

Research

**Knowledge, Attitude and Practice of Malaria Prevention among Expectant Mothers attending ante-natal clinic at OOUTH Sagamu, Ogun State**

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**Abstract**

*Malaria continues to constitute a cause for morbidity and mortality among populations of pregnant women and children in regions of the world with high transmission. The persistent poor pregnancy outcomes and unacceptably high mortality despite efforts to facilitate reduction are reasons to continue malaria research in order to fully understand the behavioral factors associated with current trends. The aim of this study was to explore levels of knowledge, attitudes about malaria and preventive practices among pregnant women attending antenatal clinic at Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu, Nigeria and to find out whether age and educational attainment are associated with risk of malaria transmission.*

*This was cross-sectional descriptive study. Data about demographic characteristics, knowledge, attitude and practice of malaria prevention was obtained from 137 participants who consented through a validated 36-item interviewer-administered questionnaire (reliability coefficient of 0.74). Analysis of variance was used to test differences in measures across age and education with a cut-off set at  $p \leq 0.05$  level of significance.*

*The results showed that the median age of participants was 20 years and majority (80.3%) had at least secondary school education with 9.5% reporting non-formal education. Results also showed that knowledge and attitude about malaria measured on 15- and 18-point scales respectively reported for the participants mean scores of  $10.73 \pm 1.62$  and  $9.77 \pm 3.64$  respectively. When malaria prevention practice was assessed on a 24-point scale, participants scored a mean of  $13.69 \pm 3.82$  which translates to 57.0% of the level of preventive practice expected from the pregnant women. The study also revealed that younger participants and women with non-formal education consistently reported lowest scores for knowledge ( $F=16.22$ ,  $p<0.0001$  and  $F=75.22$ ,  $p<0.0001$ ), attitudes regarding malaria complications in pregnancy ( $F=16.13$ ,  $p<0.0001$  and  $F=75.22$ ,  $p<0.0001$ ) and malaria preventive practices ( $F=21.90$ ,  $p<0.0001$  and  $F=11.89$ ,  $p<0.0001$ ).*

*Findings suggest moderate knowledge with average attitude and inadequate malaria preventive practices among the pregnant mothers surveyed and recommends that well designed health education programme about malaria and their implications in pregnancy should be incorporated in clinic activities to enhance their preventive practices.*

**Keywords:** Knowledge, Attitudes, preventive Behaviour, Malaria.

## Introduction

Malaria is a tropical disease transmitted by an infected *plasmodium* species of mosquito and constitutes an important cause for global burden of morbidity and mortality among pregnant women and under five year old children. The 2013 World Malaria Report has it that in 2012, an estimated 627,000 deaths occurred as a result of malaria and of this, 90% occurred in Sub-Saharan Africa with 77% recorded among under-Five years. The report also revealed that about half the world population of 3.4 billion people remains at risk of malaria exposure living in endemic regions. In Africa, malaria constitute the primary cause of infectious disease burden and bears considerable proportion of the global burden of about 2.7 million deaths attributable to the disease with an estimated 300 million people who live with it yearly (WHO, 2010). The populations at highest risk of morbidity are young children and pregnant women, because of their low immunity against the disease (Roca-Feltrer, Carneiro, Armstrong-Schellenberg, 2008; Rogerson, 2010). Malaria accounts for serious pregnancy-related complications during childbirth and a major cause of anemia in both children and pregnant women (Ekejindu, Udigwe & Chijioke, 2006; Matangila, Lufuluabu, Ibalanky, da Luz, Lutumba, & Van Geertruyden, 2014). As a result of the deteriorating health conditions of populations in the developing world, and the impact of malaria to the health of pregnant women and under five year old, the Millennium Development Goals (MDG) initiative was launched in 1990 with the aim of encouraging governments of nation states to initiate policies and mobilize resources that would significantly impact on factors responsible for health disparities, poverty in diverse communities, environmental degradation and social inequality. The Millennium Development Goal particularly

for maternal health, and reversal of the incidence of malaria calls for a reduction in maternal mortality by two-thirds by the year 2015 (Sachs, 2005; Orton & Omari, 2008). The estimates of maternal mortality suggest that 342,900 (95% confident interval 302,100–394,300) maternal deaths occurred worldwide in 2008, and that more than 50% of these deaths occurred in six countries (India, Nigeria, Pakistan, Afghanistan, Ethiopia, and the Democratic Republic of the Congo). Malaria cases in Nigeria are almost exclusively due to *P. falciparum* and several attempts have been made to control the disease, much of which have not been very successful due to ineffective strategies and insufficient resources that have been used. However, the current Roll Back Malaria (RBM) initiative has created a lot of resources with special attention placed on the most at risk groups. The local communities of Ogun State also have a high proportion of its population at high risk of becoming infected with malaria because they are situated in the tropical rain forest region of southwest Nigeria.

