

Research Article

# Prevalence, Knowledge and Prevention of Malaria among Pregnant Women Attending Antenatal Care at a Teaching Hospital in Southern Nigeria

O. R. Omole<sup>1</sup>, E. O. Ezirim<sup>2</sup>, I. O. Abali<sup>3</sup>, E. M. Akwuruoha<sup>2</sup>, C. O. Onyemereze<sup>2</sup>, Onyinye I. N. Onyekachi<sup>4</sup>, D. O. Anele<sup>5</sup>, and A. I. Airaodion<sup>6\*</sup>

<sup>1</sup> Department of Nursing, Coventry University, United Kingdom.

<sup>2</sup> Department of Obstetrics and Gynaecology, Abia State University, Uturu, Nigeria

<sup>3</sup> Department of Surgery, Abia State University, Uturu, Nigeria

<sup>4</sup> Department of Medical Microbiology, Ebonyi State University, Abakaliki, Nigeria

<sup>5</sup> Department of Pharmacology and Therapeutics, Gregory University, Uturu, Abia State, Nigeria

<sup>6</sup> Department of Biochemistry, Lead City University, Ibadan, Oyo State, Nigeria\*

**Corresponding Author:** A. I. Airaodion, Department of Biochemistry, Lead City University, Ibadan, Oyo State, Nigeria.

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## Abstract

**Background:** Malaria poses significant risks to pregnant women and their unborn babies, particularly in sub-Saharan Africa. Understanding the prevalence, knowledge, and prevention strategies among this demographic is crucial for effective management and control.

**Objectives:** This study aimed to determine the prevalence of malaria among pregnant women attending antenatal care, assess their knowledge regarding malaria transmission, symptoms, and preventive measures, and evaluate the accessibility and effectiveness of malaria prevention services.

**Methods:** A cross-sectional study was conducted at a Tertiary Health Facility in Southern Nigeria. A structured questionnaire was used to collect data on sociodemographic information, knowledge of malaria, prevalence of malaria, access to prevention services, and experiences with malaria during pregnancy. Blood samples were collected and analyzed for malaria parasites. Data were analyzed using SPSS version 20.0, employing descriptive statistics and group comparisons.

**Results:** Among the 405 pregnant women surveyed, 37.28% were diagnosed with malaria during pregnancy. Most participants demonstrated good knowledge of malaria transmission and symptoms, with 89.14% believing malaria can be prevented. However, challenges in accessing prevention services were reported by 69.88% of respondents, primarily due to financial constraints and lack of awareness. Factors influencing malaria prevalence included gestational age, educational level, and access to preventive measures.

**Conclusion:** Despite high levels of awareness, malaria remains prevalent among pregnant women in Southern Nigeria. Efforts to improve access to prevention services, including education and distribution of insecticide-treated bed nets and intermittent preventive treatment, are essential for reducing the burden of malaria in this vulnerable population.

**Keywords:** Antenatal Care, Knowledge, Malaria, Pregnancy, Prevalence and Prevention.

## 1. Introduction

Malaria remains a significant public health concern in Nigeria, particularly among vulnerable populations such as pregnant women [1]. Despite numerous efforts to control the disease, it continues to pose a threat to maternal and fetal health. Pregnant women are at increased risk of malaria infection due to changes in immunity and physiology during

pregnancy, making them more susceptible to severe complications such as anemia, low birth weight, preterm birth, and maternal death [2]. Understanding the prevalence, knowledge, and prevention practices of malaria among pregnant women attending antenatal care is crucial for developing effective interventions to mitigate its impact.

Assessing the prevalence of malaria among pregnant women attending antenatal care provides insight into the burden of the disease in this population. Studies have consistently shown a high prevalence of malaria among pregnant women in Nigeria. For instance, a recent cross-sectional study conducted by Adeyemi et al reported a prevalence rate of 45.6% among pregnant women attending antenatal clinics in Southern Nigeria [1]. Similarly, a study by Oguonu et al found a prevalence rate of 52.3% among pregnant women attending a teaching hospital in a different region of Nigeria [3]. These findings underscore the urgent need for effective malaria prevention and control strategies targeting pregnant women.

