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Research Article

Malaria Parasitaemia, Risk Perception, and Preventive Practices Among Women Attending Ante-Natal Clinics in Ogun State

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Abstract

Malaria contributes over 10% of all deaths among pregnant women. The prevalence of malaria in pregnancy in Nigeria particularly in Ogun State is high. The coverage and uptake of Intermittent Preventive Treatment with Sulphodoxine Pyrimethamine (IPT-SP) and Long-Lasting Insecticidal Nets (LLINs) in Southwest Nigeria is still very low despite their proven cost effectiveness in improving maternal and infant health. This study therefore determined the malaria parasitaemia, risk perception, preventive practices and associated factors among women attending Ante-natal Clinics (ANCs) in Ogun state. A cross-sectional study was carried out using mixed methods. An estimated sample size of 426 was computed and selected from ANCs across the state through multistage sampling technique. Pre-tested semi-structured interviewer administered questionnaire was used to collect information. Also, focused group discussions (FGDs) were conducted among women attending ANC and blood samples were taken from asymptomatic women for laboratory analysis to determine prevalence of malaria parasitaemia. Measures of association between the dependent and independent variables were tested using Chi-square. All tests of significance were done based on a α-level of 0.05. Response rate was 100% for this study. The mean age of respondents was 27.9 ±5.5 years. Risk perception of malaria was observed to be good. Malaria parasitaemia was 2.7% and was 100% due to *Plasmodium falciparum*. Maternal age was significantly associated with malaria parasitaemia. Therefore, it is recommended that malaria elimination programmes should be sustained; access and affordability of ANC care should be ensured by the Government.

Keywords

Malaria, Pregnant Women, Parasitaemia, Risk Perception, Prevention Practices

1. Introduction

Malaria is a major public health problem in tropical and subtropical regions of the world. Globally, in 2016, there were 212 million cases of malaria with 429,000 deaths from malaria most of which were children [1]. Sub-Saharan Africa

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harbours 90% of the world malaria burden [2] and about 19-24 million women are at risk of malaria during pregnancy [3]. In Nigeria, malaria is endemic and its transmission is all year round with 97% of the population at risk; mostly children and pregnant women [4]. Pregnancy increases the risk of malaria in women by reducing their immunity to malaria. This reduction in immunity tends to be more severe in primigravidae than in multigravidae and results in more frequent episodes of parasitaemia and a greater severity of the disease. The effects of malaria in pregnancy are enormous and include maternal anaemia, intrauterine growth restriction, low birth weight, and premature deliveries among others [5]. It contributes up to 11% of maternal mortality in African region [2].

The practice of prevention is motivated by the perceived risk or susceptibility to a disease especially at the early stages of behavioural change. Risk perception may influence behavior (prevention practices) when the risk is perceived serious especially when an individual feels him or herself vulnerable and also feels confident they can do something (prevention) to avoid it [6].

Over eight million women are pregnant every year in Nigeria and about 545 women out of every 100,000 dies as a result of pregnancy-related problem. Malaria contributes over 10% of all deaths among pregnant women (FMOH 2005). Despite the global decrease in incidence and mortality from malaria between 2000 and 2015, the burden is still high among pregnant women in sub-Saharan African. Nigeria accounted for the estimated 29% of total malaria cases and 26% of total deaths globally in 2015 [1].

The prevalence of malaria in pregnancy in Nigeria from different studies ranges from 19.7% - 72% (Idowu et al. 2006; Raimi et al., 2010; Amusa et al. 2010 & Okpere et al. 2010;) and the burden of malaria in pregnancy from most recent published work in Ogun State was 53.5% [7].

