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Full length Research paper

Knowledge, risk factors and prevalence of Malaria in pregnancy among women attending antenatal clinics in Uyo Metropolis Akwa Ibom State, Nigeria

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The study was descriptive and cross-sectional and the sampling was conducted between January, and June, 2017. The aim was to assess the knowledge, risk factors and prevalence of malaria infection among pregnant women attending antenatal clinic at University of Uyo Teaching Hospital and Saint Luke's General Hospital, Annua. Pregnant women were systematically selected from a number of women who attended the antenatal clinics of these two randomly selected tertiary hospitals. The sample population was selected irrespective of age, marital status, parity, occupation and level of educational as well as cultural and religions beliefs. World Health Organisation structured questionnaire was used for data collection. Blood samples were collected and examined by thin and thick by smears. Out of the 504 randomly selected, pregnant women who completely filed the questionnaires, a total of 500 subjects voluntarily participated in parasitological investigation. The result indicates that majority of the women 310 (61.5%) knows mosquito as the causes of malaria, 365 (72.42%) identified fever as the major symptom of malaria, 390 (77.38%) agreed on the use of insecticide treated bed net as the method of control of malaria. The prevalence of malaria in the study was 164 (32.8%), and varies gradually among the age group, education level and by gravidity. Malaria is still a public health challenge that needs much enlightenment campaign on its prevention and control in Akwa Ibom State, Nigeria.

Keywords: Malaria Knowledge, Prevalence, Pregnant Women, Anti-Natal Clinics

INTRODUCTION

Malaria is a preventable and treatable infectious disease, which is transmitted through the bites of infected female *Anopheles* mosquitoes which still kills more than 400,000 people and infects more than 200 million people worldwide annually with 90% of the cases in Africa (Dahalan *et al*., 2019; WHO, 2016). Malaria is caused by a protozoan parasite of the genus *Plasmodium*. Four species namely *P. vivax*, *P. ovales*, P. *falciparium* and *P. malariae* are responsible for human malaria (Okpara *et al*., 2017; Atting *et al*., 2016). The most serious forms of the disease are caused by *P. falciparum* and this accounts for about 80% of morbidity and 90% of mortality (Brabin, 1983). Malaria epidemiology is doubly dependent on the frequency and efficiency of contacts between human hosts and female *Anopheles* mosquitoes (Guelbeogo *et al*., 2018).

Pregnant women in sub-Saharan Africa are more likely than non-pregnant women to become infected with *Plasmodium falciparum* and have a higher density of parasitaernia (Chukwurah, *et al*., 2016). Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her foetus and the newborn child. Malaria associated maternal illness and low birth weight (LBW) is mostly the result of *Plasmodium falciparurn* infection and occurs predominantly in Africa (WHO, 2012; Usip and Atting, 2012). In most countries or sub- saharan Africa, malaria

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is highly endemic and due to repeated exposure to malaria infection, people develop a certain type of immunity to it during the first decade of life (Brabin, 1983). Despite this immunity, pregnant women especially primigravidae, have a higher susceptibility to *Plasmodium falciparum* infection, manifested by a higher prevalence and intensity of parasitaemia. The serious consequences of malaria in pregnancy are attributed to the sequestration of malaria parasites in the placentae, leading to impeded trans-placental nutrient transport. This combined with malaria-induced anaemia, compromises foetal growth and results in low birth weight and a subsequent increase in infant and childhood mortality. There is a strong cytoadherence to chondroitin sulphate A in the placentae and an increased attractiveness of pregnant women to the vector for malaria (Lindsay *et al*., (2000).

Plasmodium species infection during pregnancy increases the chances of maternal anaemia, abortion, stillbirth, prematurity, intra-uterine growth retardation and infant low birth weight. Malaria has been estimated to cause 8%-14% of all low birth weight babies and 3%-8% of all infant death in areas of Africa with stable malaria transmission (WHO, 2013). Malaria infection during pregnancy poses substantial risk to the mother, her fetus and the newborn. Consequences of malaria infection during pregnancy include severe anaemia, placental parasitaemia and intra-uterine growth retardation. These factors contribute to low birth weight one. The National Malaria Control Program noted in its 2006 report that the non-use of preventive measures was one of the major challenges of the Roll Back Malaria programme in Nigeria (Akaba, 2013). A study by Tobin-West and Kanu (2016) in Port Harcourt found that most of the pregnant women correctly recognised common symptoms of malaria such as; fever, malaise, nausea, vomiting and lose of appetite. This was good and expected among those residing in an area highly endemic for malaria like the Niger Delta Region.

