

# Knowledge, attitude, perception of malaria and evaluation of malaria parasitaemia among pregnant women attending antenatal care clinic in metropolitan Lagos, Nigeria

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## ABSTRACT

**Background & objectives:** Little information exists on the compliance of pregnant women to malaria management in malaria endemic countries. This study was designed to access knowledge, attitude, perception and home management of malaria among consenting pregnant women attending antenatal care (ANC) clinic.

**Methods:** In total, 350 pregnant women were randomly recruited during their ANC Clinic in Lagos. Structured questionnaires were administered in a two-stages research design; first during their early months of ANC visit and the second approximately 1–2 months before delivery. Information on occupation, parity, symptoms used to recognise malaria, treatment sources, control measures, knowledge factors, anti-vector measures, health-seeking practices, malaria parasitaemia and packed cell volume (PCV) were recorded.

**Results:** The results revealed that 78.9% of the pregnant women identified infected mosquitoes as the cause of malaria while 86% of the pregnant women identified stagnant water as its breeding sites. Knowledge of the benefit of insecticide-treated mosquito bednets was less prominent as most of the selected subjects decried its high market price. Our data also showed that educational programme targeted on potential mothers is beneficial. Overall, 27.4% (96/350) of the pregnant women had peripheral malaria infection with 88.5% (85/96) of the parasite positive women infected with *Plasmodium falciparum* and 11.5% (11/96) with *P. malariae*. PCV ranged from 20–40% (median 33.9%) with 25.7% (90/350) of the pregnant women being anaemic with PCV <33%. We found an association between malaria infection and occupation, and this association was not influenced by parity.

**Interpretation & conclusion:** Our findings revealed that improvement in knowledge and education of women of child-bearing age has an influential impact on malaria control.

**Key words** Attitude; awareness; knowledge; malaria control; practice; pregnancy

## INTRODUCTION

Malaria is the most widespread and persistent disease which affects human populations throughout the world and especially in tropical countries. It is one of the biggest health problems in sub-Saharan Africa<sup>1</sup> and its contribution to morbidity and mortality among people in Africa has been a subject of academic interest, political advocacy and speculation<sup>2</sup>. In sub-Saharan Africa alone, 400 million persons are at risk, and nearly all the 1 million deaths per annum from malaria in the world occur in this region<sup>2</sup>. Malaria kills a child in every 30 sec<sup>3</sup>. In addition, pregnant women are at immense risk of malaria due to natural immune depression in pregnancy<sup>4</sup>. In Nigeria, malaria remains a major cause of morbidity and mortality particularly among children under 5 yr age<sup>5,6</sup>.

Malaria in pregnancy has been reported to cause high rate of infant and maternal mortality, low-birth weight,

school absenteeism, low productivity in farming and other vocation<sup>7</sup>. It is more frequent and severe in primigravidae, both during pregnancy and at the time of delivery<sup>8</sup>. Anaemia during pregnancy is a global problem, and in malaria endemic areas it is usually most severe in the second trimester of gestation, following a period of acute malaria infection in the first trimester<sup>8</sup>. Severe anaemia in pregnancy is an important contributor to maternal and pre-natal morbidity and mortality<sup>9</sup>, low-birth weight, iron and foliate deficiency<sup>10</sup>, especially in first pregnancies<sup>11</sup>, this being one of the main risk factors for infant mortality.

Good health is a fundamental foundation for social and economic advancement<sup>12</sup>. Knowledge, however, is a crucial element in health improvement and the education of a disease-burdened group on the ways of disease prevention is important to the attainment of self-reliance in disease endemic countries. Furthermore, the understand-

ing of mother's ability to manage malaria appropriately is crucial in local communities especially in sub-Saharan Africa where there are inadequate medical facilities. Little information exists on the compliance of pregnant women to malaria management in malaria endemic regions. We assessed pregnant women's individual knowledge, attitude, and perception (KAP), along with home management of malaria in metropolitan Lagos during their antenatal care (ANC) clinics with the hypothesis that individual empowerment would improve malaria management at the local setting.

## MATERIAL & METHODS

The study was conducted at the Lagos Island Maternity Hospital (LIMH), Lagos between November 2001 and October 2002. LIMH is a secondary health care centre with patients from Lagos metropolis and beyond. Lagos, the commercial nerve centre of Nigeria, is an area of stable malaria transmission, and encompasses an area of 3577 km<sup>2</sup> of coastal plain along Nigeria's south-western Atlantic seaboard with a total population of 17 million out of a national estimate of 150 million<sup>13</sup>. The metropolitan area is home to > 75% of the state's population and also accounts for > 1/3 (36.8%) of Nigeria's urban residents. Due to the general lack of medical infrastructure in some rural areas, rural residents from different local government areas travel several kilometres to LIMH for their proper medical check. Some have friends or relatives who can accommodate them for the time being until their ANC visits are over.