Assessing the knowledge of malaria among pregnant women is essential for understanding their awareness of the disease and its preventive measures. Several studies have evaluated the knowledge of malaria among pregnant women in Nigeria. A study by Ankomah et al found that while most pregnant women were aware of malaria and its transmission, knowledge regarding preventive measures such as insecticide-treated bed nets (ITNs) and intermittent preventive treatment in pregnancy (IPTp) was low [4]. Similarly, a study by Olowookere et al reported inadequate knowledge of malaria prevention strategies among pregnant women attending antenatal care in Southern Nigeria [5]. These findings highlight the importance of targeted health education programs to improve malaria knowledge among pregnant women.

Effective prevention of malaria among pregnant women is crucial for reducing the burden of the disease and its associated complications. Interventions such as the distribution of ITNs, IPTp with sulfadoxine-pyrimethamine (SP), and health education have been recommended by the World Health Organization (WHO) for malaria prevention in pregnancy. However, the implementation of these interventions remains a challenge in many settings. A study by Ezebialu et al evaluated the impact of a comprehensive malaria prevention program, including the distribution of ITNs and IPTp, on malaria-related outcomes among pregnant women in Nigeria [6]. The study reported a significant reduction in malaria prevalence and adverse pregnancy outcomes following the implementation of the intervention, highlighting the importance of multi-faceted approaches to malaria prevention in pregnancy. This study therefore sought to investigate the prevalence of malaria among pregnant women attending antenatal care, assess their knowledge regarding malaria transmission, symptoms, and preventive measures, and evaluate the accessibility and effectiveness of malaria prevention services in their locality.

## 2. Research Methodology

**2.1. Study Design:** This was a cross-sectional study involving pregnant women attending antenatal clinic at a Tertiary Health Facility in Southern Nigeria. Cross-sectional studies are beneficial for identifying and assessing the prevalence and distribution of health-related states within a population at a specific point in time [7]. The study population comprised of pregnant women booking for and/or attending an-

tenatal care at the study site between April and November, 2023.

### 2.2. Sample Size Determination

Sample size was calculated using the Fisher's formula outlined by Airaodion.

$$n = \frac{Z^2(Pq)}{e^2}$$

Where n = minimum sample size

Z = 1.96 at 95% confidence level,

P = known prevalence of malaria in pregnancy in Nigeria

e = error margin tolerated at 5% = 0.05

q = 1 - p

According to Ejike the existing prevalence of malaria in pregnancy in southern Nigeria is 40.05%.

P = 40.05% = 0.4005

q = 1 - p

= 1 - 0.4005

= 0.5995

$$n = \frac{(1.96)^2(0.4005 \times 0.5995)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.24001}{0.0025}$$

$$n = \frac{0.92237}{0.0025} = 368.95$$

The minimum sample size was 369 and was adjusted to 405 to account for non-response rate of 10 % [8, 9].

### 2.3. Data Collection

A structured questionnaire was utilized to collect the data. The questionnaire was composed of four sections: (1) Sociodemographic and Clinical Information, (2) knowledge of malaria among Pregnant Women (3) Prevalence of malaria among Pregnant Women (4) Access to malaria prevention services. The questionnaire was developed and validated through extensive literature review and expert opinion, ensuring that it covered all pertinent information required for the study.

Blood samples were aseptically collected into ethylene-diamine tetraacetic acid (EDTA) bottles as described by Abdullahi [10]. About 2 mL of blood sample was obtained by venipuncture from each patient using a sterile needle and syringe. Each blood sample was analyzed for malaria parasite. For confidentiality, no personal identifiers (names, address, etc) were used on the blood sample of the participants' instead, bar-coded numbers were used to ensure anonymity of the donors, to facilitate laboratory procedures and minimize the chances of errors during the handling of the blood specimens. All specimens were analyzed within 1 hour of collection.

### 2.4. Microscopic Examination and Giemsa Staining

Giemsa-stained thick and thin blood films were performed, the average of ten views of a slide were counted and used for the determination of parasite density. Grease free slides were used and a small drop of blood was spread out in a circle at the centre of the slides with a micropipette in order to

make the thick film. For the thin film, a drop of blood using a micropipette was placed at 1cm from the end of the slide, a cover slip was placed on the slide at an angle of 45° and a thin film was made by gently pushing the cover slip forward to produce feathered edge where the cells were in a monolayer. A grease pencil was used to label the slides, which were allowed to air dry at room temperature, and were fixed after drying in methanol for one minute, making it ready for staining. The Giemsa stain was carried out using standard quality control procedure as described by Abdullahi [10].

