

# The Influence of Roll Back Malaria Program on Knowledge of Malaria among Pregnant Women in Ibadan, Nigeria

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## Abstract

*Malaria is one of the most severe public health problems globally. It is a leading cause of death and disease in many developing countries, where young children and pregnant women are the most affected (WHO, 2011). To examine the influence of the Roll Back Malaria (RBM) on malaria-knowledge among pregnant women, a cross-sectional survey design was used. Survey questionnaires were administered on 407 pregnant women. The respondents were drawn from patients attending clinics at Primary Health Centres (PHC) in six selected local government areas in Ibadan. This was to ensure that the respondents were among those who have been exposed to intervention activities, since the malaria control programs in the state are concentrated at the state-owned primary health facilities. In-depth interview with pregnant women and RBM staff were also employed to capture issues around various thematic areas of the study. The respondents' use of Insecticide Treated Net (ITN) suggests that the more informed the populace, the higher their inclination to adopt and use the RBM measures in combating the scourge of malaria. Most of the respondents (93%) were aware that malaria is preventable, which means that if given the opportunity, and armed with the right knowledge on prevention, malaria in pregnancy can be averted. The study found that proper dissemination of relevant information, and not just formal education, is the key to the success of the RBM program.*

**Keywords:** roll back malaria, malaria knowledge, pregnant women

## Introduction

Malaria during pregnancy is a major public health issue and poses significant risks to pregnant women, their foetuses and infants (WHO, 2017). In 2015, there were 212 million new cases of malaria and 429,000 malaria related deaths globally (WHO, 2016). The burden is greater on poor, tropical and subtropical areas of Africa (CDC, 2016) with a predominance of *plasmodium falciparum* infection which is implicated in malaria-related maternal illness and low birth weight (WHO, 2017).

Even though malaria in pregnancy increases the risk of maternal and foetal anaemia, still birth, spontaneous abortion and neonatal death worldwide (WHO, 2017), in Africa, infections with symptoms indicating other diseases

like typhoid fever and pneumonia exacerbate the situation, thus making proper and early diagnoses very essential (Okwa, 2003). Malaria contributes substantively to the death of women (WHO, 2016), making it a public health problem in the continent particularly sub-Saharan Africa. Poverty, social exclusion, marginalization, inadequate or lack of sanitation, and lack of standard health care system among others drive increasing malaria morbidity and mortality (CDC, 2016).

About 97% of Nigeria's population is at risk of malaria (WHO, 2014), which accounts for 60% of outpatient hospital visits, about 11% of maternal mortality and 30% of child mortality (FMOH, 2008). The symptoms and complications of malaria during pregnancy are directly proportional to the intensity of malaria transmission and the level of immunity of pregnant women. Due to immune deficiency during pregnancy, pregnant women are 2-3 times at a higher risk of suffering from malaria than non-pregnant women (WHO, 2005; WHO, 2017). Thus, the country records a maternal mortality of 576 per 100,000 live birth, which is one of the highest in the world (UNFPA, 2017).

To be sure, there have been various efforts at malaria control in the past, especially through the implementation of Primary Healthcare (PH) system, but the major landmark in malaria control in Nigeria was the country's official joining of the Roll Back Malaria initiative of the World Health Organisation (WHO). The RBM is a key program in the global fight against malaria partnership designed to reduce the burden of malaria worldwide. By joining the partnership, Nigeria unwittingly made the program's objective and strategies the framework of its policy on malaria. Insecticide Treated Nets (ITNs) were first unveiled in Nigeria in the year 2000 (FMOH, 2001), making it a foremost strategy of malaria control in the country. However, ITN coverage of the country is still very low, with many people unaware of its existence (Jegede, A.S.; Amzat, J.; Salami, K.; K. Adejumo; P.O. *et al.*, 2006).

It was in this regard that RBM initiated some specific strategies at the community level, which included: to improve the recognition of malaria illness and provision of appropriate treatment by care givers within 24 hours of the onset of illness; to strengthen the capacity of health systems, particularly at the periphery, so as to support RBM actions at community level (including access to anti-malarial drugs and referral mechanisms); to improve health-seeking behaviour of caregivers, family and community, so they can recognize signs of severe illness, seek appropriate care quickly when referral is indicated; to improve access to ITN and promote their regular and proper use and retreatment; to promote IPT for pregnant women; to promote vector control, including environment management, wherever appropriate (FMOH, 2002).