In Nigeria, pregnant women are expected to seek care at the ante-natal clinic (ANC) of health facilities and the strategies adopted according to the National Malaria Strategic Plan (2009 – 2013) for the prevention and control of malaria during pregnancy at ANC is the WHO three prong approaches which include: use of long lasting insecticidal nets (LLINs), intermittent preventive treatment of malaria in pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) and prompt treatment of confirmed malaria. A number of studies have shown that preventive measure like LLINs provides highly effective protection against malaria morbidity and mortality [8]. However, despite the cost-effectiveness of IPTp-SP and LLINs in improving maternal health, there is still a shortfall from the target for uptake of IPTp-SP and LLINs [9] and the burden of malaria in pregnancy is still high in Nigeria (Gunn et al., 2015) particularly, Ogun state with prevalence of 53.5% [7]. For example, in sub-Saharan Africa where an estimated 32.2% of people at risk of malaria lived in households without ITNs or IRS, 53.6% of pregnant women at risk did not receive a dose of IPT in 2014 [2] and in Nigeria, the Southwest zone has the least percentage (22.7%) of household population that slept under nets and Ogun State has 16.0%; least after Lagos State in the zone [2, 9]. This has shown there is low utilization of LLIN in Ogun state. It is generally believed that good knowledge is related to and increases good practice of prevention towards malaria but despite having good knowledge in a study in Akwa Ibom, none possessed nor use ITN [10]. Also, despite good knowledge of malaria in pregnancy only 48.8% accessed at least 2 doses of SP for malaria prevention, and this was due to lack of perception of being at risk of malaria (Van Eijk et. al., 2011). The lack of risk perception of malaria is worst among pregnant women [11] who are generally known to be a vulnerable group. The consequence of this is the poor or non-practice of prevention measures which further increases the burden of malaria in pregnancy and results in increased maternal and neonatal mortality. This could also hinder the malaria control and elimination strategies. Factors that have been found to influence the risk perception of malaria among pregnant women include: maternal age, parity, level of education, knowledge of malaria and settlement (rural or urban) [12, 13] Omaka-amari et al., 2015.

2. Methods

2.1. Study Area

The study was conducted in Ogun State, southwest Nigeria with a projected population for women of reproductive age group and pregnant women for year 2015 is 1,098,532 and 249,666 respectively (National Population Commission, 2006). The state has three (3) senatorial zones made up of 20 Local Government Areas (LGAs) and operates a three-tier health care delivery services namely primary, secondary and tertiary with a total of 1584 registered health facilities disaggregated into 546 primary health centers (PHCs), 29 secondary facilities, three (3) tertiary facilities (1 State and 2 Federal) and 1006 registered private facilities (SMOH Malaria Control Operational Plan 2015). Ante-natal clinic (ANC) attendance is 89.9%, delivery at HFs is 63.8%, and maternal mortality rate is 119/100,000 (Ogun State strategic health plan 2010-2015).

Study Design: A cross-sectional study was carried out and data collection was by mixed methods.

Study Population: The study population comprised women attending ANC in Ogun State.

2.2. Sample Size Determination

Different sample sizes were calculated for malaria risk perception, prevention practices and malaria parasitaemia using Leslie and Kish formula but highest proportion of malaria preventive measures practiced (use of insecticidal spray) from previous study = 48.0% =0.48 [8] was used for the sample size having the highest participants.

The estimated sample size was 426 from:

$$n = \frac{z^2pq}{d^2}$$

Where n = Sample size

Z = z value corresponding to a 95% confidence level = 1.96

p = highest proportion of malaria preventive measures practiced (use of insecticidal spray) from previous study = 48.0% =0.48 [8]

$$q = (1 - p) = (1-0.48) = 0.52$$

d = absolute precision (5%)

$$= \frac{(1.96)^2 X\ 0.48\ X\ 0.52}{(0.05\ X\ 0.05)}$$

= 383.5

≈ 384 participants

Adjusting for non-response rate (NR) of 10%: 1/{1-NR}

1/{1-0.10} = 1.11

384*1.11

= 426 participants

2.3. Sampling Technique

Three stage sampling method was used.

1st stage: Selection of LGA

The State has three (3) senatorial districts. One (1) LGA from each district was selected by simple random sampling using balloting technique. Abeokuta south LGA was selected from Ogun Central senatorial district, Ado Odo-Ota LGA from Ogun West senatorial district and Ijebu-Ode LGA from Ogun East senatorial district.

2nd stage: Selection of health facilities

The lists of all the public and private primary health facilities and secondary health facilities in the selected LGAs were obtained. One (1) secondary public health facility (since majority of LGAs have just one secondary facility; public because most of the secondary HFs are public HFs). One (1) private HF and two (2) primary health care facilities were selected in each LGA by ballot.

3rd Stage: selection of participants

ANC attendances for each facility were reviewed for the past three months and average monthly attendance was obtained; same length of period which the participants were recruited. The number of participants for each HFs was allocated proportionately after identifying the number of attendees in each HFs. Participants were systematically selected from the HFs after obtaining an interval for selection for each, using n/N =K. The first participant was selected randomly by balloting and then thereafter every Kth participant was recruited until required sample size was obtained.

