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THE KNOWLEDGE, ATTITUDE AND PRACTICE ON MALARIA AND ITS PREVENTION AMONG PREGNANT WOMEN AT BOOKING FOR ANTENATAL CARE IN WARRI, NIGERIA

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Abstract
This study assessed the knowledge, attitude and practice on malaria and its prevention among 240 pregnant women enrolled at booking for antenatal care in Warri, southern Nigeria between January and June 2022. The study was conducted with the aid of a structured questionnaire. One hundred and seventy (70.8%) respondents knew malaria parasites as the cause of disease, 85.4% correctly stated that malaria transmission was through mosquito bites while 63.8% knew at least two correct signs/symptoms of malaria, Overall, 62.9% respondents who had correct responses in the three aspects of malaria above, were considered to have a good level of knowledge of the disease. However, there was a significant difference in the level of good knowledge of malaria between the urban 84.8% (112/132) and the rural, 36.1% (39/108) respondents (P < 0.05). Respondents' attitude towards malaria indicated that 95% regarded it as a dangerous disease but 5% felt otherwise. Though 27.1% incorrectly regarded malaria (fever) as a normal thing in pregnancy, most respondents, 72.9% disagreed. Also, 91.7% respondents regarded malaria as a preventable disease, but 8.3% thought otherwise. Respondents' first treatment-seeking practice in the event of a malaria attack showed that 45% sought treatment in the hospital, while 22.1%, 17.1%, 2.9% and 0.8% resorted to self-medication, visited patent medicine shops, used herbs and ignored the signs/symptoms respectively. Although respondents' knowledge and attitude towards available methods of malaria prevention were similar, their practice differed significantly between the urban and rural dwellers. The three most common malaria preventive measures put into practice by the urban respondents were: 33.8% used insecticide-treated mosquito nets (ITNs), 31.8% used intermittent preventive treatment (IPT) and 31.1% used insecticide sprays. For the rural respondents: keeping the surroundings clean, bush clearing and use of IPT recorded 39.8%, 26.9% and 18.5%, respectively. Thus, the urban respondents were more compliant than their rural counterparts with WHO recommendations relating to effective methods of malaria prevention for all pregnant women living in areas of stable transmission of the disease. Public health education campaigns should be intensified to address the gaps in knowledge, attitude and practice on malaria and its prevention identified in this study, targeting all vulnerable groups.

Key words: *Malaria, Knowledge, Attitude, Practice, Pregnant women*

Introduction

Malaria, a parasitic disease caused by *Plasmodium* species, is a major public health challenge in many parts of the world. In 2022 malaria affected globally an estimated 249 million people and accounted for an estimated 608,500 deaths. Sub-Saharan Africa had the highest burden of the disease, with about 233 million (94%) in 2022. Pregnant women were at heightened risk. An estimated 12.7 million of these women were exposed to malaria infection during pregnancy in the WHO African Region (WHO, 2023). Transmission of malaria is through the bites of infected female anopheline mosquito. Therefore, factors that influence mosquito breeding, such as high temperature, humidity and rainfall affect malaria incidence (Schantz-Dunn and Nour, 2009). Extreme weather events such as heatwaves, and flooding can also directly impact transmission and diseases burden (WHO, 2023).

Pregnant women and children aged less than five years are the people most vulnerable to dying of malaria or suffering serious effects of the disease especially in regions where transmission is intense. Malaria infection with *P. falciparum* during pregnancy results in a wide range of adverse consequences for the pregnant woman, the developing foetus, and the newborn infant. Some of the effects on maternal health include anaemia, febrile illness, spleen enlargement, decreased blood sugar and mortality. The effects on the foetus include abortion, stillbirth, and congenital infection. The consequences on the infant include low birth weight (LBW), intrauterine growth retardation, malaria illness, convulsion, anaemia and death (WHO, 2004; Dondorp, *et al.,* 2008; Karim, *et al.,* 2013). Malaria can be prevented and treated using cost-effective interventions which include vector control, achieved largely through the use of insecticide-treated mosquito nets (ITNs, indoor residual spraying (IRS), chemoprevention, using intermittent preventive treatment (IPT) and effective case management which include prompt diagnosis and treatment of infections (WHO, 2023).

In spite of the Global Malaria Action Plan (GMAP), the Roll Back Malaria (RBM), a continued scale-up of emerging interventions including seasonal malaria chemoprotection (SMC), intermittent preventive treatment in pregnancy (IPTp) and the use of the RTS, S/ASOI malaria vaccine, malaria continues to be one of the most challenging infectious diseases to eradicate in sub-Saharan Africa, (WHO, 2023). Malaria not only debilitates the workforce, but keeps children from going to school, prevent pregnant women from effectively caring for their families and decreases the likelihood of a healthy pregnancy outcome (Schantze-Dunn and Nour, 2009).

