

Awareness, perception, and utilization of insecticides treated nets and intermittent preventive treatment of malaria among pregnant women in Sokoto, Nigeria

Umar M. Ango^{1*}, Aishatu M. Anka², Kehinde J. Awosan¹, Oche M. Oche¹, Abdulmumin Yakubu³, Mansur O. Raji¹

¹Department of Community Health, Usmanu Danfodiyo University, Sokoto, Nigeria, ²Department of Family Medicine, Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria, ³Department of Internal Medicine, Usmanu Danfodiyo University, Sokoto, Nigeria

ABSTRACT

Background: Malaria during pregnancy is a major public health problem in Nigeria and other sub-Saharan African countries, and it is one of the leading contributors to the unacceptably high maternal mortality ratio in the developing countries. This study aimed to determine the awareness, perception, and utilization of insecticides treated nets (ITNs) and intermittent preventive treatment of malaria (IPTp) among pregnant women in Sokoto, Nigeria.

Materials and Methods: This was a cross-sectional study among 307 pregnant women (selected by multi-stage sampling technique) attending the antenatal clinics of the health facilities in Sokoto State, Nigeria. A structured interviewer-administered questionnaire was used to collect data on the research variables. Data were analyzed using IBM SPSS version 20 statistical computer software package.

Results: The mean age of respondents was 27 ± 5.6 years, and a majority of them (63.8%) were aged 20–29 years. Most, 264 (86.0%) of the 307 respondents were aware of ITNs, and a majority of them (60.6%) were also aware of IPTp. Whereas most of the respondents perceived the use of ITN to be safe in pregnancy (93.2%), and protects both mother and baby from malaria in pregnancy (91.5%), the reverse is true of IPTp. Only about half of respondents (52.8%) own an ITN, and barely a third of respondents use ITN (33.8%) and IPTp (37.5%).

Conclusion: The findings of this study underscore the need for government to ensure universal access to ITNs, while healthcare workers should re-invigorate and sustain education of pregnant women on the benefits and safety of use of ITNs and IPTp.

Key words: Awareness, intermittent preventive treatment for malaria in pregnancy, insecticides treated nets, perception, pregnant women, utilization

INTRODUCTION

Malaria remains a major public health problem in Nigeria and the economic impact of the disease in the country is enormous with N132 billion lost to malaria annually in the form of prevention, treatment cost, and loss of man-hours.^[1,2] Despite the fact that malaria is preventable and treatable, more than 220 million cases are estimated to occur each year and approximately 785, 000 people die of the disease annually.^[3] It has been estimated that each year approximately 30 million women become pregnant in malaria-endemic areas of Africa.^[3] Malaria during pregnancy is a major public health problem in Nigeria and other sub-Saharan African countries, especial in malaria-endemic areas.^[4] It is responsible for maternal anemia and adverse pregnancy outcomes such as low birth weight and preterm birth during pregnancy.^[5] Malaria in pregnancy has been cited as one of the leading contributors to the unacceptably high maternal mortality ratio in the developing countries.^[6] It is known that of the approximately 50 million pregnant women who are annually exposed to malaria worldwide, more than

30 million of them live in the African region.^[3] Malaria has many deleterious effects on both the mother and the fetus, and this underscores the significance of making available to this group of people adequate and effective protection and case management.^[7] The World Health Organization^[3] had advocated a three-pronged approach to malaria control in pregnancy that includes the use of insecticides treated bed nets (ITNs), intermittent preventive treatment for malaria in pregnancy (IPTp), and case management (treatment). ITNs decrease both the number of malaria cases and death rates in pregnant women and their children; it has also been shown that women protected by ITNs every night during their four pregnancies produce 25% fewer underweight or premature babies.^[8] Reports from studies conducted across sub-Saharan Africa showed wide variations in the uptake of ITNs and IPTp. While a study conducted in Juba, South Sudan,^[9] reported a marginally lower IPTp uptake (61%) compared to ITNs utilization (87%), another study conducted in rural Kenya^[10] showed an abysmally low uptake of IPTp (6.8%) compared to ITNs utilization (82.4%).