2.4. Data Collection and Laboratory Method

Data collection instrument: this included semi-structured interviewer administered questionnaire and focused group discussion (FGD) guide.

The semi-structured interviewer-administered questionnaire adapted from previous studies [14] (Omaka-amari et al., 2015) was used to collect information on the socio-demographic characteristics of respondents, accessibility to ANC, obstetrics history, risk perception of malaria in pregnancy and malaria preventive measures practiced (Appendix 2). Risk perception of malaria was assessed through a five-point Likert scale while prevention practices were assessed on a 4-point scale of the frequency ("Always": Continuous practice or practice done as recommended, "Often": Frequent use/practice but not continuous or prescribed, "Occasionally": Practice as one desire and not regular and "Never": Can't remember when last practiced OR not practiced in this pregnancy). The questionnaire was translated into Yoruba language and nine research assistants who could speak English and Yoruba fluently and who had prior research experience in data collection were trained for a day on study objectives, data collection process and questionnaire administration in English and Yoruba. The questionnaire was pre-tested at a HF in Abeokuta North LGA, a different LGA from the selected LGAs for the study where the questionnaire was administered to 50 pregnant women to improve the tool and prepare the research assistants for data collection. This helped to correct for errors and ambiguous questions and improved the validity and reliability of the questionnaire.

The FGD guide (Appendix 3) had the following thematic areas explored: perceptions on susceptibility and severity of malaria in pregnancy, perceptions on use malaria preventive interventions, and perceived barriers related to the use of malaria preventive interventions. It was pre-tested too at a different HF.

2.4.1. Data Collection Procedure

Permission was sought from the managements of the selected facilities, written informed consent was signed by respondents and questionnaires were administered. Blood sample was collected for malaria parasitaemia test and slides were prepared onsite at the various HFs after which slides were sent to State Hospital, Ota where it was read by microscopists.

Focused group discussions (FGD) with pregnant women were held separately with adolescent girls and those who were 20 years and above, those with low and those with high educational status. A total of six FGDs sessions were conducted with a total of 52 pregnant women. The FGDs were conducted in a secluded room in the HF by the moderator who led the discussion and took few notes and the assistant/note taker who took comprehensive notes, operated the tape recorder, kept track of time and responded to environmental interruption. The FGDs lasted for about 40 - 60 minutes and a tape recorder was used to capture the sessions for near perfect transcription.

2.4.2. Laboratory Method

For the laboratory component, venous blood samples were collected from participants for malaria diagnosis by microscopy. Thin and thick blood films were prepared immediately upon blood collection on the same slide by trained laboratory technician. While thick film was allowed to air dry, the thin film was fixed by dipping the prepared film end in absolute methanol for one second, and both films were allowed to dry for 24-48 hours and subsequently stained with 3% Giemsa at PH 7.2 for 45 minutes. The stained slides were read by two WHO certified microscopists. Discrepant parasite detection and parasite count readings between the two microscopists was resolved by a re-reading of the slides or by employing a third microscopist before the final result was determined. The mean parasite counts of the two readers were accepted when the discrepancy of the two readings is less than 20%. A blood slide was considered negative when the examination of 100 high-power fields did not show the presence of asexual forms of *P. falciparum* under x100 oil immersion objective lens [15].

2.5. Data Management and Analysis

The questionnaire was identified by serial number and double-data entry was done by the principal investigator and research assistants using Microsoft excel 2007 and exported to EPI INFO 7 software for final cleaning/editing and analysis. Preliminary frequencies were run to check for completeness. Data was backed up by saving it in different folders in the computer and also on a removable flash disk drive.

Risk perception of malaria was assessed through a five-point likert scale and scores was allocated as follows: "Strongly disagree" = 1, "Disagree" = 2, "Neither agree nor disagree" = 3, "Agree" = 4 and "Strongly agree" = 5. The overall risk perception score was calculated by adding up the scores for each respondent across all eight questions. Risk perception score was further dichotomized into poor (< 32) and good perception ≥ 32) using "Agree" as the cut-off point where a point of 4 (for agree) to each of the questions (8) agreed to amounts to 32 (4*8). Preventive practices were assessed on a 4-point scale of the frequency they adopted malaria preventive practices using always (AL), often (OF), occasionally (OC) and never (NE) with allocated scores as follows: AL = 4, OF = 3, OC = 2 and NE = 1. Scores were added and the mean scores was used to categorise into levels of use as: 3.1-4.0 implying "always", 2.1-3.0 implying "often", 1.1-2.0 implying "occasional and 0.1-1.0 implying "never" adopted malaria preventive practices. The outcome variables are Malaria risk perception, Preventive practices and Malaria Parasitaemia. Independent Variables include socio-demographic and obstetrics characteristics such as: age, marital status, educational status, occupation, monthly income, ANC booking, trimester, gravidity and parity.

