.2 \pm 5.5$  years. Majority of the respondents, 77 (39.09%), were in the age group 20-24 years while those aged 35-45 years constituted the least, 14 (7.10%). The parity ranged from 0 to 11 with majority, 95 (48.22%), in the para 1-4 group. Seventy three (37.06%) were para 0 while 29 (14.72%) were para 5 and above. Most of the women, 64 (32.49%), had secondary school education, 62 (31.47%) had only Quranic form of education and 25 (12.69%) had no formal education. One hundred and sixty two (82.23%) of the respondents were unemployed, 176 (89.34%) were Hausa/Fulani and 193 (97.97%) were Muslims.

Table 2 shows the knowledge of respondents, on insecticide treated nets. While equal number of respondents, 189 (95.94%), were aware of ITNs and believed that they could prevent malaria, only 132 (67.01%) owned ITNs. Overall, 97 (49.24%) of the respondents used ITNs translating to utilization rate of 73.48% among those that owned ITNs.

Table 3 shows that women who were para  $\geq 5$  were significantly more likely to utilize ITNs, followed by those who were para 1-4 ( $\chi^2=21.118$ ;  $P=0.03$ ). There was no statistically significant association between the age groups ( $\chi^2=22.014$ ;  $P=0.46$ ), educational status ( $\chi^2=5.075$ ;  $P=0.28$ ), occupation ( $\chi^2=0.112$ ;  $P=0.99$ ), ethnic groups ( $\chi^2=2.978$ ;  $P=0.70$ ) and religion ( $\chi^2=1.084$ ;  $P=0.299$ ) of clients and their usage of ITNs.

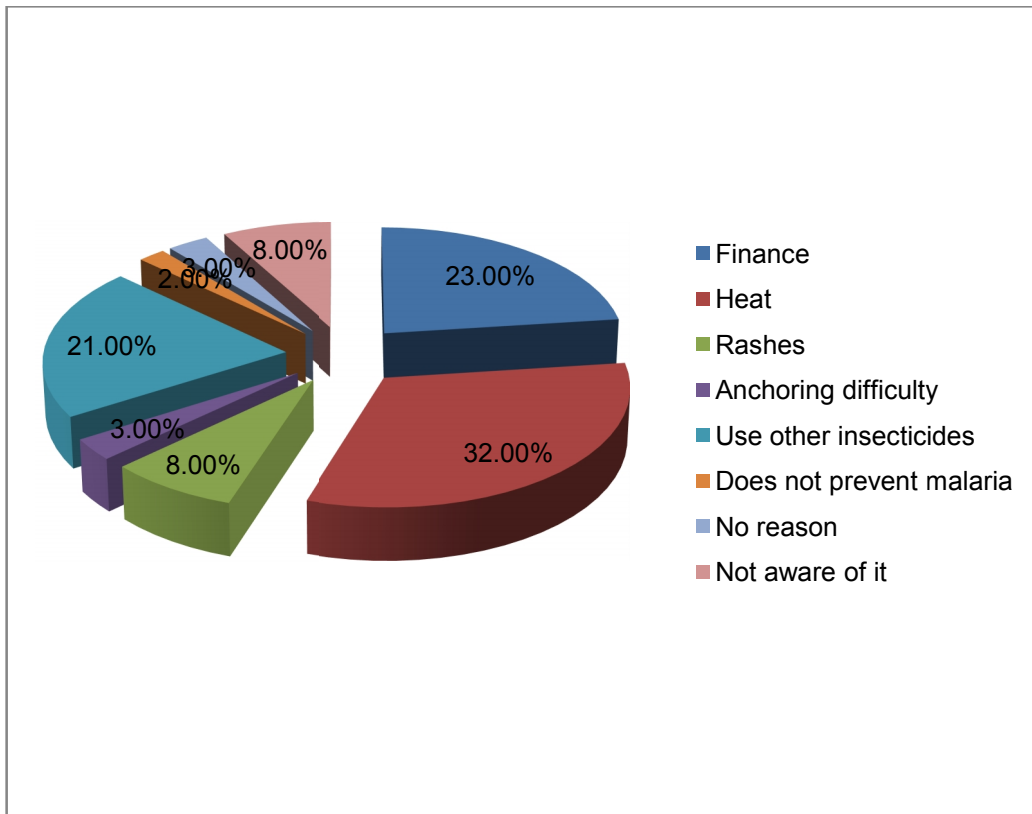
Fig. 1 depicts the reasons given by respondents for not having or utilizing ITNs. Most of the non users, 32 (32.00%), said sleeping under the ITNs causes increased heat, 23 (23.00%) gave financial difficulty as reason for not using it and 21 (21.00%) said they preferred and used insecticide spray. Three (3.00%) of them refused to use it because of anchoring difficulty while 2 (2.00%) of the non-users believed it could not prevent malaria.