Several studies conducted in malaria-endemic areas of Africa regarding knowledge, attitudes and practices toward malaria control measures among pregnant women indicate that malaria is perceived as a serious illness, and knowledge of malaria risks during pregnancy is relatively high (Snow, 2008). A number of studies also reveal that misconceptions concerning malaria still exist and that practices for the control of malaria have been unsatisfactory. To further buttress the worrisome malaria picture. Many researchers have reported high prevalence rates of malaria in pregnancy in different parts of Nigeria, ranging from 19.7% to 72% and a prevalence of placental parasitaemia of between 10 and 45% in malaria endemic areas has been reported with significant *Plasmodium falciparum* dominance (Enato *et al*., 2007). A study by Fana *et al*., 2015 found the prevalence of malaria infection among pregnant women in Argungu, Kebbi State to be 41.6%. This finding corroborated with the results in Otukpo, Benue State where a total prevalence of 42.3% was recorded (Jombo *et al*., 2010) but contrasted with another in Maiduguri where a prevalence of 22.1 % was reported among pregnant women (Kagu *et al.*, 2007) and even more sharply with findings in Lagos, where a prevalence rate of 7.7% among pregnant women attending antenatal clinics for the first time during current pregnancy was reported (Agomo *et al*., 2009).

Uyo is a malaria endemic area, despite all the effort of intermittent preventive treatment for pregnant women yet the prevalence of malaria infection remains high among the pregnant women in the area. Thus, there could be several reasons for this situation; and this research was conducted to identify the gaps.

MATERIALS AND METHODS

Study Area

The study was undertaken in Uyo, which falls in the malaria endemic region. Uyo is one of the 31 local government areas in Akwa-Iborn State and is also the state's capital city. Uyo falls within the tropical rain forest and lies between co-ordinates latitude 5 03 04.6N and longitude 7 56 00.6E. The city has an area of about 362sqkm and a population of about 436,600 people. Annual rainfall averages 2000-2400mm with a mean annual temperature of 28.6C. The randomly selected tertiary institutions were University of Uyo Teaching Hospital and Saint Luke’s Hospital, Anua.

Study Sample

The study sample of 550 pregnant women in their various trimesters who came to the anti-natal clinic were systematically selected from a number of women who attended the antenatal clinics of these two randomly selected tertiary hospitals for the study.

Ethical Consideration

Ethical approval was obtained from the Akwa Ibom State Ministry of Health and the Chief Medical Directors of the respective hospitals. Verbal informed consent was obtained from the participating women. The participants were informed that participation in the research was voluntary. They were assayed that the finding in this research work would be treated with utmost confidentially.

Data Collection Method

World Health Organisation standard questionnaire on malaria was adopted with some modifications. A well structured self-administered questionnaire was used to obtain information on s ocio-demographic factors, knowledge