Address for correspondence: U. M. Ango, Department of Community Health, Usmanu Danfodiyo University, Sokoto, Nigeria.
E-mail: drangoos@yahoo.com

Received: 10-11-17;

Revised: 30-11-17;

Accepted: 1-2-18

IPTp and use of insecticide-treated nets (ITNs) are the key components of malaria control strategy in Nigeria, but despite the documented evidence of the effectiveness of IPTp and ITNs in reducing the adverse effects of malaria during pregnancy their uptake and coverage in Nigeria remain low.^[11] Reports from studies conducted across Nigeria showed wide variations in the awareness and utilization of ITNs and IPTp. Whereas high levels of awareness of ITNs were obtained in studies conducted in Anambra state, Nigeria (91.0%) and Lagos state, Nigeria (77.0%), less than half (48.9%) of the pregnant women interviewed in a study conducted in Ogun state, Nigeria, were aware of ITNs.^[12-14] The most disturbing aspect is the abysmally low utilization of ITNs and IPTp even among pregnant women that were aware of them across the country.^[15] In a study conducted in a teaching hospital in Uyo, Nigeria, it was found that only 16.4% of the respondents who were aware of ITNs used it, and only 12.0% of those who were aware of IPTp used it.^[16] Another study conducted in 16 local government areas (LGAs) of 14 states in Nigeria reported that only 27% of pregnant women slept under ITNs, while only 6% and 3% took IPTp1 and IPTp2, respectively.^[17] Whereas the use of multiple preventive strategies remains the gold standard for malaria prevention among pregnant women, previous studies in Sokoto, Nigeria, by Oche *et al.*^[18] and Awosan *et al.*,^[19] were principally focused on awareness, knowledge, and utilization of ITNs. This study was conducted to assess the awareness, perception, and utilization of insecticide-treated nets and IPTp among pregnant women in Sokoto, Nigeria. The findings of the study would be useful to policymakers, human resource managers and other stakeholders in designing appropriate strategies and interventions for reducing the high burden of malaria in pregnancy in Nigeria.

MATERIALS AND METHODS

Study Design, Population, and Area

This was a cross-sectional study among pregnant women attending the antenatal clinics of the health facilities in Sokoto state, Northwestern Nigeria, in April and May 2015. Sokoto state has 23 LGAs with a land mass of 25,972 km² and an estimated population of 4,802,298 projected for 2015 based on the 2006 census.^[15] The state is divided into three health zones (East, West, and Central), and there are 619 health facilities.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 311 using the statistical formula for calculating sample size for cross-sectional studies,^[20] a 76.4% prevalence of awareness of ITNs among pregnant women from a previous study,^[16] a precision level of 5% and an anticipated response rate of 90%.

The eligible participants were selected by a multistage sampling technique. At the first stage, 1 LGA was selected out of the 7–8 LGAs in each of the three health zones by simple random sampling using the ballot option. Bodinga, Wurno, and Binji LGAs were selected from the West, East, and Central health zones respectively. At the second stage, a line listing of the health facilities in the selected LGAs was done, and 1 health facility was selected by simple random sampling using computer-generated random numbers. At the third stage, selection of participants was done in the selected health facilities by systematic sampling technique using the antenatal clinic attendance list in the

respective health facilities to constitute the sampling frame. Proportionate allocation of the study participants was done based on the weekly average antenatal clinic attendance in the respective health facilities.

Data Collection and Analysis

A structured interviewer-administered questionnaire was used to obtain information on study participants' sociodemographic characteristics, awareness, perception, and utilization of ITNs and IPTp. The questionnaire was pretested on 30 pregnant women attending the antenatal clinic of a health facility in Kware LGA (one of the LGAs not selected for the study). The necessary modifications were made based on the observations made during the pretesting. Five Community Health Officers and Five Health Information Officers assisted in questionnaire administration after pre-training on the conduct of survey research, the objectives of the study, selection of study participants and questionnaire administration. Data were analyzed using IBM SPSS version 20 computer statistical software package. The Chi-square test was used for bivariate analysis involving categorical variables. All levels of significance were set at $P < 0.05$.

Ethical Consideration

Institutional Ethical Clearance was obtained from the Ethical Committee of Ministry of Health, Sokoto state, Nigeria. Permission to conduct the study was obtained from the Ministry of Health, Sokoto state, Nigeria, and the management of the selected health facilities. Informed written consent was also obtained from the participants before data collection.