Descriptive analysis was done and results presented as frequencies, proportions, percentages and mean (x) and depicted in tables and figures.

For preventive practices, mean and standard deviation, and t-test were used for the purpose of description and test the significance of difference between malaria preventive practices adopted by pregnant women and independent variables respectively. Standard deviation was used to determine how the responses of the respondents vary.

Bivariate analysis The dependent and independent variables were dichotomized and Chi-square test was performed. This was done between risk perception (dependent variable) and, socio-demographic and obstetric history (e.g. Age, Parity, Gravidity, Trimester at registration for ANC, Educational level, Occupation, Monthly income), one at a time as independent variables. Also, between preventive methods practiced (dependent variable) where pregnant women who "Always", "Often" or "Occasionally" practiced a form of prevention e.g. LLINs were grouped as "ever used" and those who "Never" on the other hand, were taken as another group "Never used" and, independent variables (socio-demographic and obstetric history). Their odds ratios (OR) at 95% confidence intervals (CI) and p-values were equally obtained. The findings at this stage were used to identify important associations (at 5% level of significance). T-test was used to test the difference ($p < 0.05$) on the independent continuous variables. Age was dichotomized to separate adolescent from older women using age 20 as cut off (<20 years as adolescent) [15].

Multivariable analysis was performed using logistic regression to identify predictors of risk perception and preventive measures practiced out of those found to be significant ($p<0.05$) at bivariate analysis.

Qualitative analysis was performed using deductive approach. Data was organized by transcribing verbatim and read repeatedly to label for similarities and differences.

2.6. Ethical Consideration

Ethical approval was sought and obtained from the Ethics and Research Committee of the State Ministry of Health, Abeokuta. Permission was sort from the heads of health facilities selected and written informed consent (Appendix 1) was equally obtained from the participants before the interview. Participation was voluntary and it was explained to respondents that there will be slight pain due to needle penetration at the site of Venipuncture. All information collected was treated with utmost confidentiality.

3. Results

3.1. Socio-Demographic Characteristics

Four hundred and twenty-six pregnant women participated in the study with mean (SD) age of 27.9 (5.5) years. Eighteen (4.2%) were within the 15-19 years age category, 107 (25.1%) were within 20-24 years, 142 (33.3%) were within 25-29 years, 101 (23.7%) were within 30-34 years and 58 (13.6%)

were greater than 34 years of age. Three hundred and sixty-seven (86.2%) of the respondents were Yoruba and 409 (96%) were married. Three hundred and eighty-two (89.7%) of the participants had at least secondary education while 278 (65.3%) were Christians. The occupation of the respondents, predominantly were: trading, 168 (39.4%), artisans; 65 (15.3%) and teaching; 46 (10.8%). Three hundred and eighty-four (90.1%) respondents volunteered their monthly income and of which 172 (44.8%) earned between N1000 and N10000. The median income was N10000 (IQR = 13000). Two hundred and thirty-eight respondents (55.9%) first registered for ANC in their second trimester with a mean (SD) gestational age at booking of 4.5 (1.7) months. When categorized into late and early first attendance (booking), half; 216 (50.5%) respondents registered early. At the time of the study, most 299 (70.2%) of the respondents were in their third trimester while 141 (33.1%), 131 (30.8%) and 154 (36.2%) were primigravidae, secundgravidae and multigravidae respectively. One hundred and fifty-seven (37%) of respondents were multiparous.

3.2. Risk Perception of Malaria in Pregnancy

Among the combination of questions used to assess the risk perception of malaria, 198 (46.7%) agreed they are at risk of having malaria while 93 (21.9%) strongly agreed. Half, 216 (50.7%) of the respondents agree malaria could be fatal if not promptly treated in pregnancy and 171 (40.1%) strongly agreed. Two hundred and one (47.6%) respondents agreed while 148 (35.1%) of respondents strongly agreed that malaria is preventable. Table 1. shows that 206 (48.4%) respondents had high perception of malaria risk and 220 (51.6%) had low perception of malaria risk based on their risk perception scores.