Malaria is a disease that can be prevented with currently available interventions. Among approaches currently used for malaria reduction programme includes utilization of insecticide-treated mosquito nets (ITNs) to protect from bites, indoor residual spraying (IRS) of homes, use of intermittent preventive treatment with Sulphadoxine-pyrimethamine (Onyebuchi, Lawani, Iyoke, Onoh & Okeke, 2014) and the rapid diagnostic tests and treatment with effective high-quality drugs such as Artemisinin-containing Combination Therapies (ACTs) (NPC, 2013). However, the use of insecticide-treated nets is currently considered the most cost-effective method of malaria prevention in highly endemic areas and constitutes the main method of malaria prevention employed in Nigeria. Free

community-based distributions of long-lasting insecticidal nets (LLINs) is conducted through special campaigns, public health facilities, faith-based organizations (FBOs), and non-governmental organizations (NGOs) with the goal of achieving universal access for the at-risk populations of children under the age of five years and pregnant women (NPC, 2013). Frequently, free distributions of nets are organized as major approach to encourage community people to use LLINs to reduce malaria transmission through stand-alone campaigns and sometimes integrated with other health programmes such as immunization. Currently, Nigeria implements a nationwide routine LLIN distribution through health facilities that are modeled on the modified ITN Massive Promotion and Awareness Campaign (IMPAC) system. Under this system, pregnant women attending antenatal clinics receive an LLIN at first attendance, and children receive an LLIN on completion of their third dose of the diphtheria, pertussis and tetanus vaccine (NPC, 2014). Despite the various initiatives developed over the years to address the public health challenges malaria pose, the problem still persist. This simply means that research should be directed towards personal-level characteristics of persons defined to be at high risk of malaria transmission. It is now well established that health behaviour has links to health outcomes and these links in turn are dependent on factors associated with cognitive processes of reasoning and health literacy, quality of healthcare services, available health-related information and decision-making process at the individual level (Glanz, Rimer & Lewis, 2008). Understanding the various factors, especially, level of knowledge and attitudes associated with the practice of malaria prevention by pregnant mothers attending ante-natal care, consists an essential element in malaria control. Importantly, the combined

effects of knowledge about malaria and pregnant mothers' attitude towards protecting themselves against malaria is expected to provide the necessary consciousness-raising, concern-arousing, action-stimulating impetus for them to engage in preventive health (Atulomah & Atulomah, 2012). Lack of consciousness-awareness of the nature of the health risks individuals are exposed to and what to do about it can significantly limit preventive actions. Health Literacy acquired through appropriate health education experience operates to establish this mind set and skills in people (Atulomah & Atulomah, 2012). Therefore, the significance of the study is premised on identifying the level of knowledge and awareness regarding relevant malaria issues and the nature of pregnant mothers' attitudinal disposition to malaria prevention in order to determine whether these are adequate to generate appropriate motivation and ability of these pregnant mothers to understand and use information in ways which promote and maintain malaria preventive behaviour.

With the backdrop of persistent high morbidity and pregnancy-related complications recorded provides basis for understanding the dynamics and factors associated with malaria transmission in the tropics. Therefore, findings from this study should provide new insight about malaria preventive behaviour and the antecedents associated with this behaviour pattern that can be incorporated in designing effective Behaviour Communication Change (BCC) strategies to reduce malaria transmission. We therefore hypothesize in this study, that knowledge and attitudes about malaria will be significantly related to malaria-preventive behaviour of pregnant women and also that younger pregnant mothers and mothers with non-formal education will report lower malaria-preventive behaviour than older and more educated pregnant mothers.

It is in the light of the above that the researchers sought to find out whether knowledge and attitudinal disposition of expectant mothers attending ante-natal clinic at Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu Ogun state with respect to malaria prevention has any bearing on their ability to carry out malaria-risk prevention action. Findings from the study will provide basis for making recommendations to strengthen antenatal care health education programmes in the clinics.