This paper focuses on the efforts of stakeholders and the progress made so far in the control of malaria in pregnancy with respect to the objectives of RBM. The study was therefore conducted among pregnant women attending antenatal clinics to investigate their knowledge about malaria diagnosis and treatment issues. The study identifies key areas of strength, weakness,

opportunity, and threats, to the implementation of the RBM program. On the basis of that, recommendations were made to guide policy makers.

### ***Malaria Situation Analysis in Nigeria***

Situated between 4<sup>o</sup> and 13<sup>o</sup> Northern Latitudes, Nigeria has a suitable climate for malaria transmission. The only exception is the area South of Jos in Plateau State, where some mountain peaks reach 1600 meters above sea level and the altitude of settlements lies between 1200 and 1400 meters above sea level. This area can be considered as very low in malaria risk (Mba, 2006).

The five vegetative strata from South to North of Nigeria (mangrove swamps, rain forest, guinea-savannah, Sudan-savannah and Sahel-Savannah) define vector species dominance, seasonality and intensity of malaria transmission. Thus, the duration of transmission season decreases from South to North, from perennial in most of the South, to only 3 months, or less, in the areas around the country's border with the Chad Republic.

The dominant species of malaria parasites is *Plasmodium Falciparum* (>95%), with *P. ovale* and *P. malariae* playing a minor role; the latter is quite common as a double infection in children. The dominant vector species are *Anophelesgambiae S.I.* and the *A. funestus* group, with some other species (*A. moucheti*, *A. nili*, *A. Pharaoensis*, *A. coustani*, *A. hancocki* and *A. longipalpis*) playing a minor or local role (WHO, 2015).

Within the *Anophelesgambiae* complex, *A. gambiae S.S.* is the principal species, with *A. arabiensis* being found more often in the North and *A. melas* only in the mangrove coastal zone. Biting peaks at midnight and biting rate in raining season is 2.6 times higher than in the dry season. Transmission potential is 3.6 times higher during the rains than the dry season. The average annual infective bite is 105.6 per person (Uttah, E.C.; Ibe, D.; Wokem, G.N., 2013).

Taking into account this distribution, as well as the population density, it is estimated that approximately 30% of the country's population live in areas of high to very high transmission intensity and 67% in the moderate transmission zone. This results in an estimated figure of 3.5 fever episodes per person and 1.5 malaria episodes per year for children under 5; and 1.5 and 0.5, respectively, for those 5 years and older. Malaria related annual deaths among children under 5 years of age is estimated at around 300,000, and malaria contribution to maternal mortality is 11% (NMCP 2011). Malaria's economic impact is enormous, with about ₦132 million lost annually in form of treatment cost, prevention cost, and man-hour loss (NDHS, 2008).

Three major strategic interventions and other supportive health systems strengthening strategic (cross-cutting) interventions are being used to control malaria in the country. These are: case management of malaria, using Artemisinin Based Combination Therapies (ACTs); Integrated Vector Management/Insecticide Treated Nets (IVM/ITNs); Malaria in Pregnancy (MIP). Supportive health system strengthening (Cross-cutting) intervention: (a)

Monitoring and Evaluation (b) Behaviour Change Communication (c) Program Management Information (FMOH, 2005).

### **Literature**

The Malaria burden is a challenge to human development. It is both a cause and consequence of under-development. Almost half of the world's population is at risk of malaria, with roughly 212 million malaria cases and an estimated 429,000 malaria deaths in 2015 (WHO, 2016). Despite the increased global prevention and control measures, sub-Saharan Africa continues to bear a disproportionately high global malaria burden, with 90% of malaria cases and 92% deaths related to the disease occurring in the region.

A study by Agomo and Oyibo (2013) on the factors associated with risk of malaria infection among pregnant women in Lagos found that young maternal age and non-use of insecticidal spray were mainly responsible for increased risk of malaria infection among pregnant women. Although educational attainment of respondents was part of the demographic information collected, their knowledge of the disease was not taken into cognizance. This brought to fore the place of culture, norms, beliefs, and values in the study of malaria. Also apparent from the study is RBM's lack of prominence, despite the fact that is central to the nation's malaria prevention and control framework.