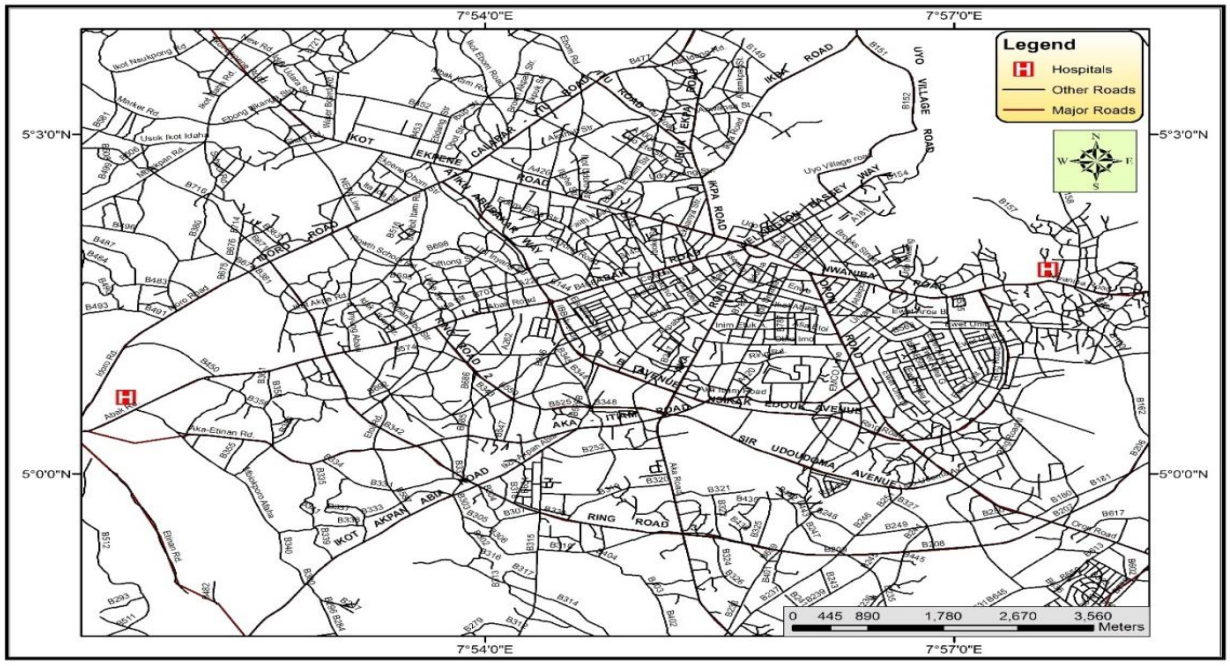

Figure 1: Study sample

of transmission and prevention of malaria in pregnancy as well as ability to identify symptoms of malaria infection.

A total of 550 questionnaires was administered to the pregnant women attending the antenatal clinic who were selected using a multi-stage random sampling method.

Collection of Blood Samples

Blood samples were collected employing the vein puncture.

The puncture site was swabbed with cotton wool dipped in methylated spirit (methanol) and the puncture was made using a new sterile 2ml syringe. The blood was transferred into a sterile EDTA container. Each sample was labeled correctly with the patient's personal data like name, age, date of collection to avoid any mix up.

A total of 500 samples of blood specimens were collected from the pregnant women who completely filled and returned their questionnaire.

The thick and thin blood films were prepared in lined with (WHO, 2010).

Examination of microscope slides and Identification *Plasmodium* space:

The thin and thick blood films slides were examined under the microscope using x 100 objective lens. The slides were examined systematically to detect malaria parasites.

Species specific characteristics of human *Plasmodium* species as listed by (Ash and Orihel, 1997) was utilized in identifying the species of *Plasmodium* encountered.

Statistical Data Analysis

Data was analyzed using SPSS software version 20, and Chi-square statistics were carried out to determine any statistical differences or associations between the variables at 0.5% levels of significance, and at specified degrees of freedom. Descriptive statistics, the frequencies and percentages were performed for the selected variables.

RESULTS

Out of a total of 550 questionnaires administered, 500 respondents representing 90.9% completely filled and returned their questionnaire thus a sample size of 500 respondents was used for the analysis of the questionnaire also voluntarily participated in the laboratory exercise.

The result in Table 1 indicates that the pregnant women's understanding of the causes of malaria showed that; 310(61.51%) said that malaria is caused by mosquito bite, *Plasmodium* spp 104(20.63%) while 9(1.79%) believed it is caused by witchcraft. The sign and symptoms of malaria mentioned by the pregnant women included: fever 365(74.40%), headache 156(30.95%), lack of appetites 103(20.44%), joint pains 49(9.72%). Other signs and symptoms mention were vomiting 17(3.37%) and malaise 13(2.58%). Preventive measures taken against malaria by the pregnant women included: use of ITNs, 390 (77.38%) malaria prophylaxis 252 (50.00%)