The study group was made up of consenting pregnant women attending ANC at LIMH. A total of 350 pregnant women were randomly recruited into the study, majority of which were from Lagos conurbation. Relevant information was recorded by the administration through a structured questionnaire in a two-stages design; first during their early months of ANC visit and second approximately 1-2 months before delivery. Information on age, occupation, parity, symptoms used to recognise malaria, treatment sources, control measures, knowledge factors, anti-vector measures, and health-seeking behaviour was collected during recruitment. The questionnaires were administered by two trained research assistants. At LIMH ANC Clinic, health education is continually provided to all the pregnant women. In view of this, no health personnel was allowed to witness the interviews and discussions to avoid biased responses, and each participant was interviewed separately. Malaria diagnosis was based on the identification of any asexual blood stages of *Plasmodium* species in thick and thin blood smears. Thin and thick

blood smears were prepared to determine the presence and species of malaria parasites. The stained slides were examined by microscopy and read by 2 competent microscopists where they had discordances, a third microscopist re-examined the slide. Packed cell volume (PCV) of each pregnant woman was also determined. Informed consent was obtained from all the selected participants prior to the interviews. Ethical clearance was given by the Ethics Committee of the College of Medicine of the University of Lagos and Lagos University Teaching Hospital.

The data were analysed using Epi Info software version 6.0 (CDC, Atlanta) and were transferred to StatView for Windows version 5.0.1 (SAS Institute Inc., Cary, NC) for further statistical analysis. The  $\chi^2$ -test was used to test the statistical significance of proportions. Fisher's exact test for contingency tables was used to test for significance in proportions of categorical data when the expected value was <5. Kruskal-Wallis test was used to compare proportions of categorical variables when there were more than two groups. All tests were two-tailed and were considered significant if  $p < 0.05$ .

## RESULTS

Table 1 summarises antenatal care women characteristics for all sub-groups. In all, 350 pregnant women were examined, out of which 38% were primigravidae, 23.1% secundigravidae and 38.9% multigravidae. Majority of the ANC women were traders and civil servants who accounted for 71.1% of the study population. Out of 350, 339 (96.9%) of the pregnant women were married while only 3.1% were single. The results revealed that 27.4% (96/350) of the pregnant women were malaria parasite positive and 88.5% (85/96) of the parasite positive pregnant women were infected with *P. falciparum* while 11.5% (11/96) were infected with *P. malariae*. Parasite density ranged from 32–1000 parasites/ $\mu$ l. PCV ranged between 20 and 40% haematocrit (median of 33.9%), and 25.7% of the pregnant women were anaemic with PCV <33%. The age of the pregnant women ranged from 19 to 40 yr, with a mean of 29.2 yr. The highest percentage of infection occurred in primigravidae (12%) followed by multigravidae (10%) and secundigravidae (5.4%) and there were no statistical significant differences. Mean age and parity were not significantly different between infected and non-infected ANC women. The majority of the infected ANC women were between the ages of 26 and 35 yr.

As shown in Table 1, 78.9% of the pregnant women responded correctly to the cause of malaria which was attributed to mosquito bites and 86% of the pregnant women responded correctly to its breeding at 1–2 months

Table 1. Background characteristics of the randomly selected antenatal care women

Categories	Characteristics	Response* n = 350	Response** n = 350	p-value†
Educational background	Primary	33 (9.4)		
	Secondary	180 (51.4)		
	Tertiary	137 (39.1)		
Occupation	Traders	143 (40.9)		
	Civil servants	106 (30.3)		
	Students	34 (9.7)		
	Housewives	12 (3.4)		
	Fashion designing	37 (10.6)		
	Youth corpsers	12 (3.4)		
	Catering	6 (1.7)		
Cause of malaria	Mosquito bites	168 (48)	276 (78.9)	0.034
	Too much of sunlight	38 (10.9)	3 (0.9)	0.027‡
	Poor sanitation	88 (25.1)	67 (19.1)	0.216
	Don't know	56 (16)	4 (1.1)	0.016‡
Breeding site of mosquitoes	Stagnant water	221 (63.1)	301 (86)	0.143
	Poor hygiene	106 (30.3)	48 (13.7)	0.038
	No response	23 (6.6)	1 (0.3)	0.003‡
Signs and symptoms	Fever (>38°C)	141 (40.3)	96 (27.4)	0.436
	Intermittent cold/shivering	12 (3.4)	28 (8)	0.021
	Vomiting	27 (7.7)	30 (8.6)	0.323
	Pains at joints	8 (2.3)	26 (7.4)	0.032
	Headache	87 (24.9)	75 (21.4)	0.412
	Dizziness	7 (2)	9 (2.6)	0.447
	Diarrhoea	4 (1.1)	10 (2.9)	0.027‡
	Loss of appetite	28 (8)	32 (9)	0.371
	Bitter taste	16 (4.6)	23 (6.6)	0.427
	Convulsion	9 (2.6)	12 (3.4)	0.458
	Nausea	3 (0.9)	9 (2.6)	0.018‡
	Others#	8 (2.3)	0 (0)	–