### 2.5. Data Analysis

The statistical package for the social science was used to analyze the collected data (version 20.0; SPSS, Chicago, IL). The mean, standard deviation and t-test were the statistical tests employed in this investigation. Simple tables containing frequencies, percentages, and mean values were used to display the obtained results. The threshold of statistical significance for group comparisons was set at P-value  $\leq 0.05$ .

### 3. Results

From the results of this study, the age distribution of respondents ranged from 18 to 24 years (10.86%), 25 to 30 years (25.93%), 31 to 35 years (31.60%), 36 to 40 years (21.98%), and 41 years and above (9.63%). Educational levels varied, with respondents reporting no formal education (4.44%), primary education (8.15%), secondary education (57.53%), and tertiary education (29.88%). Marital status included single (3.95%), married (90.62%), and divorced/widowed (5.43%). The number of pregnancies, including the current one, were categorized as first pregnancy (25.43%), second pregnancy (27.41%), third pregnancy (21.23%), fourth pregnancy (18.27%), and fifth or more pregnancies (7.65%). Respondents' current gestation age included first trimester (10.12%), second trimester (32.59%), and third

trimester (57.28%). Regarding antenatal care registration, respondents registered in the first trimester (30.62%), second trimester (67.41%), and third trimester (1.98%) (Table 1). Table 2 showed that all respondents had heard of malaria, with 96.79% knowing its cause. Mosquito bites were recognized as a transmission route by 84.49% of respondents. Common symptoms of malaria identified by respondents included fever (26.18%), headache (31.53%), and muscle aches (18.63%). Most respondents believed malaria could be prevented (89.14%) and acknowledged pregnant women's increased susceptibility (84.93%) and adverse outcomes for both mother and baby (80.99%). The results further revealed that 68.64% of respondents had been diagnosed with malaria during their current pregnancy, with varying frequencies of diagnosis. Additionally, 60.00% sought immediate medical treatment upon symptom onset. Self-medication was a common treatment approach (51.36%). Respondents rated the availability of malaria treatment services as mostly good (71.11%) (Table 3). The prevalence of malaria in pregnancy was 37.28% (Fig. 1).

The present study indicated that most respondents received education on malaria prevention during antenatal care visits (91.11%), with 80.25% rating it as very effective. Common preventive measures included sleeping under insecticide-treated nets (41.68%) and taking antimalarial medications as prescribed (19.12%). Challenges in adhering to prevention measures were reported by 69.88% of respondents, including financial constraints (50.08%) (Table 4). Table 5 demonstrated factors influencing malaria prevalence in pregnancy, such as age, educational level, number of pregnancies, gestation age at antenatal care registration, knowledge of malaria cause, belief in preventability, awareness of susceptibility, accessibility of prevention interventions, and usage of insecticide-treated bed nets.

**Table 1: Sociodemographic and Clinical Information of Respondents**

Variable	Frequency (n = 405)	Percentage (%)
Age (in Years)		
18 - 24	44	10.86
25 - 30	105	25.93
31 - 35	128	31.60
36 - 40	89	21.98
41 and above	39	9.63
Educational Level		
No formal Education	18	4.44
Primary Education	33	8.15
Secondary Education	233	57.53
Tertiary Education	121	29.88
Marital Status		
Single	16	3.95
Married	367	90.62
Divorced/Widowed	22	5.43

Number of pregnancies, including the current one		
First Pregnancy	103	25.43
Second Pregnancy	111	27.41
Third Pregnancy	86	21.23
Fourth Pregnancy	74	18.27
Fifth or more Pregnancies	31	7.65
Current Gestation age		
First Trimester	41	10.12
Second Trimester	132	32.59
Third Trimester	232	57.28
What trimester did you register for antenatal care?		
First Trimester	124	30.62
Second Trimester	273	67.41
Third Trimester	8	1.98