RESULTS

Sociodemographic Characteristics of Respondents

Out of the 311 questionnaires administered, 307 were adequately completed and found suitable for analysis, giving a response rate of 98.7%. The mean age of the participants was 27 ± 5.6 years, and a majority of them 196 (63.8%) were aged 20–29 years. Most of them were married (96.1%) and practiced Islam as religion (99.0%). Majority of the participants (53.4%) had only quranic education (53.4%), and a larger proportion of them (45.9%) were full-time housewives [Table 1]. Furthermore, a larger proportion of the participants (46.9%) were multigravidae as shown in Figure 1.

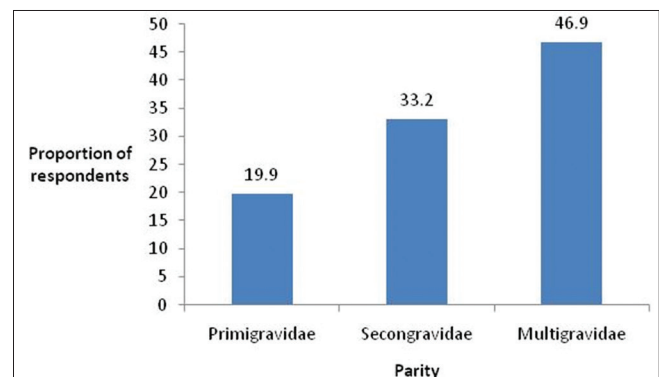


Figure 1: Parity of respondents

Awareness of ITNs and IPTp among Respondents

Most, 264 (86.0%) of the 307 participants have ever heard of ITNs, and a majority of them 186 (60.6%) were also aware of IPTp. Health workers were the main source information on ITNs (68.1%) and IPTp (83.9%) among the respondents that were aware of them. While about a third of respondents 80 (30.3%) obtained information on ITNs from radio/television, only a few respondents (12.9%) obtained information on IPTp from this source [Table 2].

Respondents' Perception on ITN and IPTp

Most of the respondents believed that use of ITN is safe in pregnancy (93.2%), and protects both mother and baby from malaria in pregnancy (91.5%); and less than half of respondents believed that use of IPTp is safe in pregnancy (47.9%) and protects

mother and baby from malaria in pregnancy (46.6%) as shown in Table 3.

Ownership and Use of ITNs Among Respondents

About half 162 (52.8%) of the 307 respondents own an ITN. About two-thirds 104 (64.2%) of the 162 respondents that own an ITN sleep under it and this constitutes 33.8% of the 307 respondents. Of the 104 respondents that sleep under ITN, only 27 (26.0%) do so consistently [Table 4]. Of the 58 respondents that own an ITN but do not sleep under it, the most commonly cited reasons were that it causes heat at night 29 (50.0%), and their accommodation not being convenient for using it 12 (20.7%). Other reasons given for not using their ITNs are as shown in Figure 2. There was no association ($P > 0.05$) between the use of ITNs and any of the respondents' sociodemographic variables.

Utilization of IPTp by Respondents

About a third 115 (37.5%) of the 307 respondents took IPTp tablets (i.e., sulfadoxine-pyrimethamine) to prevent malaria in the present pregnancy. Of these, 104 (90.4%) swallowed the tablets in the presence of health workers, but less than a third 31 (27.6%) took the recommended 2 doses [Table 5]. There was no association ($P > 0.05$) between the use of IPTp and any of the respondents' sociodemographic variables.

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (%) n=307
Age group (in years)	
15-19	22 (7.2)
20-24	78 (25.4)
25-29	118 (38.4)
30-34	61 (19.9)
>35	28 (9.1)
Marital status	
Married	295 (96.1)
Divorced	7 (2.3)
Widowed	5 (1.6)
Religion	
Islam	304 (99.0)
Christianity	3 (1.0)
Education	
None	5 (1.6)
Quranic only	164 (53.4)
Primary	73 (23.8)
Secondary	47 (15.3)
Tertiary	18 (5.9)
Occupation	
Housewife	141 (45.9)
Farmer	49 (16.0)
Petty trader	90 (29.3)
Civil servant	27 (8.8)