Malaria-related knowledge, attitudes and practice (KAP) of communities have been assessed in many parts of Africa (Adedotun, *et al.,* 2010; Iriemenam, *et al.,* 2011; Iwueze *et al.,* 2013; Kimbi, *et al.,* 2014). These studies have shown that the practice of malaria control measures was related to the level of knowledge and awareness of the disease and its consequences on the people, and that a lot of misconceptions about malaria had persisted. Poor knowledge and incorrect beliefs about the cause, signs/symptoms, transmission, prevention and treatment of malaria by communities would interfere with or hinder the implementation, sustenance and effectiveness of local

control programmes of the disease (Adedotun *et al.,* 2010; Kimbi *et al.,* 2014).

Most pregnant women care for children especially those aged below five years and often play important roles in malaria management at the family level and by extension in communities. Pregnant women during antenatal care visits, have a unique opportunity of empowerment with relevant health education that would improve on their awareness and capability regarding antimalarial measures such as vector control, chemoprophylaxis and case management. Indeed, some studies have shown that improvement in the knowledge and education of women of childbearing age had an influential impact on malaria control in communities (Iriemenam *et al.,* 2011; Kimbi *et al.,* 2014).

However very little is known about the level of awareness and participation of pregnant women on malaria and its prevention in Warri, southern Nigeria. This study was therefore undertaken to evaluate the knowledge, attitude and current practice on malaria and its prevention by consenting pregnant women on their first visit to antenatal care clinic in Warri. Findings from this study would help in developing appropriate information, education and advocacy strategies and programmes to increase knowledge, access to and compliance with effective malaria preventive measures by pregnant women and the public in the study area.

Materials and Methods

Study Area

Warri is an industrial town and a major port on Warri River in the Niger Delta region of Nigeria. It lies approximately on longitude 5°75′E and latitude 5°52′N. The vegetation is a combination of rainforest and mangrove swamp forest. The climate is tropical, with two annual seasons, the dry (November - March) and the rainy (April - October).

Study Population

The study participants were 240 pregnant women enrolled on their first day visit to the antenatal care (ANC) clinic at the General hospital, Warri, Delta State, between the months of January and June 2022.

Study Design

The design of the study was descriptive and cross sectional. A simple random sampling method was used to obtain the sample size.

Data Collection

Data collection was accomplished with the aid of a 3-part interviewer-administered questionnaire. The first part of the questionnaire dealt with the socio-demographic characteristics of the pregnant women. The second part assessed the respondents' knowledge of the cause, signs/symptoms and transmission of disease, attitude and first health seeking practice on malaria. The third part was designed to obtain interrogation on respondents knowledge, attitude and current practice of malaria preventive measures.

The researchers used the content and construct validity to develop the questionnaire in line with the objectives of the study. A pilot study was conducted using 15 health care workers from a private hospital. The reliability of the questionnaire as described by the test-retest value was 0.87.

Ethical Consideration

An ethical clearance for the study was obtained from the Ethical Committee of

the hospital. The purpose of the study was carefully explained to the pregnant women and their consent individually obtained before the questionnaire was administered.

Statistical Analysis

Statistical analysis was done using the statistical programme for social sciences (SPSS) version 15.0 software. Chi-square test was done to compare proportions between groups. The level of significance was set at $P < 0.05$

Results

Table 1 summarizes the socio-demographic characteristics of the pregnant women at booking for antenatal care (ANC). Two hundred and forty (240) pregnant women were enrolled into the study. The maternal age ranged from 15 to 47 years. The mean age of the women was 29.38 ±6.047 years. The ANC women comprised of 37.5%, 31.7% and 30.8% primigravidae, secundigravidae and multigravidae, respectively. On maternal residence, majority of the respondents were urban (132, 55%) while (108, 45.0%) were rural. The pregnant women belonged to various professions, comprising mostly traders (41.7%) while farmers (12.1%) were the least group. Most (90%) of the respondents had formal education (primary - tertiary levels) while 10% had no formal education.