**Table 2: Knowledge of Malaria**

Variable	Frequency (n = 405)	Percentage (%)
Have you ever heard of malaria?		
Yes	405	100.00
No	00	0.00
Do you know the cause of malaria?		
Yes	392	96.79
No	00	0.00
Unsure	13	3.21
*How is malaria transmitted? (Select all that apply) (n = 445)		
Through contaminated food and water	12	2.70
Through mosquito bites	376	84.49
Through physical contact with an infected person	00	0.00
Through sexual intercourse	18	4.04
Mother-to-Child Transmission	39	8.76
Others	00	0.00
*What are the common symptoms of malaria? (Select all that applies) (n = 1272)		
Fever	333	26.18
Headache	401	31.53
Muscle aches	237	18.63
Fatigue	129	10.14
Vomiting	99	7.78
Diarrhoea	73	5.74
Others	00	0.00
Can malaria be prevented?		
Yes	361	89.14
No	5	1.23
Unsure	39	9.63
Do you believe that pregnant women are more susceptible to malaria compared to the general population?		
Yes	344	84.93
No	29	7.16

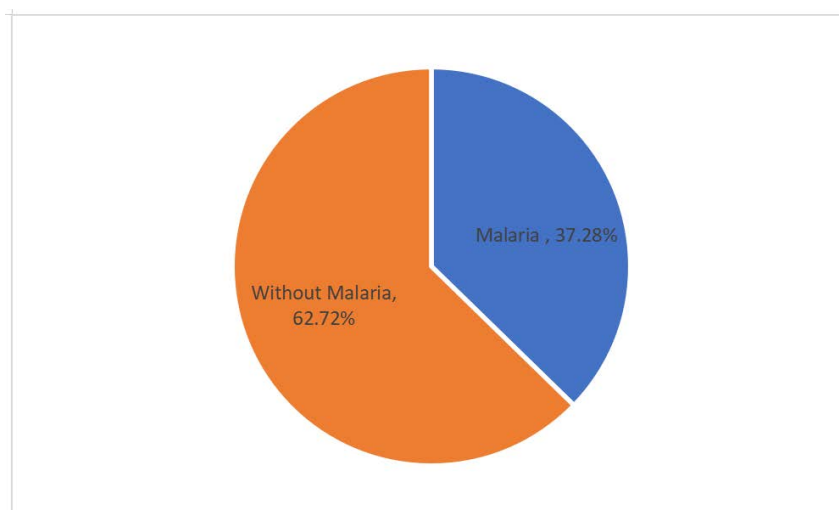
Unsure	32	7.90
Are you aware that malaria during pregnancy can lead to adverse outcomes for both the mother and the baby?		
Yes	328	80.99
No	25	6.17
Unsure	52	12.84

\* = multiple responses

**Table 3: Malaria Prevalence and Experience**

Variable	Frequency (n = 405)	Percentage (%)
Have you ever been diagnosed with malaria during your current pregnancy?		
Yes	278	68.64
No	127	31.36
If yes, how many times have you been diagnosed with malaria during your current pregnancy?		
Once	88	31.65
Twice	116	41.73
Three times or more	74	26.62
Did you seek medical treatment immediately after experiencing symptoms of malaria during your current pregnancy?		
Yes	243	60.00
No	35	8.64
Not Applicable	127	31.36
*If yes, where did you seek medical treatment? (Check all that apply) (n = 358)		
Self-medication	208	51.36
Public health facility	63	15.56
Private health facility	49	12.10
Traditional healer/Herbs	38	9.38
Others	00	0.00
How would you rate the availability of malaria treatment services in your area?		
Excellent	95	23.46
Good	288	71.11
Fair	22	5.43
Poor	00	0.00