Table 1: Knowledge of the causes, symptoms and prevention of malaria

Variables	Yes	%	No	%	χ^2	df	P value
What causes Malaria?							
Mosquito bite	310	61.51	194	38.49			
Bad food/water	77	15.28	427	84.72	11.090	9	0.270
Witchcraft	9	1.79	495	98.21			
Plasmodium parasite	104	20.63	400	79.37			
Symptoms of Malaria							
Fever	365	72.42	139	27.58			
Headache	156	30.95	248	69.15			
Malaise	13	2.58	491	97.42			
Joint pains	49	9.72	455	91.28	30.00	25	0.2240
Vomiting	17	3.37	487	96.63			
Lack of appetite and weakness	103	20.44	401	79.56			
Ways to Prevent Malaria							
Use of ITNs	390	77.38	114	22.62			
Malaria Prophylaxis	252	50.00	252	50.00			
Environmental Sanitation	128	25.40	376	74.60	20.00	16	0.220
Use of Insecticide spray	320	63.49	184	36.51			
Regular taking of herbs	125	21.80	379	78.20			
What would you do if you notice symptoms							
Visit the hospital	377	74.80	127	25.20			
Visit the patent shop	213	42.26	291	57.74			
Take herbal concoction	186	36.90	318	63.10	12.00	9	0.2130
Visit prayer house	64	12.70	440	87.30			

use of insecticide 320)63.49%). Environmental sanitation was mentioned by 128(25.40%) while regular taking of herb was practiced by 125(21.06%).

The pregnant women reactions to symptoms of malaria were; visit to the hospital 377(24.80%), visit to patent shop 213(42.26%) use of herbal concoction 186(36.90%) and visit to prayer house 64(120.70%). There was no significant difference ($p > 0.5$) in their reactions to symptoms of malaria.

The result in Table 2, Figure 2 showed that, on the usage of WHO recommendations; 303(6.12%) of the pregnant women said they sleep under ITNs, 261(51.79%), make use of insecticide spray, 203(40.28%) make use of prophylaxis malaria drug while 45(8.90%) used insect repellent.

Table 2: Use of WHO Recommendation

Use of WHO Recommendation	Yes	%	No.	%	χ^2	Df	P value
Do you sleep under ITNS	303	60.12	201	39.88			
Use of insecticide spray	261	51.79	243	48.21			
Use of insect repellent	45	8.93	459	91.07	12.000	9	0.213
Prophylaxis of malaria	203	40.28	301	59.22			
Reasons for non Usage of WHO Recommendation							
Cost	120	23.81	384	76.90			
Non-effective	86	17.06	418	82.94			
Not easily accessible	159	31.55	345	68.45			
Religious belief	18	3.57	486	96.43	42.000	36	0.227
Cultural belief	20	3.97	484	96.03			
Spouse refusal	30	5.95	474	94.05			
Generate heat	56	11.11	448	88.89			

The reason for non usage of WHO recommendation were; not easily accessible 159(31.55%), expensive 120(23.81%), non effective 86(17.06%), cultural belief 20(3.92%), religious belief 18 (3.57%), spouse refusal

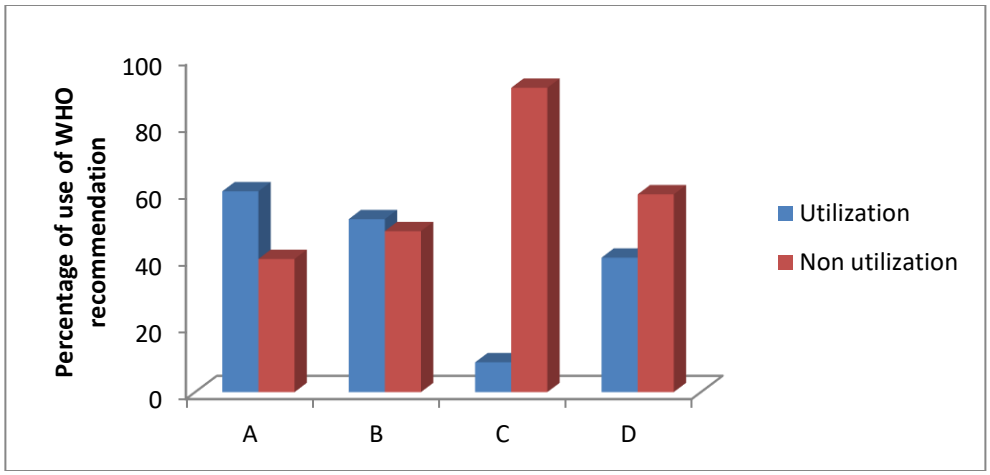

Figure 2: Utilization of WHO recommendation by pregnant women
Key
A = Do you sleep under ITN
B = Use of Insecticide spray
C = Use of insect repellent
D = Prophylaxis of malaria