Table 1: The socio-demographic characteristics of the pregnant women at booking for antenatal care (ANC)

Maternal age (years)	**Numbers (%)**
15-24	80(33.3)
25-34	112(46.7)
35-44	29(12.1)
>45	19(7.9)
Total	240(100)
Trimester (gestational age)	
First	83 (34.6)
Second	89(37.1)
Third	68 (28.3)
Total	240(100)
Gravidity	
Primigravidae	90 (37.5)
Secundigravidae	76 (31.7)
Multigravidae	74 (30.8)
Total	240(100)
Educational status	
No formal education	24 (10.0)
Primary	51 (21.3)
Secondary	97 (40.4)
Tertiary	68 (28.3)
Total	240(100)
Residence	
Urban	132(55.0)
Rural	108(45.0)
Total	240(100)

Occupation	
Traders	100(41.7)
Civil servants	38 (15.8)
Farmers	29 (12.1)
Full time housewives	43 (17.9)
Others (Catering, Tailoring, hair dressing)	30 (12.5)
Total	240 (100)

The responses of respondents on the three aspects of knowledge on malaria are shown in Table 2.

Cause of Malaria

One hundred and seventy (70.8%) of the pregnant women knew that malaria is caused
by malaria parasites. However, wrong responses included: dirty surroundings, 40 (16.7%), and bad water, 16 (6.7%).

Signs/symptoms of Malaria

Most of the respondents were familiar with at least two correct signs/symptoms of malaria. The most frequently mentioned symptoms were fever/high body temperature, headache and body pains, recording 63.8%, 16.6% and 8.8% respectively.

Malaria Transmission

A total of 205 (85.4%) respondents knew that malaria is transmitted through mosquito bites. Others had wrong perceptions such as poor hygiene and drinking dirty water, recording, 20 (8.4%) and 11 (4.6%), respectively.

Overall, the correct and wrong responses for the three aspects of knowledge on malaria, namely, (a) cause, (b) signs/symptoms and (c) transmission, were put together to assess the level of knowledge on malaria among the pregnant women. Respondents who had correct responses for all the three aspects indicated above, were considered to have a good level of knowledge on malaria. Those with correct responses in two aspects or only one aspect were considered to have a fair or a poor level of knowledge on malaria respectively. In all, 151/240 (62.9%) respondents had a good level of knowledge on malaria. Other respondents, 55/240 (22.9%) and 34/240 (14.2%) recorded fair and poor levels of knowledge on malaria, respectively.

Furthermore, respondents' level of knowledge on malaria was assessed on the basis of their residence (urban or rural). It was observed that 112/132 (84.8%) urban respondents and 39/108 (36.15%) rural respondents had a good level of knowledge on malaria. The difference was statistically significant ($P < 0.05$). The urban respondents recorded 15 (11.4%) and 5 (3.8%) fair and poor levels of knowledge respectively while their rural counterparts had 40 (37.1%) and 29 (26.9%) fair and poor levels of knowledge, respectively.

Table 2: Respondents' knowledge on malaria, namely (a) the cause (b) signs/symptoms and (c) mode of transmission

Aspects of the disease	**Number of respondents (%)**
(a) The cause of malaria	
Dirty surroundings	40 (16.7)
Bad water	16 (6.7)
Oily food	4 (1.7)
Too much sunlight	5 (2.1
Overwork/stress	3 (1.2)
Malaria parasites	170 (70.8)
Don't know	2 (0.8)
Total	**240 (100)**
(b) The signs/symptoms of malaria	
Fever/high body temperature	153 (63.8)
Chills and shivering	10 (4.2)
Headache	40 (16.6)
Body pains	21 (8.8)
Vomiting	2 (0.8)
Bitter taste	11 (4.6)
Convulsion	3 (1.2)
Total	**240 (100)**
(c) The transmission of malaria	
Drinking dirty water	11 (4.6)
Eating dirty food	1 (0.4)
Poor hygiene	20 (8.4)
Mosquito bites	205 (85.4)
Bites of other insects	1 (0.8)
Don't know	1 (0.4)
Total	**240 (100)**

Table 3 shows respondents' attitude towards malaria. Two hundred and twenty-eight (95%) agreed with the fact that malaria is a dangerous disease but 12 (5%) felt otherwise. Whereas 65 (27.1%) respondents regarded malaria (fever) as a normal thing in pregnancy, 175 (72.9%) disagreed. Sixty (25%) respondents thought that malaria is a seasonal disease, occurring in the rainy season, while 180 (75%) respondents thought otherwise, stating that malaria is a perennial disease in their area. Two hundred and twenty (91.7%) respondents regarded malaria as a preventable disease but 20 (8.3%) felt otherwise.