\* = multiple responses



**Figure 1: Prevalence of Malaria in Pregnancy**

**Table 4: Access to Malaria Prevention Services**

Variable	Frequency (n = 405)	Percentage (%)
Have you received any education or information on malaria prevention during your antenatal care visits?		
Yes	369	91.11
No	4	0.99
Unsure	32	7.90
If yes, how would you rate the effectiveness of the education or information provided?		
Very effective	325	80.25
Somewhat effective	31	7.65
Not effective	13	3.21
Not applicable	36	8.89
*What preventive measures have you taken to protect yourself from malaria during your current pregnancy? (Select all that apply) (n = 727)*		
Sleeping under Insecticide-Treated Nets (ITNs)	303	41.68
Taking Antimalarial Medications as Prescribed	139	19.12
Using Mosquito Repellents	94	12.93
Removing stagnant water around living areas	114	15.68
Avoiding sexual intercourse with infected person	77	10.59
Others	00	0.00
Have you faced any challenges in adhering to malaria prevention measures during your pregnancy?		
Yes	283	69.88
No	122	30.12
Have you been provided with insecticide-treated bed nets during your antenatal care visits?		
Yes	23	5.68
No	382	94.32
How often do you sleep under insecticide-treated bed nets?		
Always	96	23.70
Often	112	27.65
Sometimes	60	14.81
Rarely	71	17.53
Never	66	16.30
Have you been offered intermittent preventive treatment (IPTp) for malaria during your antenatal care visits?		
Yes	146	36.05
No	61	15.06
Unsure	198	48.89
How would you rate the accessibility of malaria prevention interventions (e.g., ITNs, antimalarial medications) in your community?		
Very Accessible	57	14.07
Somewhat Accessible	294	72.59
Not Accessible	54	13.33
*What barriers, if any, do you face in accessing malaria prevention services during pregnancy? (Check all that apply) (n = 589)*		
Lack of awareness about available services	194	32.94
Financial constraints	295	50.08
Distance to healthcare facilities	58	9.85
Cultural or religious beliefs	34	5.77
Others	8	1.36

\* = multiple responses



**Table 5: Factors influencing the Prevalence of Malaria in Pregnancy**

Variable	Prevalence of Malaria in Pregnancy		p-value
	Malaria	Without Malaria	
Age (in Years%)			0.049*
18 – 24	11 (25.00%)	33 (75.00%)	
25 – 30	44 (41.90%)	61 (58.10%)	
31 – 35	48 (37.50%)	80 (62.50%)	
36 – 40	38 (42.70%)	51 (53.30%)	
41 and above	10 (25.64%)	29 (74.36%)	
Educational Level			0.013*
No formal Education	13 (72.22%)	5 (27.78%)	
Primary Education	20 (60.61%)	13 (39.39%)	
Secondary Education	76 (32.62%)	157 (67.38%)	
Tertiary Education	42 (34.71%)	79 (65.29%)	
Marital Status			2.961
Single	8 (50.00%)	8 (50.00%)	
Married	133 (36.24%)	234 (63.76%)	
Divorced/Widowed	10 (45.45%)	12 (54.55%)	
Number of pregnancies, including the current one			0.001*
First Pregnancy	73 (70.87%)	30 (29.13%)	
Second Pregnancy	46 (41.44%)	65 (58.56%)	
Third Pregnancy	30 (34.88%)	56 (65.12%)	
Fourth Pregnancy	2 (2.70%)	72 (97.30%)	
Fifth or more Pregnancies	00 (0.00%)	31 (100.00%)	
Current Gestation age			0.004*
First Trimester	29 (70.73%)	12 (29.27%)	
Second Trimester	66 (50.00%)	66 (50.00%)	
Third Trimester	73 (31.47%)	159 (68.53%)	
What trimester did you register for antenatal care?			0.008*
First Trimester	47 (37.90%)	77 (62.10%)	
Second Trimester	99 (36.26%)	174 (63.74%)	
Third Trimester	5 (62.50%)	3 (37.50%)	
Do you know the cause of malaria?			0.000*
Yes	138 (35.20%)	254 (64.80%)	
No	00 (0.00%)	00 (0.00%)	
Unsure	13 (100.00%)	00 (0.00%)	
Can malaria be prevented?			0.000*
Yes	117 (32.41%)	244 (67.59%)	
No	5 (100.00%)	00 (0.00%)	
Unsure	29 (74.36%)	10 (25.64%)	
Do you believe that pregnant women are more susceptible to malaria compared to the general population?			0.000*
Yes	100 (29.07%)	244 (70.93%)	
No	23 (79.31%)	6 (20.69%)	
Unsure	28 (87.50%)	4 (12.50%)	

Are you aware that malaria during pregnancy can lead to adverse outcomes for both the mother and the baby?		
Yes	88 (26.83%)	240 (73.17%)
No	22 (88.00%)	3 (12.00%)
Unsure	41 (78.85%)	11 (21.15%)
How often do you sleep under insecticide-treated bed nets?		
Always	3 (3.13%)	93 (96.88%)
Often	11 (9.82%)	101 (90.18%)
Sometimes	28 (46.67%)	32 (53.33%)
Rarely	47 (66.20%)	24 (33.80%)
Never	62 (93.94%)	4 (6.06%)
Have you been offered intermittent preventive treatment (IPTp%) for malaria during your antenatal care visits?		
Yes	11 (7.53%)	135 (92.47%)
No	49 (80.33%)	12 (19.67%)
Unsure	91 (45.96%)	107 (54.04%)
How would you rate the accessibility of malaria prevention interventions (e.g., ITNs, anti-malarial medications%) in your community?		
Very Accessible	8 (14.04%)	49 (85.96%)
Somewhat Accessible	94 (31.97%)	200 (68.03%)
Not Accessible	49 (90.74%)	5 (9.26%)