**Table 1. Socio-demographic characteristics of Respondents**

<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Age Group (yrs)</b>		
<20	35	17.77
20-24	77	39.09
25-29	45	22.84
30-34	26	13.20
≥35	14	7.10
Total	197	100
<b>Parity</b>		
0	73	37.06
1-4	95	48.22
≥5	29	14.72
Total	197	100
<b>Educational Status</b>		
No formal Education	25	12.69
Primary	15	7.61
Secondary	64	32.49
Tertiary	31	15.74
Quranic	62	31.47
Total	197	100
<b>Occupation</b>		
Unemployed	162	82.23
Petty trader	17	8.63
Artisan	4	2.03
Civil servant	14	7.11
Total	197	100
<b>Ethnic Group</b>		
Hausa/Fulani	178	89.34
Kanuri	6	3.05
Yoruba	3	1.52
Igbo	1	0.51
Others	11	5.58
Total	197	100
<b>Religion</b>		
Islam	193	97.97
Christianity	4	2.03
<b>Total</b>	<b>197</b>	<b>100</b>

**Table 2. Knowledge of respondents on ITNs**

Characteristics	Frequency	Percentage (%)
<b>Awareness of ITNs</b>		
Yes	189	95.94
No	8	4.06
Total	197	100
<b>Believe ITNs can prevent malaria</b>		
Yes	189	95.94
No	8	4.06
Total	100	100
<b>Ownership of ITNs</b>		
Yes	132	67.01
No	65	32.99
Total	197	100
<b>Usage of ITNs</b>		
Yes	97	49.24
No	100	50.76
<b>Total</b>	<b>197</b>	<b>100</b>



**Fig. 1. Reasons for non usage of ITNs**

Table 3. Usage of ITNs among respondents

Characteristics	Usage of ITNs N (%)		Total
	Yes	No	
<b>Age Group (yrs)</b>			
<20	18(51.43)	17(48.57)	35
20-24	38(49.35)	39(50.65)	77
25-29	21(46.67)	24(53.33)	45
30-34	12(46.15)	14(53.85)	26
≥35	8(57.14)	6(42.86)	14
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=22.014; P=0.46$		
<b>Parity</b>			
0	30(41.10)	43(58.90)	73
1-4	51(53.68)	44(46.32)	95
≥5	16(55.17)	13(44.83)	29
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=21.118; P=0.03$		
<b>Educational Status</b>			
No formal Education	15(60.00)	10(40.00)	25
Primary	4(26.67)	11(73.33)	15
Secondary	29(45.31)	35(54.69)	64
Tertiary	16(51.61)	15(48.39)	31
Quranic	33(53.23)	29(46.77)	62
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=5.075; P=0.28$		
<b>Occupation</b>			
Unemployed	79(48.77)	83(51.23)	162
Petty trader	9(52.94)	8(47.06)	17
Artisan	2(50.00)	2(50.00)	4
Civil servant	7(50.0)	7(50.0)	14
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=0.112; P=0.99$		
<b>Ethnic Group</b>			
Hausa/Fulani	86(48.86)	90(51.14)	176
Kanuri	2(33.33)	4(66.67)	6
Yoruba	1(33.33)	2(66.67)	3
Igbo	1(100)	0(0.00)	1
Others	7(63.64)	4(36.36)	11
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=2.978; P=0.70$		
<b>Religion</b>			
Islam	94(48.70)	99(51.30)	193
Christianity	3(75.00)	1(25.00)	4
<b>Total</b>	<b>97</b>	<b>100</b>	<b>197</b>
	$\chi^2=1.084; P=0.30$		