Table 2: Awareness of ITNs and IPTp among respondents

Variables	ITNs Frequency (%) (n=307)	IPTp Frequency (%) (n=186)
Awareness status		
Aware	264 (86.0)	186 (60.6)
Unaware	43 (14.0)	121 (39.4)
Source of information		
Health workers	180 (68.1)	156 (83.9)
Neighbor	2 (0.8)	6 (3.2)
Radio/Television	80 (30.3)	24 (12.9)
Mosque/Church	2 (0.8)	0 (0)

ITNs: Insecticides treated nets, IPTp: Intermittent preventive treatment for malaria in pregnancy

Table 3: Respondents' perception on ITN and IPTp

Variables	Frequency (%) n=307
Perception on ITN	
Believe that sleeping under ITN protects mother and baby from malaria	281 (91.5)
Believe that ITN prevent malaria in pregnancy	295 (96.1)
Believe that ITN is safe to use in pregnancy	286 (93.2)
Perception on IPTp	
Believe that IPTp should be used in pregnancy	177 (57.7)
Believe that IPTp is safe in the 2 nd trimester of pregnancy	147 (47.9)
Believe that use of IPTp in the 2 nd trimester of pregnancy protects mother and baby from malaria	143 (46.6)

ITNs: Insecticides treated nets, IPTp: Intermittent preventive treatment for malaria in pregnancy

Table 4: Ownership and use of ITN among respondents

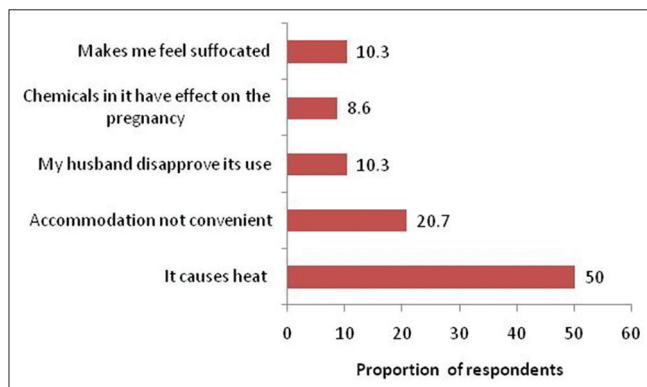
Variables	Frequency (%)
Own an ITN (n=307)	
Yes	162 (52.8)
No	145 (47.2)
Sleep under ITN (n=162)	
Yes	104 (64.2)
No	58 (35.2)
Frequency of use of ITN (n=104)	
Always	27 (26.0)
Sometimes	77 (74.0)

ITNs: Insecticides treated nets, IPTp: Intermittent preventive treatment for malaria in pregnancy

Table 5: Utilization of IPTp by respondents

Variables	Frequency (%)
Have taken IPTp tablets to prevent malaria in the present pregnancy (<i>n</i> =307)	
Yes	115 (37.5)
No	192 (62.5)
Swallowed IPTp tablets in the presence of a health worker (<i>n</i> =115)	
Yes	104 (90.4)
No	11 (9.6)
Number of doses of IPTp tablets taken in the present pregnancy (<i>n</i> =115)	
1 dose	84 (72.4)
2 doses	31 (27.6)

IPTp: Intermittent preventive treatment for malaria in pregnancy

**Figure 2:** Reason for not using insecticides treated net

DISCUSSION

The relatively young population of respondents in this study, with a larger proportion in the 25–29 years age group, and a mean age of 27 ± 5.6 years is in consonance with the finding in studies conducted in Ilorin, Nigeria,^[21] and Anambra, Nigeria,^[22] that reported similarly young population with a majority of respondents being in the 25–29 years age group, and it reflects the prevalent practice of early age at marriage for girls across Nigeria. This is corroborated by the reports of the Nigeria Demography and Health Survey 2013 which showed that half of the women aged 25–49 years were married by age 18 and 61% were married by age 20.^[23] The preponderance of Muslims among the respondents in this study could be due to the fact that Islam is the predominant religion in northern Nigeria, and the religious/cultural practices that prohibit giving birth outside wedlock in the study area could be the reason why most of the respondents (96.1%) were married.