### **Materials and methods**

This was a cross-sectional descriptive study. Information about demographic characteristics, knowledge, attitude and practice of malaria prevention was obtained from 137 expectant mothers who consented to participate, following explanation of the research and confidentiality issues, at the ante-natal clinic of the tertiary health facility in Ogun State, Nigeria. Data collection was through a validated 32-item interviewer-administered questionnaire (reliability coefficient of 0.74). Sample size was determined by considering 80% power computations that accounted for type II error with a 95% confidence level for type I error to give a minimum sample size of 98 respondents.

The study location is a rapidly growing metropolitan city within the tropical rain forest of south-western Nigeria. Sagamu is strategically located (*location-12°16' North and 6°33' East*) on the main highway between the port city of Lagos and the northern as well as southeastern part of Nigeria. It is the biggest city in Ogun State which is close to the Ibu River. The Local Government Area consists of different communities. The city consists of multi-ethnic non-indigenes of Igbos, Hausas among others, but predominantly Yorubas. They are mostly traders, few civil servants and farmers.

### *Instrument Development and Measures*

The variables measured in this study included certain socio-demographic characteristics of the pregnant women attending the antenatal clinic among which included their ages, ethnic expressions, their occupations, educational attainment, marital status and number of children alive. Other measures included knowledge about malaria such as causation, symptoms, consequences of exposure and conditions for encouraging malaria transmission. Other variables included in the study are attitudes of pregnant women towards malaria and its prevention and the outcome variable of malaria prevention practice among pregnant women.

The instrument used for this study measured level of knowledge regarding malaria causes, treatment, consequences of poorly treated malaria in pregnancy and preventive action required to limit transmission. Knowledge was measured as a dichotomous variable and was computed as a weighted score of one point for correct response and zero for wrong answers. Similarly, attitudinal dispositions of the mothers were measured in the questionnaire adopting the 4-response type likert scales of *Strongly Agree, Agree, Disagree and Strongly Disagree* in which poor attitude likely to predispose her to malaria transmission was scored a zero while 3-points score was assigned high score indicating attitudinal disposition likely to facilitate prevention of malaria. Some items were assigned reverse coding to check for faking of responses. Similarly, malaria prevention behaviour of the respondents was operationalize in the questionnaire using 4-response type likert scales of *Not at all, Rarely, Occasionally and Very often* for practice items and coded zero for practices that will put the respondent at serious risk of malaria transmission and 3-points indicates preventive practice that is most likely to

prevent malaria transmission. Scores on the knowledge scale ranged from 0 to 15 points, on the attitudinal scale was from 0 to 18 points and on the practice scale was from 0 to 24 points. The scaling transformation enabled level of knowledge, attitudinal disposition and preventive practice of each respondent to be determined as a continuous measure.

The validity of the questionnaire was assured by considering the important variables related to the problem in the study such as knowledge required to act in a protective way, attitudes relevant to malaria prevention and malaria-prevention behavior. Furthermore, the specific objectives and the conceptual framework derived from the KAP-model guided operationalizing the constructs in the instrument development. A

## **Results and Discussion**

One hundred and thirty seven participants gave their consent to participate and were enrolled. The overall median age of the participants in this study was 20 years. Most of the participants (56.9%) were from the Yoruba tribe followed by Igbo tribe (23.4%) and Hausa/Fulani tribe (19.7%). Majority (80.3%) had at least secondary school education with 9.5 reporting non formal education. Majority of the participants are traders (51.1%) and 16.1% are teachers with only 3.6% declaring to be house wives. (See table 4.1) All of the participants reported being married.

### **Knowledge about Malaria Prevention Treatment Requirement**

The basic results for participants who responded in this study are presented as frequency distribution of their responses that reflect knowledge likely to enhance preventive behaviour, their mean scores and standard deviations (SD). The knowledge variables sought to identify likely causes of malaria, symptoms, use of insecticide treated bed nets

split-half reliability analysis of the data was conducted to compute the reliability coefficient (Cronbach's alpha of 0.74) and internal consistency of the instrument. Data analysis was conducted using IBM® SPSS version 21. Descriptive statistics such as frequency distributions and means with standard deviations were used to evaluate personal characteristics, knowledge, attitude and malaria preventive practices. Analysis of variance was used to compare the distribution of knowledge, attitude and malaria preventive practices across certain demographic characteristics such as age groups and education. Correlation analysis was conducted to validate the hypotheses proposed at 5% level of significance for all statistical procedures.