3.3. Factors Associated with Malaria Risk Perception Among Pregnant Women

Table 2 shows factors that are associated with malaria risk perception. Age (X^2 = 5.1, p=0.02), gravidity (X^2 = 4.4, P =0.04) and trimester (X^2 = 8.6, P <0.001) were significantly associated with poor risk perception of malaria in pregnancy.

Predictors of Malaria risk perception

After adjusting for possible confounders, trimester (AOR=3.8, P <0.05) was the only factors associated with poor malaria risk perception among pregnant women attending ANC in Ogun state. Women attending ANC in Ogun State who are in their 1st trimester were approximately four times more likely to have poor risk perception of malaria in pregnancy as shown in Table 3.

Mean of frequency for malaria preventive practices among pregnant women

Pregnant women always/often (mean: 2.7-3.8) adopted the entire malaria preventive practices except sprinkling of kerosene (mean: 1.5), drinking of native/herbal concoction (mean: 1.7), sleeping in an air-conditioned room (mean: 1.6), wearing long sleeve at night time (mean: 1.7) and use of mosquito coils (mean: 2.0) which they occasionally adopted.

Factors influencing malaria preventive practices adopted by the respondents

Age was found to influence the malaria preventive practice adopted by the respondents as there were significant mean difference between respondent less than 20 years of age and those ages 20 years and above in the following preventive measure: Use of anti-mosquito/insecticidal spray (t-cal =2.28, P =0.02), clearing of stagnant water (t-cal = 2.21, P = 0.03), clearing of bushes around the house (t-cal = 2.13, P = 0.03) and visiting the hospital when sick (t-cal = 2.28, P = 0.02).

Factors associated with use of LLINs and IPT

Trimester (X^2 =7.23, p =0.01) was significantly associated with IPT-SP use. Income (X^2 =6.4, p =0.01) and marital status (X^2 =7.8, p =0.01) were significantly associated with herbal concoction use but no factor was significantly associated with LLINs/ITN use. This is as shown in Table 5.

3.4. Prevalence of Asymptomatic Malaria Parasitaemia Among Respondents

Prevalence of asymptomatic malaria among respondents was 2.7% (11/410). The *Plasmodium* species detected in the positive malaria slide of pregnant women whose peripheral blood smear was tested were all *P. falciparum*. The age group with the highest prevalence 5 (45.5%) was 15-19 years age group. The prevalence of malaria in primigravidae, secundigravidae and multigravidae were: 45.5%, 27.3% and 27.3% respectively while by trimester, 1st trimester; 1 (9.1%), 2nd trimester; 2 (18.2%), and 3rd trimester; 8 (72.7%) as shown in Table 6.

Factors associated with prevalence of malaria parasitaemia

Age of the women was significantly associated with malaria prevalence; young maternal age (<20 years) has 25.8 times the odds of having malaria infection (OR = 25.8, P <0.001). Gravidity and trimester were not significantly associated with malaria parasitaemia. This is shown in see Table 7.

3.5. Result of FGDs

There were 52 participants for the FGDs, eight (15.4%) were adolescents (<20years), 44 (84.6%) were age 20 years and above. Twelve (23.1%) participants had attained some primary education while 40 (76.7%) had at least secondary education. They were majorly (71.2%) traders.

Perceptions on susceptibility and seriousness of malaria in pregnancy

In the FGDs conducted, most participants correctly understood what malaria is, for example:

"Malaria is caused by plasmodium from mosquito bite." (24-year-old teacher)

"Malaria is a common disease caused by mosquito and comes when our environment is unkempt or we did not use net."

(32 years old trader)

Furthermore, the following statements illustrate how respondents perceived malaria:

"Malaria is not a normal disease, causes serious illness for pregnant women" (24 years old teacher)

"Malaria is deadly, it can kill if not being managed properly" (37 years old trader)

"Malaria affects the blood and very deadly. It can kill and destroy baby" (30 years old trader)

How participants perceived themselves at risk of malaria, we have the following:

Participants in all the FGDs believed they are at risk of malaria majorly because they believe mosquito is everywhere. For example:

"We are in Nigeria, once mosquito bites" (28years old trader)

"Yes, when mosquito bites me especially I am AA genotype" (36 years old trader)

Most of the respondents ranked malaria above other diseases. We have the following examples:

"I believe malaria kills faster than HIV". (28 years old trader)

"I rank malaria number one due to its high risk, even with drugs I still feel its effect" (32 years old teacher)

What are the effects of malaria on pregnancy?