The finding of a larger proportion of the respondents in this study being full-time housewives is in contrast to the finding in a study conducted in Ogun state, Nigeria,^[14] in which a larger proportion of the respondents (42.3%) were civil servants. This could be due to the differences in the educational attainment of the participants in the two studies. Whereas a majority (55.0%) of the participants in this study had either Quranic education or none at all (and as such, they lack the basic requirements for recruitment into the civil service), most of the respondents (97.8%) in the study conducted in Ogun state had formal education.

The high level of awareness (86.0%) of insecticide-treated nets among the respondents in this study correlates perfectly with the 86.0% awareness obtained in a previous study in the study area by Awosan *et al.*^[19] This could be related to the fact that health workers were the main source of information on ITNs among the respondents and a larger proportion of them (46.9%) were multigravidae (who were more likely to have had some health education sessions at the antenatal clinics attended in their previous pregnancies). Similarly, high levels of awareness of ITNs were also reported in studies conducted in other centers in Nigeria, including Ilorin,^[21] and Owerri^[24] with awareness levels of 85.2 and 89.2%, respectively; and in these studies, health workers were also the main source of information on ITNs.

While the poor awareness of intermittent preventive treatment for malaria in pregnancy (IPTp) among the respondents in this study (60.6%) compares well with the poor awareness of IPTp obtained in studies conducted in Ekiti state, Nigeria,^[11] and Uyo, Nigeria,^[16] that reported IPTp awareness rates of 52.2% and 40.8%, respectively, it is in contrast to the high awareness of IPTp (78.2%) reported in a study conducted in Ibadan, Nigeria.^[25] Although majority of the respondents in this study also obtained information on IPTp from health workers, the relatively low awareness of IPTp as compared to ITNs among them suggests the need for health workers to pay equal attention to both ITNs and IPTp during the antenatal clinics' health education sessions.

Whereas a majority of the respondents in this study believed that use of ITN is safe in pregnancy (93.2%), and protects both mother and baby from malaria in pregnancy (91.5%), less than half of them believed that use of IPTp is safe in pregnancy (47.9%), and protects mother and baby from malaria in pregnancy (46.6%). This could be related to the relatively low awareness of IPTp among them. While most of the respondents in studies conducted in Lagos, Nigeria,^[13] and Northern Uganda,^[26] also believed that use of ITNs is safe in pregnancy and protects mother and baby from malaria, a substantial proportion of the participants (42.6%) in a study conducted in Imo, Nigeria,^[27] believed that the chemicals in ITNs are dangerous to both mother and baby. This underscores the importance of not only focusing on generating awareness on ITN, but to also focus on removing misconceptions that could inhibit its acceptance, by highlighting the safety of its use in pregnancy during the antenatal clinics' health education sessions.

Utilization of ITNs was low (33.9%) among the respondents in this study with the major hindrance being unavailability since only about half of the respondents (52.8%) own an ITN. Of serious concern is the fact that even among the respondents that own an ITN in this study, only about two-thirds (64.2%) use it; and of these, a much lower proportion (26.0%) do so consistently, with the main reason for not using ITN being that it causes excessive heat at night. Similar to the finding in this study, studies conducted across Nigeria principally reported low ITNs' ownership and utilization. In a study conducted in 21 states across Nigeria,^[28] only 28.8% of respondents own an ITN, and only 25.7% of those that own an ITN use it. Similarly, a study conducted in Ogun state, Nigeria,^[14] reported a low ITNs' ownership of 14.8%, while another study conducted in Lagos, Nigeria,^[13] reported an abysmally low ITNs' utilization of 11.2%. The fact that most of the respondents in this study and other studies across the country obtained their ITNs from the health facilities underscores the

need for government and other stakeholders to make provision of ITNs (either free of charge or at highly subsidized rates) for pregnant women at the antenatal clinics in all the health facilities across the country a core component of the malaria prevention intervention in Nigeria. In addition, awareness creation and education of pregnant women on the safety of ITNs should be re-invigorated and sustained by healthcare workers.

The low use (37.5%) of IPTp tablets (sulfadoxine-pyrimethamine) among the respondents in this study and the relatively lower proportion (27.6%) of those that took the recommended 2 doses is not surprising in view of its low awareness among them. Similar to the finding in this study, low uptake of IPTp of 27.3% and 12.0% were reported in studies conducted in Ekiti state, Nigeria,^[11] and Uyo, Nigeria,^[16] respectively. These findings re-emphasize the need for healthcare workers to pay equal attention to educating their clients on the use of both ITNs and IPTp during the antenatal clinics' health education sessions.