and complications in pregnancy of persistent malaria attacks. As described by the frequency distribution displayed in table 4.2, all the respondents identified that malaria is a disease and is caused by the bite from a mosquito. Interestingly, a small proportion of the pregnant women (26.3%) indicated that long exposure to intense sun may also be the cause of malaria. Regarding protection against bites from mosquitos offered by sleeping under insecticide treated bed-net, 133(97.1%) pregnant women were able to answer correctly. On the other hand, only 5.1% of the women surveyed were able to provide all the correct reasons for protecting pregnant from having malaria. (See table 4.2)

Knowledge about sanitary conditions that would facilitate malaria transmission showed that majority of the respondents (83.2%) identified that stagnant water encourages breeding of mosquitos and bushes around the house also encourages transmission. Another disturbing observation which showed low level of knowledge about malaria transmission showed that only 23% of respondents were able to answer correctly that improper disposal of

waste would encourage malaria transmission.  
(See Table 4.2)

Table 1; Demographic Characteristics of the participants in the study.

VARIABLES	Respondents in this study N=137	
	Frequency (N)	Percent (%)
<b>Age of participants</b>		
▪ 18 to 22	60	43.8
▪ 23 to 27	54	39.4
▪ 28 to 32	12	8.8
▪ 33 to 37	11	8.0
<b>Ethnicity:</b>		
▪ Yoruba	78	56.9
▪ Igbo	32	23.4
▪ Hausa	27	19.7
<b>Education:</b>		
▪ Non-Formal	13	9.5
▪ Primary	14	10.2
▪ Secondary	66	48.2
▪ Tertiary	44	32.1
<b>Marital Status</b>		
▪ Single	0	0.0
▪ Married	137	100.0
▪ Divorced	0	0.0
<b>Number of Children alive</b>		
▪ None	89	65.0
▪ One	19	13.9
▪ Two	29	21.1
<b>Occupation</b>		
▪ Teacher	22	16.1
▪ Self-Employed	18	13.1
▪ Trader	71	51.1
▪ Housewife	5	3.60
▪ Others	21	15.3

When knowledge scales was developed to measure the level of knowledge related to malaria among the participants in the study, the result showed that on a 15-point scale the participants scored a mean of 10.73 with a standard deviation of 1.62 (See table 4.3). Measuring knowledge variables derived and making statistical multiple comparison of means for various demographic variables such as age and educational attainment using one-way Analysis of Variance (ANOVA) showed that the

participants' knowledge variable for the different age groups show significant difference across age groups and 28 to 32 years (N=12) scored the highest ( $\bar{X}$ =12.58, SD=0.52; F (3, 133) =16.22,  $p<0.0001$ ). When knowledge scores was compared among the respondents based on their level of education, it was also found out that participants' knowledge scores varied significantly across education and respondents with more than secondary education again scored the highest while

participants with non-formal education scored the lowest (N=13;  $\bar{X}$ =8.14, SD=1.88; F (3, 133) =75.22, p<0.0001).

When the overall knowledge level was assessed based on the group mean scores, it was found that knowledge about malaria reported was 71.5%.

Table 2 Frequency distribution of correctly answered questionnaire items related to malaria transmission, symptoms and pregnancy –related complications in malaria.

Knowledge Variable	Respondents in this study N=137	
	Frequency (N)	Percent (%)
Items related to Malaria as a disease and causation:		
▪ Malaria as a disease,	137	100.0
▪ Cause by bite from mosquitos,	137	100.0
▪ Malaria is Not caused by long stay in the sun,	36	26.3
▪ Bet nets protects from mosquitos,	133	97.1
▪ Malaria associated with fever,	101	73.7
▪ Malaria associated with anaemia	114	83.2
▪ Pregnant woman should be protected from having malaria for all the number of reasons,	7*	5.1
▪ Malaria kills babies easily	93	67.9
▪ Stagnant water encourages breeding of mosquitos,	114	83.2
▪ Bushes around houses encourages malaria transmission,	110	80.3
▪ Improper waste disposal creates breeding ground.	23	16.8

Table 3. Summary of descriptive statistics regarding knowledge, attitude and preventive practice scores for participants in the study.