Table 3: Respondents' attitude towards malaria

Variable	**Frequency (%)**	
	Yes	No
Do you regard malaria as a dangerous disease?	228 (95)	12 (5)
Do you regard malaria (fever) as a normal thing in pregnancy?	65(27.1)	175(72.9)
Do you regard malaria as a seasonal disease in your area?	60 (25)	180(75)
Do you think that pregnant women are more susceptible to malaria than than non-pregnant women?	218(90.8)	22 (9.2)
Do you think that malaria can be prevented?	220(91.7)	20 (8.3)

The first treatment-seeking practice by respondents in the event of a malaria attack before other treatment options is shown in Table 4. One hundred and eight (45.0%) sought treatment in the hospital first, while 53 (22.1%) resorted to self-medication. For some other respondents, 41 (17.1%) and 21 (8.7%) would first visit a patent medicine shop and a pharmacy respectively. Four (1.7%) would consult an experienced mother while 2 (0.8%) would ignore the signs/symptoms for a short period.

Table 4: Respondents' first health-seeking practice in the event of a malaria attack

Variable	**Frequency (%)**
Practice self- medication	53 (22.1)
Visit a hospital	108 (45.0)
Use traditional herbs	7 (2.9)
Visit a patent medicine shop	41 (17.1)
Go to a prayer house	4 (1.7)
Visit a pharmacy	21 (8.7)
Consult an experienced mother	4 (1.7
Ignore the signs/symptoms for some period	2 (0.8)
Total	240 (100)

Most pregnant women had a good knowledge of available methods of malaria prevention. The three most common measures for malaria prevention stated by respondents were: use of insecticide treated bed nets (ITNs) (90.1%), keeping the surroundings clean (89.0%) and the use of insecticide spray (85.6%) (Table 5). The use of protective clothing at night (60.5%) and window screening (57.2%) recorded the least responses.

Respondents' preference for or attitude towards specific method(s) of malaria prevention regarded as most effective showed that the use of ITNs (24.5%) was highest, followed by IPT (18.6%), insecticide spray (16.2%) and keeping the surroundings clean (14.7%). Window screening (1.1%) recorded the least preference by respondents.

On the specific malaria preventive measures currently put into practice at home by respondents, the use of ITNs recorded 31.7%, the highest, followed by IPT (21.4%) and the use of insecticide spray (20.5%). Other measures put into practice were keeping the surrounding clean (12.5%), bush clearing (8.4%), use of ordinary mosquito nets (5.5%). Three measures: window screening, use of protective clothing at night and the removal of stagnant water around the house were not put into practice by respondents.

Table 5: Respondents' knowledge, attitude and practice on malaria preventive

	Selected methods of malaria prevention								
	Use of ordinary mosquito net	Use of insecticide – treated mosquito nets (ITNs)	Window screening	Use of insecticide spray	Intermittent preventive treatment (IPT)	Protective clothing at night	Bush clearing	Removal of stagnant water around houses	Keeping the surrounding clean
(a) Knowledge: Percentage of pregnant women with the knowledge of available methods of malaria prevention.	66.3	90.1	57.2	85.6	75.2	60.5	82.5	72.4	89.0
(b) Attitudes: Percentage of respondents' preference for method(s) of malaria prevention regarded as most effective	7.4	24.5	1.1	16.2	18.6	1.4	12.3	3.8	14.7
(c) Practice: Percentage of pregnant women currently putting into practice specific method(s) of malaria prevention	5.5	31.7	-	20.5	21.4	-	8.4	-	12.5

Discussion

Overall, 151 (62.9%) of the ANC women had a good level of knowledge on malaria. This finding is similar to the reports of some studies (Adedotun, *et at.,* 2010; Iriemenam, *et al.,* 2011; Iwueze, *et al.,* 2013). That level of knowledge was expected for a population in malaria endemic area, where the people suffer frequently from the disease. Some earlier studies (Odili, *et al.,* 2011; Kimbi, *et al*., 2014) had shown that knowledge of malaria was strongly associated with the level of formal education of the population. That observation has been corroborated in this study where 90% of the ANC women had formal education (Table 1). However, there was a significantly higher level of good knowledge about malaria among the urban ANC women (84.8%) than their rural counterparts (36.1%) (P< 0.05). Similar findings have been reported in some studies (Isah, *et al.,* 2007; Adedotun, *et al.,* 2010; Odili, *et al.,* 2011). The relatively higher level of good knowledge among the urban respondents could be attributed to greater access to media information and contact with modern health services found in urban areas. Some studies (Kimbi, *et al.,* 2014) in contrast, had reported similarity in malaria awareness among pregnant women/mothers in urban (99%) and rural

(98%) areas. On the attitude of the ANC women towards malaria, 228 (95.0%) regarded it as a dangerous disease that could cause death if left untreated while 12 (5.0%) felt otherwise (Table 3). The latter group, who were indifferent, had a reduced malaria risk perception. They stood the risk of suffering from severe malaria as they might not bother to prevent or seek treatment on time.