#### **4. DISCUSSION**

Findings from this study indicated that although majority of the pregnant women were aware of ITNs and believed they could prevent malaria, only 49% of them used ITNs. This finding is consistent with reported low usage rate of less than 50% despite high level of awareness among pregnant women in Nigeria and other parts of sub-Saharan Africa [13,14,19-22]. Various reasons including level of education and marital status have been reported to influence the utilization of ITNs [23,24]. In this present study, only increasing parity was found to positively influence utilization of ITNs significantly. This could be due to frequent access to health education at antenatal care, where information about malarial prevention is given.

It is surprising that increased awareness did not translate to high level of usage of ITNs. This negative attitude has been reported among women in the rural South-West of Nigeria [25]. Besides financial difficulty, side effects of ITNs given by respondents might have contributed to the negative attitudes towards their usage. Heat was the major side effect reported by non-users. Similar reason has been reported in other studies in Africa [13,20]. The typical African hot weather and erratic electricity supply to power fans and air-conditioners could explain this. Although not documented in the studied population, the typical large family size and room overcrowding in our setting may be another reason for heat experienced by users of ITNs. All these reported side effects might have contributed to the low usage as documented in a similar study carried out by Joel et al. [20].

Poverty given by 23 % of non-users as a reason for not using ITNs despite being aware of their usefulness calls for inclusion of pregnant women attending tertiary health centres in Nigeria in the free ITNs distribution list. Free distribution of ITNs in Nigeria is concentrated in Primary and secondary health care centres, leaving out patients attending tertiary health facilities [19].

#### **5. CONCLUSION**

Although majority of the respondents were aware of and believed that ITNs can prevent mosquito bites and malarial transmission, only few used them because of mainly heat and poverty. It is therefore recommended that free ITNs distribution programme of the Federal Government of Nigeria should be scaled up for effectiveness. Education of the pregnant women to correct the myths associated with use of ITNs and improvement in financial status and living conditions of the pregnant women will improve the utilization of ITNs. Further study may be required at the community level to determine the actual cause or the basis for the side effects given by the respondents.

#### **CONSENT**

Consent was obtained from all the clients studied, for conduct of the study and publication of findings in scientific Journal. Ethical approval was also obtained from the research and ethic committee of the hospital. Statements on ethical approval have been included in the methodology section of this manuscript.

#### **ETHICAL APPROVAL**

Not applicable.

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## DECLARATION OF INTEREST

The authors report no declarations of interest.