In another study on the knowledge and utilization of malaria preventive measures among pregnant women Akaba, Otubu, Agida and Onafowokan (2013) found that there is relatively adequate knowledge about malaria and its preventive measures in pregnancy, but utilization of these measures is poor. Hence, there is need for concerted efforts at addressing barriers to utilization of relevant interventions.

Ugwu, Ezechukwu, Obi, Ugwu and Okeke (2013) studied the utilization of insecticide treated nets among pregnant women in Enugu, Nigeria and found that despite the favourable maternal and feto-neonatal outcome associated with ITNs, its use among pregnant women in Enugu is poor. Consequently, scaling up of free distribution of ITNs in the short term and improvement in education and social class of the populace in the long run was advocated.

In a community based descriptive cross-sectional study in four villages of Kebbi State, Nigeria, Singh, Musa, Singh, and Ebere (2014) examined the knowledge, attitude and practices on malaria in rural communities. Even though the communities' knowledge of the role of mosquitoes in malaria transmission was observed to be low, their comprehensive knowledge about malaria prevention measures was high, yet it did not reflect in their practice. As the authors noted, misconceptions about malaria transmission and its cause still exist, with the implication that knowledge about preventive measures does not necessarily translate into improvement in practices. Evident from the foregoing is the absence of RBM.

## **Theoretical Framework**

### ***Social Action***

According to Weber, the behaviour of humans is social with meanings and reasons, in a defined manner, with defined results. These actions are however, subject to the actor's interpretation. The meaning attached to such actions may either be (i) the meaning originally intended by the actor(s) based on history or by others in similar situations, or (ii) the meaning attributed to the actor(s) in a pure abstract manner. In both cases, there is no absolutely 'correct,' 'valid' or 'true' meaning, making it a function of social and historical contexts. Thus, the meaning attached to human action(s) is subjective, given the prevailing socio-historical context.

Weber submits that human action is social in so far as, by virtue of the subjective meaning attached to it by the acting individual (or individuals), it takes account of the behaviour of others and is thereby oriented in its course (Ritzer, 1975). Thus, 'meaning' is the rationalised reasons advanced by individuals as explanation for specific actions. Hence, Weber asserted that the "absence of assigned 'meaning' by individuals makes the action to be meaningless" (Amzat and Razum, 2014: 134).

Based on the foregoing, it is clear that human behaviours are shaped by the prevailing socio-cultural setting in which they operate. In this vein, it can be said that disease perception is a result of the interaction of culture and society, thus informing the variation in the knowledge of a disease within a culture, and from one culture to another. The perception of malaria by pregnant women belongs in this sphere. With respect to sustainable disease control programs, for instance, RBM, strong partnerships between actions, beliefs and health services are necessary. This implies that the management of the program and its achievement lies in the socio-cultural milieu which largely explains the underlying factors that determine the actions to be taken by a pregnant woman.

Behaviour is clearly related to health, first in terms of its local understanding. It is in this regard that Heggenhougen, Hackethal and Vivek (2003) observed that in malaria control, attention needs to be paid to local realities (including cultural characteristics) that constitute major influence in shaping ideas pertaining to health and illness. It is for this reasons that Heggenhougen, Hackethal and Vivek (2003) advocated for increased attention to the socio-cultural environment (especially behavioural and social factors). Generally, the idea related to social action has been substantively utilised in understanding care and support system, especially in health care utilization.

This paper focuses on the perceived understanding of pregnant women about malaria and its relationship to RBM program. The implication is that the procedure adopted in RBM intervention should recognize local realities (e.g. herbs, TBA, prayers, beliefs etc), including cultural characteristics that could constitute major influence in its implementation in relevant communities.