#### 4. Discussion

The findings from the study shed light on the level of awareness and understanding of malaria among pregnant women in the region. It is encouraging to note that all respondents reported having heard of malaria. This high level of awareness is consistent with previous studies conducted in similar settings. For instance, a study conducted in Tanzania reported a similarly high awareness level among pregnant women, with 99% indicating prior knowledge of malaria [11]. Regarding the understanding of the cause of malaria, the majority of respondents correctly identified the cause of malaria. This is in line with findings from other studies in sub-Saharan Africa, which have consistently shown a high level of knowledge regarding the etiology of malaria among pregnant women [12, 13].

In terms of transmission, the overwhelming majority of respondents correctly identified mosquito bites as the primary mode of transmission. This aligns with existing literature, which emphasizes the importance of mosquito control measures in malaria prevention among pregnant women [14, 15]. However, it is concerning that a small percentage of respondents believed that malaria could be transmitted through contaminated food and water, indicating a potential misunderstanding that warrants further education and awareness campaigns.

The study also assessed knowledge of malaria symptoms, with fever, headache, and muscle aches being the most commonly recognized symptoms among respondents. These findings are consistent with previous research highlighting fever and headache as hallmark symptoms of malaria [16, 17].

Regarding prevention, the majority of respondents believed that malaria can be prevented. This underscores the importance of promoting preventive measures such as insecticide-treated bed nets, intermittent preventive treatment, and indoor residual spraying among pregnant women [18, 19].

Furthermore, the study assessed perceptions of malaria susceptibility during pregnancy and awareness of its adverse outcomes for both the mother and the baby. The majority of respondents recognized pregnant women as being more susceptible to malaria compared to the general population and were aware of the potential adverse outcomes associated with malaria during pregnancy. These findings are consistent with existing literature highlighting the increased susceptibility of pregnant women to malaria infection and the associated risks for maternal and fetal health [14, 20]. The prevalence of malaria during pregnancy reported in this study aligns with previous research findings. For instance, a study by Uneke found a comparable prevalence rate of 65.4% among pregnant women attending antenatal clinics in Enugu State, Nigeria. This consistency underscores the persistent burden of malaria in this demographic group [21].

The frequency of malaria diagnoses during pregnancy revealed in the current study indicates a substantial recurrence of the infection. A notable finding is the high proportion of women diagnosed with malaria more than once during their current pregnancy. This observation echoes findings from a study by Nwajiaku which reported multiple episodes of malaria during pregnancy among Nigerian women, suggesting the challenge of effectively managing the infection in this population [22].



The study also assessed the treatment-seeking behavior of pregnant women experiencing malaria symptoms. While a majority sought medical treatment, a concerning proportion resorted to self-medication. This finding is consistent with previous research by Aina which highlighted the widespread practice of self-medication for malaria among pregnant women in Nigeria [23]. Such behavior poses risks of inadequate treatment and potential harm to both the mother and fetus.

Regarding perceptions of malaria treatment services, most participants rated the availability of malaria treatment services in their area as either good or excellent. This positive perception contrasts with findings from a study by Ankomah which identified challenges such as stock-outs of malaria drugs and inadequate healthcare infrastructure in Nigeria [4]. However, it's important to note that perceptions may not always accurately reflect the reality of service provision. Thus, efforts should be made to ensure that perceived availability aligns with the actual accessibility and quality of malaria treatment services.

The prevalence of malaria among pregnant women attending antenatal care at the Teaching Hospital was found to be 37.28%, with 151 out of 405 participants testing positive for malaria. This finding aligns with previous studies conducted in similar settings, highlighting the persistent burden of malaria among pregnant women in Nigeria. For instance, a study by Ani conducted in a tertiary hospital in Lagos, Nigeria, reported a comparable prevalence rate of malaria among pregnant women attending antenatal care [24]. Similarly, another study by Okoronkwo in Southeast Nigeria found a prevalence rate consistent with our findings, indicating the widespread nature of malaria among pregnant women in different regions of Nigeria [25].