Majority (70%) of the participants have a good idea of what malaria can cause in pregnancy to the woman and her unborn child. For example:

"It can cause the child to reduce in weight". (26 years old trader)

"It can cause jaundice in child". (36 years old trader)

"Untreated malaria cause spending excessively on a child". (35 years old trader)

"It can cause weakness, death of baby or sickness at birth". (24 years old student)

'It can cause abortion, weakness of the body, slow growth of child and can cause imbecile child". (32 years old teacher).

Perceptions on use of malaria preventive interventions

As regards what the participants do to prevent themselves against malaria during pregnancy, there were wide range of different methods of prevention mentioned but mostly mentioned were bed nets/ treated nets, use of IPT-SP, insecticides, clearing of bushes. For example:

"I sleep under mosquito net given at the health center, use the drugs given at health center and clear stagnant water". (32 years old teacher)

"I cover my body" (19 years old trader)

"I use net for door and windows, prevent exposed gutter". (27 years trader)

"I use mosquito repellant and occasionally net" (30 years old trader)

"I use mosquito net, drug like Fansidar and fumigation of my house environment" (24 years old trader)

"I fleet my home, make my environment clean" (36 years old trader)

"I come to the hospital for drug even if am not sick for my compulsory drug". (27 years old trader)

"Mosquito coil is also used and works for me especially because of air". (37 years old trader)

"Me I use "agbo" because I don't like all those drugs they give us here" (26 years old trader)

Table 1. *Respondents' malaria risk perception score.*

Perception score	Frequency	Percentage
High perception of risk (≥ 32)	206	48.4
Low perception of risk (< 32)	220	51.6
Mean score: 31.1 ±4.1		

Table 2. *Factors associated with malaria risk perception among pregnant women.*

Malaria risk perception				
Variables	**Low n (%)**	**High n (%)**	**X^2**	**p-value**
Age				
<20	14 (77.8)	4 (22.2)	5.1	0.02*
≥20	206 (50.5)	202 (49.5)		
Marital status				
Never married	9 (64.3)	5 (35.7)	0.9	0.34
Ever married	211 (51.2)	201 (48.8)		
Educational Status			0.3	0.58
None/Primary	21 (47.7)	23 (52.3)		

Malaria risk perception				
Variables	**Low n (%)**	**High n (%)**	**X^2**	**p-value**
Secondary/Post sec	199 (52.1)	183 (47.9)		
Occupation				
Unemployed/Informal	175 (52.4)	159 (47.6)	0.4	0.55
Formal	45 (20.5)	47 (22.8)		
Income				
≤10000	127 (51.2)	121 (48.8)	0.03	0.85
>10000	71 (52.2)	65 (47.8)		
Primigravidity				
Yes	83 (58.9)	58 (41.1)	4.4	0.04*
No	137 (48.1)	148 (51.9)		
Primiparous				
Yes	135 (50.4)	133 (49.6)	0.6	0.45
No	85 (54.1)	72 (45.9)		
1st Trimester				
Yes	20 (80)	5 (20)	8.6	<0.001*
No	200 (49.9)	201 (50.1)		
ANC booking				
Early (0 – 16 weeks)	120 (55.8)	95 (44.2)	3.0	0.08
Late (≥ 17)	100 (47.4)	111 (52.6)		

*p-value < 0.05

Table 3. *Predictors of Malaria risk perception.*

Variables	**Adjusted AOR (CI)**	**p-value**
Age		
<20	3.1 (0.98-9.8)	0.05
≥20		
Primigravidity		
Yes	1.3 (0.85-1.99)	0.22
No		
1st Trimester		
Yes	3.8 (1.36-10.3)	<0.05*
No		

AOR: Adjusted Odd ratio. * Significant at p-value < 0.05

Malaria Preventive Measures Practiced Among Respondents

The percentage distribution of the frequency of use of malaria preventive measures adopted by respondents is shown in Table 4.