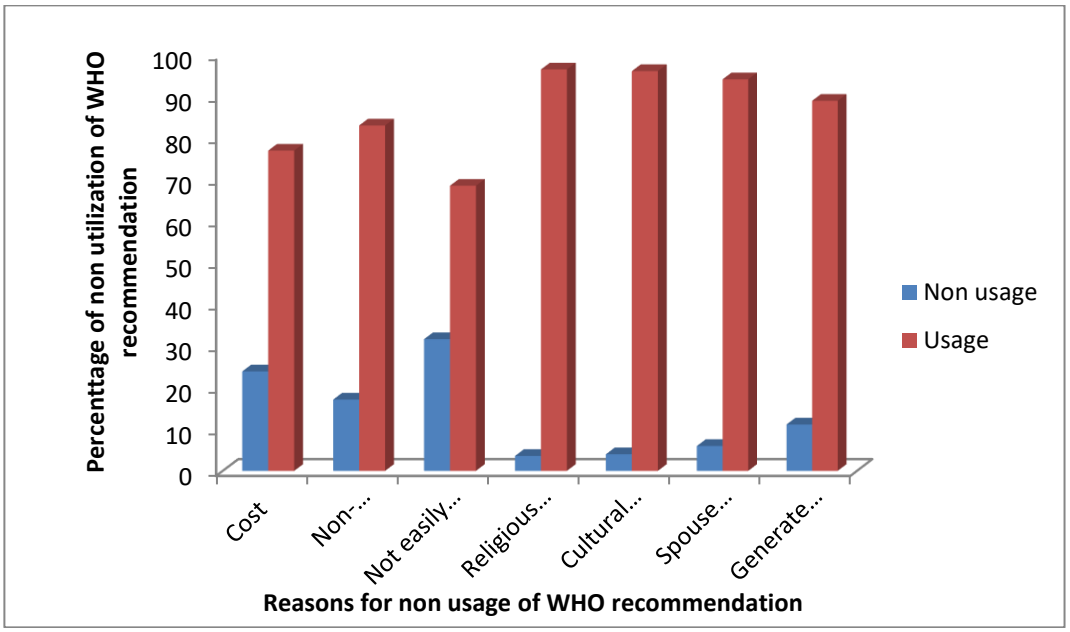

Figure 3: Reasons for non usage of WHO recommendations by the pregnant women

30(5.95%) and generation of heat 56(11.11%) Table 2 Figure 3).

The result of the household risk factors of malaria among pregnant women (Table 3) indicates that 281(56.75%) of the pregnant women plant banana, plantain and cocoyam near their houses 87(17.26%) kept livestock animals 320(63.49%) had their window screened with ITN. Those whose compound were scattered by cans and burrows were 111(22.02%) while those with stagnant water and ditches in their compound were 145(28.77%).

The prevalence of malaria infection among the pregnant women showed that the highest level of infection of 15(42.80%) was among the 15-20 age group, followed by 21-25 age bracket 41(38.37%) as the least infected were the 36-40 years group with 164 (32.8%). Infection rate

Table 3: Household Risk Factors of Malaria among Pregnant Women

Variables	Yes (%)	No (%)
Do you plant banana, plantain or cocoyam near your habitation?	281(55.75)	223(44.25)
Do you have empty cans and burrow plants near your habitation?	111(22.02)	393(77.08)
Is there any animal such as goat, sheep or dog in your compound?	145(28.7)	359(71.23)
Do you rear animal such as goat, sheep or dog in your compound?	87(17.26)	417(82.74)
Is your window screened with mosquito net (ITNs)?	320(63.49)	184(36.51)

$\chi^2 = 16.094$; df = 16; P = 0.446

decreases with increase in age (Table 4).

The prevalence of malaria parasites among the pregnant women with regard to education showed that those with primary education had 56(46.67%) infection, those with secondary level of education 78(30.23%) while those with tertiary level of education had 30(24.59%). However, infection rate decreases with increase in educational level (Table 5).