Sixty (25.0%) of the respondents regarded malaria as a seasonal disease which is more common during the rainy season. However, most of the respondents, 180 (75.1) disagreed, noting that malaria is a year-round problem. The attitude of the former group could result in the inconsistent use of malaria preventive measures such as the insecticide-treated mosquito nets (ITNs) throughout the year, especially through the dry season.

Findings from the study showed that 65 (27.1%) of the ANC women incorrectly regarded malaria (fever) in pregnancy as a normal thing and that nothing could be done about it. Such negative attitude and misconception could be essential opportunity to intensify malaria awareness campaign programmes for positive behavioural change among pregnant women. However, most of the respondents, 175 (72.9%) disagreed; noting that malaria (fever) was not a normal feature or sign associated with pregnancy.

The majority of the ANC women, 220 (91.7%) felt that malaria during pregnancy could be prevented. This finding was not surprising as 90% of the respondents had formal education. Literate ANC women would have been better informed about malaria while at school. They are also more likely to read and comprehend malaria messages from different sources of information such as the media and health facilities, compared with their uneducated counterparts who constituted only 10% of the respondents.

An analysis of the first treatment seeking pattern in the event of a malaria attack, showed that 108 (45%) respondents would go to the hospital (Table 4). This finding is comparable to the 41% reported by Iwueze *et al.* (2013) and 40.9% reported by Odili *et al.* (2011) but higher than 27.3% reported by Erhun, *et al.,* (2005). Generally, the results had established a high level of preference (55%) of treatment outside the formal health facilities among respondents. Factors that influenced the first treatment-seeking practice when attacked by malaria included the following: lack of adequate finance for medical consultation and treatment, inadequate knowledge about mild or severe malaria disease, distance to the hospital, availability of home stocked drugs, religious beliefs, educational status and convenience. The use of herbs mainly by rural respondents could be attributed to their belief in the effectiveness of traditional medicines.

The ANC women generally showed a good level of knowledge about several available methods of malaria prevention. However, such knowledge had not sufficiently influenced their attitude and practice of these measures. While 90.1% of the respondents, for example, were knowledgeable about the availability and benefit of the use of ITNs, 24.5% preferred it as an effective method of malaria prevention, only 31.7% were currently putting it into practice (Table 5). Some studies have reported a lower utilization of ITNs: 16.7%, 14.6% and 13.1% by Adedotun, *et al.,* (2010), Iriemenam, *et al.,* (2011) and Odili, *et al.,*

(2011), respectively. However, higher utilization of ITNs: 48% and 79% have been reported by Kimbi *et al.* (2014) in Buea, Cameroon and Wogu *et al.* (2013) in Port Harcourt, Nigeria, respectively. The poor utilization of ITNs in the study was attributed to the following: inconvenience such as little space in the house, poor sleeping conditions etc, unavailability of nets, high cost, heat generation and fear of suffocation. Similar findings were reported in some earlier studies (Batega, 2004; Erhun *et al.,* 2005: Odili *et al.,* 2011). Another example where practice by ANC women differed from stated knowledge of malaria preventive measure was the removal of stagnant water around houses. Whereas 72.4% respondents were knowledgeable about the method, only 3.8% of the respondents regarded it as an effective malaria preventive measure, but none of the respondents put it into practice at home. Indeed, out of the nine methods of malaria prevention stated by respondents only six were actually put into practice by them (Table 5).

Although the urban and rural ANC women exhibited similarity in knowledge and attitude towards available malaria preventive measures, their practice of these methods differed significantly. The three most common preventive methods put into practice by the urban respondents were: the use of ITNs (33.3%), IPT (31.8%) and insecticide spraying (31.1%), whereas for the rural respondents: keeping the surrounding clean (39.8%), bush clearing (26.9%) and IPT (18.5%) were the most common methods. Thus, the urban ANC women were more compliant than their rural counterparts, with the WHO recommended effective measures for the prevention or reducing the burden of malaria in pregnancy through ITNs, IPT and case management.

The study has shown that there is a wide gap between respondents' knowledge and practice of effective measures of malaria prevention. Health care providers should scale up IPT coverage and compliance. Also, they should create operational framework to improve the delivery and use of ITNs for both the pregnant women and the general public

Conclusion

Appropriate health campaigns should be conducted to educate the women about the dangers of malaria in pregnancy, and the importance or benefits of effective preventive measures. These steps would encourage or produce significant positive changes in the knowledge, attitude and practice on malaria and its prevention by pregnant women.

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