CONCLUSION

Whereas awareness of ITNs and perception of its benefits in protecting mother and baby was high among the respondents in this study, the reverse is true of IPTp. Use of ITNs and IPTp was generally low with the main obstacle to ITNs' use being unavailability. Government should ensure universal access to ITNs, while healthcare workers should re-invigorate and sustain education of pregnant women on the benefits and safety of use of ITNs and IPTp.

ACKNOWLEDGMENTS

The authors appreciate the Honorable Commissioner, Ministry of Health, Sokoto state, Nigeria, the Management of hospitals that were used for the study, and all the pregnant women that participated in the study for their cooperation.

REFERENCES

1. Federal Ministry of Health (Nigeria). National Guidelines and Strategies for Malaria Prevention and Control During Pregnancy. Abuja, Nigeria: FMOH; 2005.
2. Federal Ministry of Health (Nigeria). National Guidelines and Strategies for Malaria Prevention and Control During Pregnancy. Abuja, Nigeria: FMOH; 2008.
3. World Health Organization (WHO). World Malaria Report 2008. Geneva, Switzerland: WHO; 2008. Available from: https://www.hqlibdoc.who.int/publications/2008/9789241563697_eng.pdf. [Last accessed on 2016 Mar 16].
4. Arogundade ED, Adebayo SB, Anyanti J, Gilpin U, Adedeji W. The Role of Mass Media in the use of Insecticide Treated Nets and Integration of Intermittent Preventive Therapy for Malaria Prevention Among Pregnant Women in Nigeria. Abuja, Nigeria: The Society for Family Health; 2009. Available from: <http://www.iussp2009.princeton.edu/papers/92482>. [Last accessed on 2016 Mar 16].
5. Wylie BJ, Hashmi AH, Singh N, Singh MP, Tuchman J, Hussain M, *et al.* Availability and utilization of malaria prevention strategies in pregnancy in eastern India. *BMC Public Health* 2010;10:557.
6. Van-Geertrudyn JP, Ntakirutimana D, Erhart A, Rwagacondro C, Kabano A, D' Alessandro U. Malaria infection among pregnant women attending ante natal clinic in six Rwandan districts. *Trop Med Health* 2005;10:681-8.
7. Crawley J, Hill J, Yartey J, Robalo M, Serufulira A, Ba-Nguz A, *et al.* From evidence to action? Challenges to policy change and programme delivery for malaria in pregnancy. *Lancet Infect Dis* 2007;7:145-55.
8. United Nations Children's Fund (UNICEF). Statesmen's Forum 2010, Global Health Initiative: Integration and Innovation for Better Outcomes. New York: UNICEF; 2010.
9. Napoleon RP, Anyangu AS, Omolocolan J, Ongus JR. Preventing malaria during pregnancy: Factors determining the use of insecticide-treated bednets and intermittent preventive therapy in Juba. *South Sudan Med J* 2011;4:33-8.
10. Van-Eijk AM, Blokland JE, Slutsker I, Odhiambo F, Ayisi JG, Bles HM, *et al.* Use of intermittent preventive treatment for malaria in pregnancy in a rural area of western Kenya with high coverage of insecticide-treated bed nets. *Trop Med Int Health* 2005;10:1134-40.
11. 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 centers in rural southwest, Nigeria: A cross-sectional study. *BMC Pregnancy Childbirth* 2009;9:28.
12. Ukibe SN, Mbanugo JI, Ukibe RN, Ikeakor LC. Level of awareness and use of insecticide treated bed nets among pregnant women attending antenatal clinics in Anambra State, South Eastern Nigeria. *J Public Health Epid* 2013;5:391-6.
13. Aina BA, Ayeni FA. Knowledge and use of insecticide treated nets as a malaria preventive tool among pregnant women in a local government area of Lagos state, Nigeria. *J Appl Pharm Sci* 2011;1:162-6.
14. Runsewe-Abiodun TI, Iyanwura AC, Sotimehin SA. Awareness and knowledge about insecticide treated nets among pregnant mother in Ogun state, Western Nigeria: A descriptive cross-sectional study. *Educ Res J* 2012;2:1-8.
15. NPC and ICF Macro. Nigeria Demographic and Health Survey 2008. Abuja, Nigeria: National Population Commission and ICF Macro; 2009.
16. Abasiattai AM, Etukumana EA, Umoiyoho AJ. Awareness and practice of malaria prevention strategies among pregnant women in Uyo, South-south Nigeria. *The Internet J Gynae Obst* 2008;11. Available from: <https://www.print.ispub.com/api/0/ispub-article/7004>. [Last accessed on 2018 Jan 28].
17. Afolabi BM, Okoh F, Fatumbi BS, Komakech W, Saliu O, Ewoigbokhan F, *et al.* Combined intervention of intermittent preventive therapy and long-lasting insecticide treated nets among pregnant women in Nigeria. *J Public Health Epid* 2011;3:608-16.
18. Oche MO, Ameh IG, Umar AS, Gana G, Njoku CH. Awareness and use of insecticide treated net (ITN) among pregnant women attending ante-natal at Usmanu Danfodiyo University Teaching Hospital, Sokoto. *Niger J Parasitol* 2012;31:98-101.
19. Awosan KJ, Ibrahim MT, Alayande MO, Isah BA, Yunusa E, Mahmud MB. Prevalence and barriers to the use of insecticide treated nets among pregnant women attending ante-natal clinic at Specialist Hospital, Sokoto, Nigeria. *J Public Health Epid* 2013;5:416-20.
20. Araoye M. Research Methodology with Statistics for Health and Social Sciences. Ilorin: Natherdex; 2004.
21. Omokanye LO, Saidu R, Olatinwo AO, Jimoh AA, Salaudeen AG, Balogun OR, *et al.* The determinants of utilization of insecticide treated nets among pregnant women attending antenatal clinic at University of Ilorin Teaching Hospital, Ilorin, Nigeria. *Int J Biol Med Res* 2012;2:18-22.
22. Igwe PC, Ebuehi OM, Inem V, Afolabi BM. Effect of use of insecticide-treated bed nets on birth outcomes among primips in a peri-urban slum settlement in South-East Nigeria. *S Afr Fam Pract* 2007;49:15.
23. National Population Commission [Nigeria] and ICF