\*First-stage questionnaire at their early weeks of antenatal care visit; \*\*Second-stage questionnaire administered about 1–2 months before delivery; †p-values were derived from  $\chi^2$ -test; ‡p-values were derived from Fisher's exact test; #Urine colour (yellow), restlessness, pale eyes, evil attack; Figures in parentheses indicate percentages.

before delivery. Prior to their first ANC visits, 16% of the pregnant women had no knowledge of the cause of malaria, and 10.9% ascribed it to working under the direct rays of the sun for so long. Furthermore, 6.6% of the pregnant women had no knowledge of breeding site of mosquitoes. At 1–2 months before delivery, only 1.1 and 0.3% of the pregnant women failed to commit to memory the cause of malaria and its breeding site, respectively. Although our data showed an improved perception of malaria by these pregnant women, there is still an insignificant belief among the least educated in rural Lagos that malaria is an attack from the enemy. However, this is not observed among the educated middle and upper strata population in Lagos metropolitan area. Our data revealed no association between malaria infection and the level of

the pregnant women's education (Table 2). However, we found an association between malaria infection and occupation indicating that malaria infection is related to the degree of exposure to infected mosquitoes ( $\chi^2 = 13.797$ ,  $df = 6$ ;  $p = 0.032$ ).

The health-seeking behaviour and the knowledge of malaria prevention among the selected ANC women in Lagos are shown in Table 3. Self medication decreased significantly from 10.9 to 4.3% by 1–2 months before delivery. The use of old drugs/tablets decreased significantly from 3.1 to 1.4%. Visiting a health centre increased from 35.4 to 43.3% although it was not significant. Other treatment source options decreased but were not statistically significant with the exception of the use of traditional medicine (Agbo). Traditional concoctions were the

Table 2. Percentage parasitaemia in relation to selected variables of the antenatal care women

Categories	Primigravidae n = 133	Secundigravidae n = 81	Multigravidae n = 136	p-value
<i>Education</i>				
Primary	17 (12.8)	6 (7.4)	5 (3.7)	0.274
Secondary	20 (15)	10 (12.3)	18 (13.2)	
Tertiary	5 (3.8)	3 (3.7)	12 (8.8)	
<i>Occupation</i>				
Traders	31 (23.3)	9 (11.1)	29 (21.3)	0.032
Civil servants	6 (4.5)	3 (3.7)	3 (2.2)	
Students	0 (0)	3 (3.7)	1 (0.7)	
Housewives	1 (0.8)	1 (1.2)	0 (0)	
Fashion designing*	2 (1.5)	2 (2.5)	2 (1.5)	
Youth corpsers	0 (0)	0 (0)	0 (0)	
Catering	2 (1.5)	1 (1.2)	0 (0)	

\*Fashion designers/Tailors/Hair dressers; Figures in parentheses indicate percentages.

Table 3. Health seeking behaviour of respondents and preventive measures

Knowledge factors	Response* n = 350	Response** n = 350	p-value <sup>†</sup>
<i>Treatment sources<sup>#</sup></i>			
Self medication	38 (10.9)	15 (4.3)	0.024
Visit a health centre	124 (35.4)	152 (43.3)	0.642
Traditional medicine (Agbo)	78 (22.3)	89 (25.4)	0.742
Visit a patent medicine store	49 (14)	42 (12)	0.534
Consult an experienced mother/friend/neighbour	36 (10.3)	21 (6)	0.158
Private hospital	22 (6.3)	31 (8.9)	0.811
No response	3 (0.9)	0 (0)	–
<i>Control measures</i>			
Use of traditional concoctions	101 (28.9)	52 (14.9)	0.097
Use of insecticide-treated mosquito bed net (ITN) <sup>§</sup>	35 (10)	51 (14.6)	0.245
Use of mosquito coils/insecticide spraying	72 (20.6)	87 (24.9)	0.578
Use of old drugs/tablets	11 (3.1)	5 (1.4)	0.022 <sup>‡</sup>
Good sanitary measures	75 (21.4)	98 (28)	0.435
Prayer (Church)	47 (13.4)	55 (15.7)	0.465
No response	9 (2.6)	2 (0.6)	0.014 <sup>‡</sup>