VARIABLES	Maximum Points on Scale of Measure	Mean and Standard Deviat N=137		Over all
		$\bar{X}$	±SD	%
Knowledge about Malaria and Complications in pregnancy	15	10.73	1.62	71.5
Attitudinal Dispositions about Malaria and Complications in pregnancy	18	9.77	3.64	54.3
Malaria Prevention Practice	24	13.69	3.82	57.0

### Attitudinal Disposition of Pregnant women towards Malaria and its Prevention

Frequency distribution for the study assessing attitudinal disposition towards malaria and its prevention likely to facilitate malaria transmission among the women showed that, 78.1% of the women surveyed indicated that, they are not worried about getting malaria in their present state. Furthermore, malaria was conceived as a mere inconvenience just like common cold (79.1%) and that it is not a problem because everybody gets the disease (54.8%). Although some of the respondents (43.8%) felt that experiencing frequent bouts of malaria has no consequences on pregnancy. (See table 4.4)

Attitudinal disposition scales developed to measure the level of attitudes of the pregnant women towards malaria and its prevention measured on a 18-point scale showed that participants scored a mean of 9.77 with a standard deviation of 3.65 (See table 4.3). Attitudinal dispositions of all the participants varied across demographic characteristics such

as age and educational attainment. Using one-way Analysis of Variance (ANOVA) showed that the attitudinal dispositions of participants for the different age groups show significant difference ( $F = 16.13, p < 0.0001$ ) with the age group of 33 to 37 years ( $N=11$ ) scoring the highest ( $\bar{X}=13.25, SD=4.83$ ), while the lowest score was reported for age group of 18 to 22 years ( $\bar{X}=7.83, SD=2.95$ ). Similarly, when attitudinal disposition scores was compared among the respondents based on their level of education, it was also found out that participants with non-formal education ( $N=13; \bar{X}=5.00, SD=0.93$ ) scored the lowest compared with participants having more than secondary education who scored the highest ( $N=44; \bar{X}=10.95, SD=4.30$ ). Thus attitudinal dispositions across educational level showed significant difference ( $F = 75.22, p < 0.0001$ ).

When the overall attitudinal disposition was assessed for the group, on the basis of their mean scores, it was found that they were about 54.3% predisposed.

Table 4: Frequency distribution of attitude towards malaria and its prevention expressed by respondents that is likely to predispose to malaria transmission.

Attitudinal Disposition Variable	Respondents in this study N=137	
	Frequency (N)	Percent (%)
<i>Respondents' reactions towards Malaria:</i>		
▪ Not worried about getting malaria in pregnancy,	107	78.1
▪ When Protected, baby is also protected,	95	69.3
▪ Malaria merely an inconvenience,	96	79.1
▪ No a problem, everybody gets it,	75	54.8
▪ Frequent bouts of malaria has no consequences on pregnancy,	60	43.8
▪ Traditional herbal preparations are more effective than drugs prescribed at clinics.	79	57.7



Table 5: Frequency distribution of self-reported malaria prevention practices among the respondents in this study.

Malaria Prevention Practices Variable	Respondents in this study N=137	
	Frequency (N)	Percent (%)
<i>Respondents' Malaria prevention practice based on frequency of preventive behaviours:</i>		
▪ Clinic provides all information about malaria prevention in pregnancy,	71	51.8
▪ Sleep under Insecticide Treated net,	41	29.9
▪ Regular clinic attendance for check-ups,	46	33.6
▪ Medication adherence,	74	54.0
▪ Apply protective clothing at night time,	74	54.0
▪ Use traditional herbal preparations,	49	35.8
▪ Forget taking prescribed medications,	48	35.0
▪ Good sanitation of surroundings	57	41.6

### Malaria Prevention Practices of Pregnant women

Exploring frequency distribution for the study related to malaria preventive practices among women in the study showed that, 51.8% of them claimed to have all the information about malaria from the clinics required for adequate protection from malaria transmission and only 29.9% claimed to sleep under insecticide-treated bed-nets. Self-reported adherence to antimalarial medications was 54.0% of which, only 15.3% reported optimal adherence and 38.7% reported sub-optimal adherence to the prescribed antimalarial agents. Similarly, 35.0% of surveyed pregnant mothers claimed forgetting to take their medications. (See table 4.5)

Assessment of malaria preventive practices measured for pregnant women on a 24-point scale showed that participants scored a mean of 13.69 with a standard deviation of 3.82 (See table 4.3). Malaria preventive behaviour of all the participants varied across demographic characteristics such as age and educational

attainment. Using one-way Analysis of Variance (ANOVA) showed that participants for the different age groups show significant difference ( $F = 21.90, p < 0.0001$ ) with the age group of 33 to 37 years ( $N=11$ ) scoring the highest ( $\bar{X} = 19.27, SD=1.01$ ), while the lowest score was reported for age group of 18 to 22 years ( $\bar{X} = 11.33, SD=3.15$ ). Similarly, when preventive behaviour scores for malaria was compared among the respondents based on their level of education, it was also found that participants with non-formal education ( $N=13; \bar{X}=10.15, SD=1.52$ ) scored the lowest compared with participants having more than secondary education who scored the highest ( $N=44; \bar{X} = 13.07, SD=2.48; F(3, 133) = 11.89, p < 0.0001$ ). Thus malaria preventive practices across educational level showed significant difference; ( $F(3, 133) = 11.89, p < 0.0001$ ).