## REFERENCES

1. Chiodini P, Hill D, Laloo D, Lea G, Walker E, Whitty C, et al. Advisory Committee on Malaria Prevention in UK Travellers. Guidelines for Malaria Prevention in Travellers from the United Kingdom 2007. London: Health Protection Agency; 2009. Available: [www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb\\_C/1195733830209](http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733830209)
2. World Health Organization. African Summit on Roll Back Malaria. Abuja, Nigeria. WHO/CDS/RBM. 2000;1.
3. National Population Commission. Nigeria indicator survey 2010: final report. Calverton, USA. ICF International. 2012;123.
4. Federal Ministry of Health National Malaria Control Programme. Strategic plan 2009-2013: "A road map for malaria control in Nigeria", abridged version. Abuja. Yaliam press Ltd. 2009;155.
5. World Health Organization. Strategic framework for malaria control during pregnancy in the WHO African region. WHO, Geneva; 2003.
6. Tako EA, Zhou A, Lohoue J, Leke R, Taylor DW, Leke RSG. Risk factors for placental malaria and its effects on pregnancy outcome in Yaounde, Cameroon. *Am Trop Med Hyg.* 2004;72(3):236-245.
7. D'Alessandro U. The impact of a national impregnated bed net programme on the outcome of pregnancy in primigravidae in the Gambia. *Trans R Soc Trop Med Hyg.* 1996;90(5):487-92.
8. Steketee R, Nahlen B, Parise M, Menendez C. The burden of malaria in pregnancy in malaria-endemic areas. *Am J Trop Med Hyg.* 2001;64:28-35.
9. World Health Organization. Establishing a global partnership on roll back malaria. First partnership meeting. Geneva; 1998. Draft report -1999.
10. World Health Organization Global malarial programme. World Malaria Report -2010. Geneva. World Health Organization. 2010;204.
11. United Nations. The millennium development goals report 2008. New York. United Nations. 2008;52.
12. National population commission and ICF Macro. Nigeria 2008 demographic and health survey: key findings. Calverton, Maryland USA. 2009;12.
13. Isa AY, Nwobodo EI. Awareness and utilization of insecticide treated mosquito nets among pregnant mothers at a tertiary health institution in North-Western Nigeria. *Niger J Med.* 2009;18(2):175-8.
14. Njama D, Dorsey G. Urban malaria: primary care givers' knowledge, attitudes, practices and predications of malaria incidence in a cohort of Uganda children. *Trop Med Int Health.* 2003;8(8):685-92.
15. Adeneye AK, Jegede AS, Mafe MA, Nwokocha EE. A pilot study to evaluate malaria control strategies in Ogun state, Nigeria. *World Health Popul.* 2007;9(2):83-94.



16. Osero JS, Otieno MF, Orago AS. Maternal use of insecticide treated nets in the prevention of malaria among children under five years in Nyamira district, Kenya. *East Afr Med J*. 2005;82(10):495-500.
17. Karanja J, Wambari E, Okumu D. A study of awareness of malaria among kibera population: implication for community based intervention. *National Institute of Public Health Journal*. 2002;51:51-5.
18. Nyamongo IK. Health care switching behaviour of malaria patients in a Kenyan rural community. *Soc Sci Med*. 2002;54:377-386.
19. Okoye CA, Isara AR. Awareness on the use of insecticide-treated nets among women attending antenatal clinic in a tertiary health facility in South-South Nigeria. *Niger Med J*. 2011;52(2):67-70.
20. Joel OA, Abimbola OO. Utilization of insecticide treated nets during pregnancy among postpartum women in Ibadan, Nigeria: a cross-sectional study. *BMC Pregnancy and childbirth*. 2012;12:21.  
Available: <http://www.biomedcentral.com/1471-2393/12/21>
21. Kiwuwa M, Mufubenga P. Use of antenatal care, maternity services, intermittent presumptive treatment and insecticide treated bed nets by pregnant women in Lowero district, Uganda. *Malar J*. 2008;7:44.
22. Nganda RY, Drakeley C, Reyburn H, Marchant T. Knowledge of malaria influences the use of insecticide treated nets but not intermittent presumptive treatment by pregnant women in Tanzania. *Malar J*. 2004;3:42.
23. Shakira C. Malaria prevention among pregnant women in Kenya: socioeconomic factors affecting the usage of insecticide treated nets. *World Academy of Science, Engineering and Technology*. 2012;66:673-6.
24. Atieli HE, Zhou G, Afrane Y, Lee MC, Mwanzo I, Githeko AK, et al. Insecticide treated net (ITNs): ownership, usage and malaria transmission in the highlands of Kenya. *Parasites and Vectors*. 2011;4:1-10.
25. Akinleye SO, Falade CO, Ajayi IO. Knowledge and utilization of intermittent preventive treatment for malaria among pregnant women attending antenatal clinics in primary health care centres in rural southwest Nigeria: a cross-sectional study. *BMC Pregnancy Childbirth*. 2009;9:28.  
Available: <http://www.biomedcentral.com/1471-2393/9/28>

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