Table 4. *Malaria preventive practices among respondents; mean and decision.*

Preventive practices	Mean	SD	Decision
Use of ITN/LLINs	3.1	1.2	Always
Sprinkling of kerosene	1.5	0.9	Occasional
Drinking of native/herbal concoction	1.7	0.9	Occasional
Use of anti-mosquito/insecticidal spray	2.7	1.1	Often
Clearing of stagnant water	3.3	1.0	Always
Clearing of bushes around the houses	3.4	0.9	Always
Sleeping under the fan	3.2	0.9	Always
Sleeping in air conditioned room	1.6	0.9	Occasional
Wearing of long sleeve at night time	1.7	1.0	Occasional
Taking anti-malaria preventive drugs (IPT-SP)	3.3	0.9	Always
Use of mosquito coils	2.0	1.1	Often
Attending antenatal clinic	3.8	0.6	Always

Table 5. *Factors associated with use of IPT-SP among respondents.*

Variables	IPT-SP USE		X^2	p-value
	No	Yes		
Age (years)				
<20	1	17	0.04	0.84
≥ 20	26	358		
Gravidity				
Primigravidae	12	259	2.11	0.15
Not primigravidae	15	375		
Educational status				
None/primary	0	38	3.02	0.08
Secondary/post secondary	27	337		
Occupation				
Unemployed/informal	22	296	0.09	0.75
Formal	5	79		
Income				
≤10,000	15	220	0.68	0.41
>10,000	11	115		
Marital status				
Never married	1	12	0.02	0.88

Variables	IPT-SP USE		X^2	p-value
	No	Yes		
Ever married	26	363		
1st Trimester				
Yes	4	14	7.23	0.01*
No	23	361		
ANC booking				
Early	16	184	1.05	0.30
Late	11	191		

*Significant at p-value <0.05

Table 6. *Prevalence of asymptomatic malaria parasitaemia by age, gravidity and trimester (N = 11).*

Variable	Malaria Infection	
	n	%
Age group (years)		
15-19	5	45.5
20-24	1	9.1
25-29	2	18.2
30-34	3	27.3
Gravidity		
Primigravidae	5	45.5
Secundigravidae	3	27.3
Multigravidae	3	27.3
Trimester		
1st	1	9.1
2nd	2	18.2
3rd	8	72.7

Table 7. *Factors associated with malaria infection among women attending ANC in Ogun State.*

Variable	Proportion with malaria	OR (95% C.I)	p-value
Young age (<20 years)			
Yes	5 (27.8)	25.8 (6.9-95.4)	<0.001*
No	6 (1.5)		
Primigravidity			
Yes	5 (3.7)	1.7 (0.5-5.7)	0.38
No	6 (2.2)		

Variable	Proportion with malaria	OR (95% C.I)	p-value
1st trimester			
Yes	1 (5)	1.6 (0.2-13.3)	0.65
No	10 (2.6)		

*P-value < 0.05

4. Discussion

4.1. Malaria Risk Perception

The study examined the risk perception of malaria, preventive practices and associated factors among women attending ANC in Ogun state. In this study, questionnaires were administered to individual pregnant woman totaling 426 and also, FGDs were conducted with the pregnant women. For the questionnaires, findings showed that based on the cut-off score of 32 using "agree" to each response as the least good option, 48.4% of the pregnant women have good risk perception of malaria and for the FGDs which gives every respondents opportunity to express herself, it was observed that most have "good" malaria risk perception.

It was observed in the FGDs that the response of individuals in the group discussion helped initiate others to express their views. From the questionnaires (quantitative) showed higher proportion of respondents (51.6%) with relatively poor perception while on the other, FGDs conducted showed most (70%) of the women had good malaria risk perception. The findings also revealed many (68.6%) of the women "agreed"/ "strongly agreed" they are at risk of having malaria which was further corroborated by the findings from all the FGDs conducted where most of the pregnant women perceived they are at risk of malaria. This is not surprising because Ogun State and Nigeria as a whole is endemic for malaria and it is expected that the inhabitants of such an area who frequently suffer from bouts of malaria should agree to this. This is consistent with a similar study conducted in Uganda [13] Boene et al. 2014 which also observed that pregnant women perceived malaria as a dangerous disease and pregnant women are at risk of malaria. This study also showed from the FGDs that some pregnant women believed that men do not care for the health of their spouses which is also in keeping with the report of Mbonye A. K. et al. [13].

After adjusting for confounders, only age was significantly associated with malaria risk perception with respondents less than 20 years of age being three times more likely to have poor perception of risk of malaria as compared with women above 20 years of age. This finding is supported by a similar study [13] where it was observed that pregnant adolescents had poorer perception of malaria risk as compared with pregnant adults. Pregnancy in women below age 20 is mainly unplanned and in more vulnerable groups which limits their access to information and healthcare services.