When the overall prevention behaviour related to malaria was assessed for the group on the basis of their mean scores, it was found that the level was about 57.0%.

Table 6. Correlation analysis regarding relationship between knowledge and malaria preventive practice scores for participants in the study.

VARIABLES**	Maximum Points on Scale of Measure	Malaria Preventive Practices		
		$\bar{X}$	Coefficient (r)	p-value
Knowledge about Malaria and Complications in pregnancy	15	10.73	0.396	0.000
Attitudinal Dispositions about Malaria and Complications in pregnancy	18	9.77	0.575	0.000

\*\*Knowledge is significantly correlated with attitudinal disposition  $r=0.738$  ( $p<0001$ )

Table 7: Comparing knowledge, attitude and preventive practice scores across **age groups** for participants in the study using Analysis of Variance (ANOVA).

VARIABLES	Scale	18 to 22 yrs.		23- 27 yrs.		28 – 32 yrs.		33 – 37yrs.		F-value (p-value)
		$\bar{X}$	±SD	$\bar{X}$	±SD	$\bar{X}$	±SD	$\bar{X}$	±SD	
Knowledge about Malaria and Complications in pregnancy	15	9.97	1.95	10.9	0.81	12.5 8	0.55	12.0	0.00	16.22 (0.000)
Attitudinal Dispositions about Malaria and Complications in pregnancy	18	7.83	2.95	10.8 0	3.2	13.2 5	4.83	12.0	0.01	16.13 (0.000)
Malaria Prevention Practice	24	11.6	3.15	14.6 8	3.57	14.6	2.27	19.2 7	1.01	21.9 (0.000)

Table 8: Comparing knowledge, attitude and preventive practice scores across **educational attainment** of participants in the study using Analysis of Variance (ANOVA).

VARIABLES	Scale	Non-Formal		Primary		Secondary		Tertiary		F (p-value)
		$\bar{X}$	$\pm$ SD	$\bar{X}$	$\pm$ SD	$\bar{X}$	$\pm$ SD	$\bar{X}$	$\pm$ SD	
<b>Knowledge about Malaria and Complications in pregnancy</b>	15.0	8.23	1.01	8.14	1.87	11.15	0.9	11.7	0.75	75.22 (0.000)
<b>Attitudinal Dispositions about Malaria and Complications in pregnancy</b>	18.0	5.00	0.01	5.57	0.94	10.9	2.03	10.95	4.3	27.61 (0.000)
<b>Malaria Prevention Practice</b>	24.0	10.15	1.52	11.43	0.9	15.29	4.41	13.06	2.48	11.89 (0.000)

## Discussion

This study sought to provide better understanding of how knowledge and attitudinal disposition of pregnant women attending ante-natal clinic at a tertiary health facility may be associated with their malaria prevention practices. The study measured three variables, levels of knowledge about malaria transmission, treatment and prevention behaviour; attitudes towards complications of malaria in pregnancy and malaria preventive actions necessary to reduce transmission and morbidity among pregnant women.

The study reported level of knowledge regarding malaria prevention and treatment requirement that is considered to be within the third quartile with a mean score of 10.73 and a standard deviation of 1.62 on a 15-point scale of measure, which translates to 71.5% of complete knowledge required of the women for preventing malaria transmission. This observation is not surprising with the gradual improvement observed with reduction in malaria transmission following implementation of various malaria control initiatives. Furthermore, the result is

consistent with literature (Keating, et al, 2012) reporting above average knowledge of populations at risk of malaria transmission studied elsewhere. Recognizing the importance of knowledge in behaviour change, Keating and colleagues (2012) in order to influence knowledge and attitudes through motivational counselling to drive better uptake of ITN, focused their intervention on enhancing knowledge through providing accurate information about the nature of malaria transmission, malaria prevention with use of ITNs, how to repair bed-nets and retreatment, who should be using the ITNs, and the importance. It is disturbing to note that in this study, younger mothers, similar to the findings of Agomo & Oyibo, 2013, seem to have low knowledge about the issues related to malaria as a disease and its prevention. Again, it was observed that those with non-formal education demonstrated lower level of knowledge about malaria. This is particularly important because, this situation is likely to place these groups at some risk of malaria transmission and morbidity. Findings from