- International. Nigeria Demographic and Health Survey 2013. Rockville, Maryland, USA: National Population Commission and ICF International; 2014.
24. Iwu RU, Ijioma BC, Egeruoh AS, Awurum IN, Ohalete CN. Awareness and use of Insecticide treated among pregnant women attending antenatal clinic at Federal Medical Centre and General Hospital Owerri, Imo State. Report Opin 2010;2:154-7.
25. Tongo OO, Orimadegun AE, Akinyinka OO. The use of intermittent preventive treatment with sulphadoxine-pyrimethamine in pregnancy in Ibadan, Nigeria: Implications for policy. J Public Health Epid 2009;1:1-6.
26. Obol JH, Atim P, Moi KL. Possession, attitudes and perceptions of insecticide-treated bed nets among pregnant women in a post conflict district in Northern Uganda. Int J Trop Dis Health 2014;4:645-60.
27. Chukwuocha UM, Dozie IN, Onwuliri CO, Ukaga CN, Nwoke BE, Nwankwo BO, *et al.* Perceptions on the use of insecticide treated nets in parts of the imo river basin, Nigeria: Implications for preventing malaria in pregnancy. Afr J Reprod Health 2010;14:117-28.
28. Ankomah A, Adebayo SB, Arogundade ED, Anyanti J, Nwokolo E, Ladipo O, *et al.* Determinants of insecticide-treated net ownership and utilization among pregnant women in Nigeria. BMC Public Health 2012;12:105.

How to cite this Article: Ango UM, Anka AM, Awosan KJ, Oche OM, Yakubu A, Raji MO. Awareness, perception, and utilization of insecticides treated nets and intermittent preventive treatment of malaria among pregnant women in Sokoto, Nigeria . Asian Pac. J. Health Sci., 2018; 5(1):64-69.

Source of Support: Nil, **Conflict of Interest:** None declared.