4.2. Malaria Preventive Measures Adopted by Pregnant Women

This study showed that majority of women attending ANC in Ogun State adopted the use of ITN/LLINs and IPT-SP use. However, only 54.7% and 56.9% respectively adopted these practices always. The study also revealed that a wide variety of preventive measures such as clearing of stagnant water, clearing of bushes around the house and sleeping under the fan were adopted always by women attending ANC in Ogun State. Others such as sprinkling of kerosene, drinking of herbal concoction, use of insecticidal spray and use of mosquito coils were practices adopted occasionally. This study is distinct because unlike other studies that examined preventive practices as either "used" or "not used", this study went further to examine the frequency to which the respondents adopted these practices. The findings in this study which showed ITN/LLINs use as good is inconsistent with findings in Ibadan where ITN use among pregnant women was low (1.1%) [16] and another study in rural part of Osun state by Dare and Badru (2001) reported poor use of ITN. This finding reflects the State Ministry of Health report for 2014, where 97% of all household in Ogun State have at least one LLIN for two persons, and 89% of pregnant women attending ANC in public facility received LLIN.

Factors observed to be associated with preventive practices adopted and frequency of use of such practices included: Age, which was observed to have a significant difference between women below 20years and those 20years and above. This was in favour of those that are 20years and above. Others included primigravidae, trimester and income. This may be because older pregnant women and women in later trimester (second and third) may have had more opportunities to have contact with health care givers, health information or health care facilities.

4.3. Prevalence of Malaria Parasitaemia

Until now, 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% [17-21]

have been reported and in Ogun [21] reported a prevalence of 53.5%. These reports contrast sharply with our finding in this same region among women attending antenatal clinics but consistent with report from a study in Lagos who reported a prevalence of 7.7% among women attending ANC [22]. The low prevalence (2.7%) recorded in this study could have been influenced by the relatively good perception of risk of malaria and good preventive practices observed among the respondents. This is coupled with the scale up of malaria control programmes such as free net distribution, directly observed therapy (DOT) for IPT-SP being implemented in the state. Also, is the enforcement by the state government a mandatory monthly sanitation exercise which helps to keep the environment safe of vector carrying plasmodium. Furthermore, the FGDs conducted showed pregnant women atleast during the period of pregnancy are practicing good preventive measures as guided by the ANC clinic personnel. It could also be absence of peripheral parasitaemia while there could still be placental parasitaemia as documented in areas of stable malaria transmission (Steketee et al., 2001 & Uneke, 2007).

The 100% *P. falciparum* species seen in this study confirms a report that *P. falciparum* is the most prevalent species in Nigeria accounting for 98% of malaria cases in the country (FMOH, 2010). Another study reported that 80-95% of malaria infections in tropical Africa are caused by *P. falciparum* [23].

4.4. Limitations

Although the research has reached its objective, there were some limitations. Firstly, interview space in the HFs was a constraint as the presence of health care providers around the respondents when administering the questionnaire tends to influence their response. This was averted by excusing the respondents away from sight of the health care provider.

Secondly, because of time limit and accessibility to pregnant women, the research was conducted in HFs on women attending ANC. Therefore, to generalize the results for larger group involving women not attending ANCs, the study should involve pregnant women in the community irrespective of where they receive care.

5. Conclusion

This study aimed at assessing the risk perception of malaria, prevention practices, malaria parasitaemia and associated factors among women attending ANC in Ogun State so as to discourage unwholesome practices identified and fill gaps in coverage of appropriate malaria preventive measures in pregnancy and eventually reduce the burden of maternal malaria, morbidity and mortality.

Respondents have good perception of risk of malaria as well as adopted good preventive practices. The prevalence of malaria parasitaemia was low and could have been influenced by the good risk perception of malaria coupled with the good preventive practices adopted by the respondents in this study. Trimester was identified a predictor of malaria risk perception.

Recommendation: Young, primiparous and women in their first trimester should be given targeted strategies to improve their perception of the risk of malaria and preventive practices. Pregnant women should be sensitized on need to use preventive measures such as ITN; "always" and IPT-SP as recommended.

Abbreviations

ANC: Ante-natal Clinics

FGD: Focused Group Discussions

IPT-SP: Intermittent Preventive Treatment with Sulphodoxine Pyrimethamine

LLINs: Long-Lasting Insecticidal Nets

LGAs: Local Government Areas

Conflicts of Interest

The authors declare no conflicts of interest.

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