previous studies have blamed poor knowledge as the result of inadequate malaria education and considered it an important barrier to malaria prevention practices and further suggested that in order to maintain continuing reduction in malaria transmission, require ongoing health education for both health care providers and clients reinforcing the importance of using preventive measures (Bauch, Gu, & Baltzell, 2013). Lack of knowledge about the nature of malaria transmission and breeding conditions determined by sanitation practices in the community most certainly would facilitate high-risk exposures and possible morbidity as observed in the study with only 23% of respondents able to answer correctly that improper disposal of waste would encourage malaria transmission. Consequently, providing adequate information about malaria to pregnant mothers at clinic health education and counselling sessions would naturally facilitate malaria risk-reduction practices. This view is supported by the observation that the correlation analysis derived in this study suggested a significant association ( $r=0.396$ ;  $p<0.0001$ ) between knowledge about malaria transmission and malaria risk-reduction practices of pregnant mothers. Therefore strategically structured health education and counselling can leverage this link as illustrated by the KAP-conceptual model applied in this study to improve preventive practices.

Malaria in pregnancy is a serious situation that constitutes a threat to the unborn baby and most likely to result in adverse pregnancy outcome. The theoretical framework that guided this study clearly demonstrates that cognitive and psycho-behavioural antecedents may influence behavioural outcomes such as malaria-protection and health outcomes and therefore, when antecedents of behaviour such as knowledge, attitudes and perception are considered, they are identified to be

remotely responsible for why diseases are prevalent in communities; in this situation, malaria. When levels of awareness is high addressing ignorance, and the individuals at risk of a particular disease condition understands clearly the implications involved, usually would arouse attitudinal dispositions that contributes to preventive behaviour (Atulomah & Atulomah, 2012). Attitudinal response in the study show that majority (78.1%) of the pregnant women surveyed reported that they are not worried about getting malaria and 79.1% described the disease as a mere inconvenience similar to common cold and constituted no serious problem because they conceived that everybody gets the disease. These responses demonstrate that their attitudinal dispositions are inappropriate. In this study, attitudinal disposition of the pregnant women towards malaria and its prevention measured on a 18-point showed that participants scored a mean of 9.77 which translates to average disposition. Again, participants in the age group of 33 to 37 years demonstrated better attitudinal disposition likely to enhance preventive behaviour than reported for those in the age group of 18 to 22 years ( $F=16.13$ ,  $p<0.0001$ ). Similarly, when attitudinal disposition scores was compared among the respondents based on their level of education, it was also found out that participants having more than secondary education displayed better attitudes about malaria than participants with non-formal education. Bivariate relationships between the KAP-construct of attitude and malaria-risk reduction practices showed correlation coefficient  $r=0.575$  and was significant indicating that if attitudes are improved through well designed health education strategy, preventive behaviour would also improve.

*Malaria Prevention Practices of Pregnant women*

Malaria still account for significant burden of clinical cases seen among pregnant women globally and in particular, Nigeria. Pregnancy outcomes can be complicated by poorly treated malaria and therefore every effort directed toward improved prevention practice with regard to malaria transmission will contribute tremendously in reducing current morbidity and mortality accountable to the disease. The results of specific responses showed that among women in the study, 51.8% of them claimed to have all the information about malaria from the clinics required for adequate protection from malaria transmission and only 29.9% claimed to sleep under insecticide-treated bed-nets. Furthermore, self-reported adherence to antimalarial medications was 54.0% of which, only 15.3% reported optimal adherence and 38.7% reported sub-optimal adherence to the prescribed antimalarial agents. Similarly, 35.0% of surveyed pregnant mothers claimed forgetting to take their medications. The data obtained in this study provides the basis for concluding that respondents in the study demonstrated average malaria-risk reduction practice (Mean= 13.69 with a standard deviation of 3.82) when measured on a maximum scale of 24 points. This finding is not surprising since levels of knowledge and attitudes were not impressive. These may account for the persistent malaria transmission despite much effort in providing structural resources to reduce the disease.