Furthermore, the prevalence rate observed in this study underscores the urgent need for effective malaria prevention strategies targeted specifically at pregnant women. Several studies have emphasized the importance of interventions such as intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) and insecticide-treated bed nets (ITNs) in reducing the burden of malaria in pregnancy [26, 27]. However, despite the availability of these interventions, their uptake among pregnant women remains suboptimal due to various factors including socio-economic barriers, inadequate healthcare infrastructure, and cultural beliefs [26].

The study also revealed high rates of education and information dissemination on malaria prevention during ANC visits, with 91.11% of participants reporting receiving such education. Moreover, the majority perceived the education to be effective. This finding suggests a positive trend in the integration of malaria prevention education into ANC services, aligning with the WHO's recommendations for comprehensive ANC. The effectiveness of education reported in this study is notably higher compared to previous findings in similar settings. For instance, a study in Tanzania reported lower rates of effective education (51%) among pregnant

women attending ANC [28]. This disparity underscores potential variations in the quality and coverage of ANC services across different regions.

Sleeping under insecticide-treated nets (ITNs) emerged as the most commonly adopted preventive measure, followed by taking antimalarial medications as prescribed. These findings align with existing literature emphasizing the efficacy of ITNs and intermittent preventive treatment in pregnancy (IPTp) for malaria prevention [18, 29]. However, the relatively low uptake of IPTp is concerning, considering its proven effectiveness in reducing maternal malaria-related morbidity and adverse birth outcomes [17]. The underutilization of IPTp underscores the need for targeted interventions to improve its accessibility and uptake among pregnant women.

The study identified significant challenges in adhering to malaria prevention measures during pregnancy, with 69.88% of participants reporting facing obstacles. Financial constraints and lack of awareness about available services emerged as the predominant barriers. These findings resonate with previous research highlighting socio-economic factors and health system deficiencies as major impediments to malaria prevention and control efforts [30, 31]. Addressing these barriers requires multifaceted approaches, including targeted community engagement, health education, and health system strengthening initiatives.

While the majority of participants perceived malaria prevention interventions to be somewhat accessible, a considerable proportion reported challenges in accessibility. This finding underscores persistent disparities in the distribution and availability of essential malaria prevention tools, particularly in rural and underserved communities. Similar observations have been documented in previous studies, highlighting the need for equitable distribution mechanisms and strengthened health systems to ensure universal access to malaria prevention interventions [32, 33].

Age appears to have a significant association with malaria prevalence during pregnancy, with higher prevalence observed in older age groups. This finding aligns with previous research indicating that older pregnant women may be at a higher risk of malaria due to factors such as decreased immunity and increased exposure over time [34]. Educational level also emerged as a significant factor, with lower prevalence observed among women with higher levels of education. This finding is consistent with existing literature suggesting that education plays a vital role in influencing health-seeking behaviors and adherence to preventive measures [35].

The number of pregnancies, gestation age at presentation, and timing of antenatal care registration were also associated with malaria prevalence. Women with higher parity and those presenting in the third trimester or registering for antenatal care later were more likely to have malaria during pregnancy. These results corroborate previous studies highlighting the importance of early and consistent antenatal

care attendance for malaria prevention and management [36].

Knowledge about malaria and its prevention emerged as critical determinants of malaria prevalence among pregnant women. Lack of awareness about the cause, prevention, and potential adverse outcomes of malaria during pregnancy was associated with higher prevalence. This underscores the importance of health education and communication strategies to improve awareness and promote preventive behaviors among pregnant women [37].

Furthermore, access to preventive interventions such as insecticide-treated bed nets and intermittent preventive treatment significantly influenced malaria prevalence. Women who reported higher accessibility to these interventions had lower prevalence rates, highlighting the importance of ensuring equitable access to malaria prevention measures in communities [38].

## 5. Conclusion

Despite relatively high knowledge levels, malaria remains prevalent among pregnant women in Southern Nigeria. Efforts to improve accessibility to preventive measures and address socio-economic barriers are essential for reducing the burden of malaria in this vulnerable population.

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