\*First-stage questionnaire administration at their early antenatal care visit; \*\*Second-stage questionnaire administered 1–2 months before delivery; <sup>#</sup>Concurrent treatment with traditional medication is often common particularly with young mothers; <sup>§</sup>Most of the recruited antenatal care women complained of the high cost of ITN kits; <sup>†</sup>p-values were derived from  $\chi^2$ -test; <sup>‡</sup>p-values were derived by Fisher's exact test; Figures in parentheses indicate percentages.

preferred options for most of the mothers at the first stage of the questionnaire. However, good sanitary measures and the use of mosquito coils/insecticide spraying became the choice of most of the mothers at the second phase of the questionnaire. The majority of the respondents were of the opinion that malaria can be prevented with traditional concoctions in combination with other prescriptions while only a minority mentioned insecticide-treated mos-

quito bed nets (ITNs) or other measures. Those who have mentioned ITN use decried of its high cost.

## DISCUSSION

This study showed that individual empowerment through health education of women of reproductive age has an influential impact on malaria control. Previous stud-

ies had reported low compliance of knowledge, attitude, perception and home management of malaria in Nigeria; Lagos<sup>14</sup>, rural Lagos<sup>15</sup>, Ibadan<sup>16</sup>. However, our data show improved knowledge, perception and attitude of the ANC women to malaria symptoms and management in agreement with previous findings in Enugu<sup>17</sup> and Oyo town<sup>18</sup>. This acquired knowledge, we believe, will not only be beneficial to the mothers only, but also to her child, husband and the community at large. Previous studies have also confirmed the significance of health education in communities highlighting it as major effective way of disseminating health information<sup>19,20</sup>. Apparently, this improved knowledge may be attributed to the positive effects of an educational 'Eko Malaria Programme' an outfit of the Lagos State Government established in 1998, meant to tackle malaria, particularly at community level in conformity with Roll Back Malaria (RBM) initiative. But, this may not reflect the exact perception of malaria among rural Lagos residents unlike the educated middle and upper strata population. Furthermore, the patronage of patient medicine store and traditional medicine (Agbo) raises a challenge to health education and empowerment for community health care delivery as their services are cheaper and more affordable.

Anaemia is the trademark of malaria, especially with *P. falciparum* infection. In this study, 25.7% of the ANC women with falciparum malaria had anaemia. The mean haematocrit level was lower in primigravidae when compared with secundigravidae and multigravidae as confirmed in other malaria endemic areas<sup>8,21-23</sup>. Given that the aetiology of anaemia in pregnancy is multi-factorial, (due to iron deficiency, foliate deficiency, malaria, malnutrition, haemoglobinopathy, human immunodeficiency virus, bothrioccephaliosis and hookworm infection)<sup>21-23</sup> the effect of malaria on anaemia in this study cannot be established. However, relative contributions of malaria, hookworm and malnutrition to anaemia are very important in selecting suitable control measures to check the adverse perinatal outcomes associated with anaemia in pregnancy<sup>22</sup>.

Generally, the parasite count in this study was low. This may be attributed to the improved understanding of the ANC women about malaria control strategies or alternative intermittent preventive treatment with pyrimethamine-sulfadoxine (SP). No selected pregnant women were found to be symptomatic during the study. Percentage parasitaemia in relation to the occupation of the pregnant women revealed that traders, probably due to the nature of their occupation (trade till dawn, exposure to the environment) recorded the highest malaria infection. This observation corroborates with our previous

report on the correlation of mother's occupation and neonatal malaria<sup>24</sup>.

Malaria control depends on many factors, some of which have not been studied at the level of communities, and in different cultural settings. In order to provide the community with the capacity of dealing with malaria management, the mother's ability to appropriately manage malaria in the house is crucial. With reported increase in self medication, patronage to patent medicine stores, traditional medicine and non-compliance of some individuals to medical prescriptions in most endemic regions, the need for extra-communal efforts in health education is challenging. A recent study has confirmed that malaria control could be influenced by targeted malaria educational information to women<sup>25</sup>. Since the pregnant women in this study were found to recognise malaria mainly by fever, headache, pain at joints, bitter taste, etc., measures by which they can prevent malaria at their homes such as the use of insecticide treated mosquito bed nets (reported to be very low among enrolled mothers in south-west Nigeria<sup>26,27</sup>), early registration for antenatal care in order to identify complications early<sup>28</sup>, and good environmental sanitary measures should be emphasized. Provision of affordable health facilities especially in rural settings is also a necessity. In summary, educational campaigns informing women of reproductive age about the dangers of malaria and the potential benefits available to expectant mothers has an influential impact on malaria control.

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