#### IMPLICATION FOR PRACTICE

A number of studies related to preventive health-seeking behaviours in diverse health-risk conditions have been carried out to better understand the behavioural dynamics and antecedent factors that drive these health-seeking behaviours. Preventive health behaviour represents any activity undertaken by an individual who believes that he is healthy, for the purpose of preventing illness and attaining an even

greater level of health. These include good nutrition, immunization, regular exercise and malaria transmission prevention among others. (Glanz, Rimer & Lewis, 2002; Kasl & Cobb, 1966). Most health promotion activities are strategically designed at the level of primary prevention when the disease process asymptomatic and has not been established. The framework for any intervention programmes at this level such as patient education or counseling offered at ant-natal clinics when pregnant women visit for follow-up of their condition are usually organized around health promotion and specific protection activities to enhance knowledge about issue related to their condition and their susceptibility to adverse pregnancy outcomes. Primary prevention is a desirable goal and cheaper addressing the community and individuals. These health promotion activities consist of non-medical interventions involving education to sensitize and arouse their understanding, modify their knowledge about their conditions which usually includes counsels on lifestyle adjustments such as good nutrition, clean environment, use of insecticide treated bed nets to prevent malaria transmission.

Such cognitive and behavioural approaches to influence health protection and health outcomes can effectively address issues related to antecedents of behaviour such as knowledge, attitudes and perception, when they are identified to be remotely responsible for why diseases are prevalent in communities; for instance malaria. Among these include health literacy issues regarding levels of conscious-awareness addressing ignorance, perceptions defining cognitive processes of understanding implications of actions and far-reaching consequences of decisions taken by individuals, attitudinal dispositions, beliefs and values held (Atulomah & Atulomah, 2012) .Treatment failure with antimalarial agents as a result of emergence of resistant strains of *plasmodium*

and consequent increase in morbidity and mortality of at-risk populations significantly underscore the rationale for Behaviour Change Communication (BCC) approach to be seriously considered and scaled up in every community to address the emerging drug-resistance in Nigeria. While it is believed that campaign to increase protective use of ITN through wide distribution, will reduce malaria transmission, challenges to increasing ITN ownership especially among populations vulnerable to increased malaria morbidity and mortality, such as children and pregnant women, is a hindrance (Alaii, Hawley, Kolczak, Ter- Kuile, Gimnig, Vulule, Odhacha, Oloo, Nahlen & Phillips-Howard, 2003). Importantly, for behaviour change to take place, there is need to influence knowledge and attitudes through motivational counselling as a number of studies have noted (Keating, J., Hutchinson, P., Miller, JM., Bennett,A., Larsen, DA., Hamainza, B., et al 2012) . In their study, only 52% of households slept under ITN, this they considered grossly inadequate to halt malaria transmission (Keating, *et al.* 2012). In order to effect an increase in uptake of ITN, Keating and colleagues (2012) in their intervention focused on enhancing knowledge through providing accurate information about the nature of malaria transmission, malaria prevention through the use of ITNs, how to repair the nets and retreatment, who should be using the ITNs, and the importance of using the nets persistently always. Even though knowledge is important, it is not sufficient on its own to drive behaviour; there has to be motivation the will in subtle ways modify perception and attitudes. In another study on factors associated with malaria transmission conducted in Lagos, it was found that younger pregnant mothers were more susceptible than older mothers to prevalence of malaria (Agomo & Oyibo, 2013). In

another study of community perceptions of malaria risk and adherence to prevention measures in two districts in Zanzibar East Africa, it was found that inadequate malaria education accounted for an important barrier to malaria prevention practices and the study suggested that in order to maintain continuing reduction in malaria transmission, will require on-going health education for both health care providers and residents to reinforce the importance of using preventive measures (Bauch, Gu, & Baltzell, 2013). Therefore, in order to commence any effort to address present malaria prevalence towards strengthening gains made so far in the MDG initiative, it is important to validate levels of knowledge related to malaria transmission and susceptibility, attitudes towards outcomes especially in pregnancy, and determine malaria preventive practices.

### **Conclusion**

This study on level of knowledge, attitudes and malaria preventive practice among pregnant women attending antenatal clinic was average and reflected situation that puts the women at risk of continued malaria transmission. The observed inadequate preventive behaviour strongly suggest scaled up health education and counselling to meet what is required to attain zero malaria transmission. It is with the foregoing conclusion in mind that the following recommendations are made. Since the study revealed evident unsatisfactory levels of knowledge about malaria prevention and treatment among surveyed mothers, particular attention should be placed on health education strategies involving the use behaviour change communication (BCC). This should arouse sufficient conscious awareness appropriate for action required to prevent malaria transmission among pregnant women.

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