With respect to prevalence of malaria in pregnant women by gravidity. Infection of those with primigravidae was 77(39.49%), secondigravidae 56(33.94%) and multigravidae 31(22.14%) (Table 6 Figure 4).

The prevalence of malaria parasites among the pregnant women with regard to occupation showed that farmers were more infected 5(55.56%) followed by traders 73(34.42%) civil servant 22(29.33%) students 27(27.55%) while house wife was the least with 18(25.71%) (Table 7).

The prevalence of malaria infections among the pregnant women with regards to trimester indicated that 39(28.48%) pregnant women of the 1st trimester were infected, 67(39.18%) pregnant women to the 2nd trimester lead in prevalence of malaria infection and was followed by 58(30.21%) infection of the pregnant women in the 3rd trimester (Table 8 Figure 4).

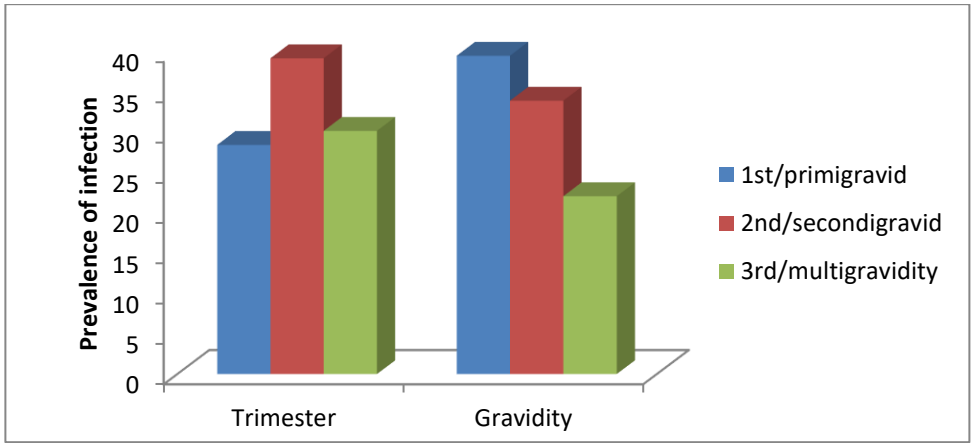

Figure 4: The prevalence of malaria infection among pregnant women by trimester and gravidity

Table 4: Prevalence of Malaria Parasites of Pregnant Women in the Study Area by Age

Age in Years	No. Examined	No. (%) Infected	No. (%) Not Infected
15-20	35	15(42.80)	20(57.14)
21-25	135	41(38.37)	94(69.63)
26-30	200	75(37.50)	105(62.50)
31-35	80	28(35.00)	52(65.00)
36-40	50	5(10.00)	45(90.00)
Total	500	164(32.8)	336(67.2)

$\chi^2 = 16.094$; df = 16; P = 0.446

Table 5: Prevalence of Malaria Parasites of Pregnant Women in the Study Area by Education

Education	No. Examined	No. (%) Infected	No. (%) Not Infected
Primary	120	56(46.67)	64(53.33)
Secondary	258	78(30.23)	180(69.77)
Tertiary	122	30(24.59)	92(79.49)
Total	500	164 (32.8)	336(67.2)

$\chi^2 = 6.592$; df = 4; P = 0.159

Table 6: Prevalence of Malaria Parasites of Pregnant Women in the Study Area by Gravidity

Gravidity	No. Examined	No. (%) Infected	No. (%) Not Infected
Primigravidae	195	77(39.49)	118(60.52)
Secondigravidae	165	56(33.94)	109(66.06)
Multigravidae	140	31(22.14)	109(77.86)
Total	500	164(32.80)	336(67.20)

$\chi^2 = 3.819$; df = 2; P = 0.148

Table 7: Prevalence of Malaria Parasites of Pregnant Women in the Study Area by Occupation

Occupation	No. Examined	No. (%) Infected	No. (%) Not Infected
Farmer	9	5(55.56)	4(44.44)
Trader	190	73(38.42)	117(61.58)
Civil servant	75	22(29.33)	53(70.67)
Students	98	27(27.55)	71(72.45)
Housewife	70	18(25.71)	52(74.29)
Others	58	19(32.76)	336(67.20)
Total	500	164(32.80)	

$\chi^2 = 21.501$ df = 25 P = 0.664

Table 8: Prevalence of Malaria Parasites of Pregnant Women in the Study Area by Trimester

Trimester	No. Examined	No. (%) Infected	No. (%) Not Infected
1st Trimester	137	39(28.48)	98(71.52)
2nd Trimester	171	67(39.18)	104(60.82)
3rd Trimester	192	58(30.21)	134(69.79)
Total	500		

$\chi^2 = 14.086$; df = 12 ; P = 0.264

DISCUSSION

The overall knowledge of malaria prevention practices among majority of the respondents was found to be good. This finding agrees with the submissions of Adegun and Awosusi (2011), Chukwuwah *et al*. (2016) and Oyewole and Ibidapo (2007) that showed that the general knowledge about malaria prevention among urban residents in Southern Nigeria was good. This might be partly due to appropriate means of communication and delivery of these messages by the health workers in addition to the high level of education of the respondents. The respondents' level of education was found to be significantly associated with knowledge of malaria prevention. However, other studies in Nigeria (Falade *et al*., 2006; Okeke, *et al*., 2006) and Tanzania (Cornoro *et al*., 2003) have documented that gaps still exist in the knowledge of causation and treatment of malaria in rural areas and that these gaps have serious public health implications. The finding on the use of native concoction by pregnant women in Nigeria is corroborated by Fakeye *et al*., (2009). Inadequate information from health workers could also contribute to the misconceptions of malaria treatment. The current ongoing aggressive public health campaign which involves mass distribution of ITNs at Primary Health Centers could account for the high awareness noted in this study. However, some respondents had poor attitudes and misconceptions about the use of ITNs and other WHO Recommendations. The respondents' attitudes may have

a strong implication on ownership and utilization of ITNs (Onwujekwe.*et* al., 2005; Usip *et al*., 2017; Ankomah *et al*., 2012).

The reports of prevalence of malaria in pregnancy have been very high, especially in Southwest Nigeria where prevalence rates of between 34.0% and 72% (Anorlu *et al.*, 2001; Okwa, 2003; Adefioye *et al*., 2007; Tayo *et al.,* 2009) have been reported. These reports are slightly higher than our finding among pregnant women attending antenatal clinics at University of Uyo Teaching Hospital. The differences in the reported prevalence rates of malaria may be attributed to skill and experience of laboratory personnel involved in blood film preparation, and the staining and reading of the slides.

Educations of the women at the time of registration for ANC at the clinics were significantly associated with malaria infection. Low educational level was associated with malaria infection.

This may be attributed to lack of understanding of the basic concepts in malaria prevention and management, were education to a certain level is required. A previous risk factors analysis by Usip and Ekwere (2016) in Uyo metropolis showed that both spraying with insecticide and use of ITN lower risk of malaria. The use of insecticide spray was very common among pregnant women in the study (51.79%). This probably accounted for its significant impact on malaria infection.

Despite reports that the use of ITNs substantially reduced the risk of malaria in pregnancy (Gamble. *et al*., 2006; Usip and Atting, 2012), the use of ITN and spraying with insecticide bed nets, whether treated or not, did not have a significant impact on malaria infection in this study.

CONCLUSION

Malaria is still a major public health problem among pregnant women In Uyo. The overall prevalence of malaria parasite in the study area was 32.8%. Prevalence of malaria parasite was higher among primigravidae and least among pregnant women with tertiary level of education. Lack of education, risk factors like; planting of Banana, Plantain or Cocoyam, rearing animals, allowing stagnant water or irrigation ditches near their houses and non-usage of WHO recommendations were the major factors associated with an increased risk of malaria infection.

Despite concerted efforts at malaria control nationwide. Myths and misconceptions about malaria prevention are still prevalent.

RECOMMENDATIONS

The control measures available in the area should be reviewed and emphasis should be placed on adequate sensitisation on usage of WHO recommendations. Early attendance and participation in focused ante-natal care services should be encouraged among all pregnant women especially the primigravidae, in order to reduce the risk of malaria infection in pregnancy.

Again, awareness on malaria prevention measures during pregnancy should target young women even before marriage preferably at schools, and social and religious gatherings.

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