## **Methodology**

### ***Study Population***

Six Local Government Areas (LGAs) were purposively selected from the eleven LGAs in Ibadan. They were: Akinyele, Egbeda, Ibadan Southwest, Ibadan Southeast, Oluyole and Lagelu. A total of 407 respondents were purposively selected based on the average monthly antenatal clinic records. The LGAs purposively for the study because of the challenges faced by the RBM program i.e. limited resources to scale up intervention in all the 774 local government areas of Nigeria. The selection process also involved the identification of Oyo State as a malaria endemic state with pregnant women constituting 70% of malaria patients (Owolabi, 2009); the identification of six LGAs where the RBM program was first introduced. The inclusion criteria for respondents in this study were: respondents must be pregnant; must have registered with the clinic; and must be receiving treatment at the Antenatal Care (ANC) at the time of field work. The questionnaire comprised open-ended and close-ended questions relating to the knowledge about malaria; use of: Insecticide Treated Net (ITN), Artemisinin Based Combination Therapy (ACT) and Intermittent Preventive Treatment (IPT); and variables that determine maternal health. Ethical approval for the study was got from Institute for Advanced Medical Research and Training (IAMRAT), Ibadan.

### ***In-depth Interview***

In-depth interviews (IDI) were conducted in order to gain a deeper understanding of challenges encountered in delivering the malaria control strategies by the implementers and to identify the role of each level of government in program implementation. A few structured questions were used to elicit explanations and clarifications about the objectives: their knowledge about malaria, malaria related complications in pregnancy and treatment services among others. Thirteen RBM staff, made up of the state RBM manager and twelve RBM officers (2 per local government) were interviewed. This was necessary because they were the ones on ground in each of the LGAs, and the State manager is the final authority. Twenty-four pregnant women utilizing various primary healthcare services where the study was conducted were also interviewed, given that the majority of the subsidized malaria interventions in the state were directed towards PHC centres.

Quantitative data was analyzed using descriptive and inferential statistics, at 0.05 level of significance, while content analysis was employed in analyzing qualitative data. Table 1 is the scale used to measure the respondents' knowledge of malaria.

**Table 1: Adopted scale of malaria knowledge**

Objective	Variables	Categories	Indicators
Examine the level of knowledge of malaria among pregnant women in the study area.	Level of knowledge of malaria	High	i. Knowledge of symptoms. ii. Knowledge of causes. iii. Knowledge of prevention. iv. Knowledge of available treatment methods. v. Knowledge of treatment facility
		Moderate	Has knowledge of 2 or 3 of the 5 indicators above.
		Low	Has knowledge of 1 or none of the 5 indicators.

**Results**

**Table 2: Percentage distribution of respondents by socio-demographic characteristics**

Characteristics	Categories	Frequency	Percent
<b>Age Group</b>	≤19 years	17	4.3
	20-24 years	80	20.2
	25-29 years	158	39.9
	30-34 years	90	22.7
	35-39 years	45	11.4
	40-44 years	6	1.5
	<b>Total</b>	<b>396</b>	<b>100</b>
<b>Marital Status</b>	Single Parent	18	4.5
	Married	377	93.3
	Cohabiting	4	1.0
	Separated/Divorced	4	1.0
	Others	1	0.2
	<b>Total</b>	<b>404</b>	<b>100</b>
<b>Religion</b>	Christianity	145	35.6
	Islam	261	64.1
	Traditional	1	0.2
	<b>Total</b>	<b>407</b>	<b>100</b>
<b>Education</b>	No formal education	7	1.7
	Primary	80	19.8
	Secondary	226	55.8
	Post secondary	92	22.7
	<b>Total</b>	<b>405</b>	<b>100</b>
<b>Occupation</b>	Unemployed	39	9.7
	Civil Servant	51	12.6
	Self-employed	299	74.0
	Others	15	3.7
	<b>Total</b>	<b>404</b>	<b>100</b>
<b>Monthly Income (N)</b>	≤ 5000	43	51.8
	5001 - 10,000	25	30.1
	>10,000	15	18.1
	<b>Total</b>	<b>83</b>	<b>100</b>
<b>Age at Marriage</b>	15-19 years	42	11.8
	20-24 years	169	47.3
	25-29 years	131	36.7
	30+ years	15	4.2
	<b>Total</b>	<b>407</b>	<b>100</b>
<b>Parity</b>	One Pregnancy	158	59.2
	Two Pregnancies	88	33.0
	4-6 Pregnancies	21	7.9
	<b>Total</b>	<b>267</b>	<b>100</b>

Table 2 showed the socio-demographic characteristics of the sampled population. In terms of the age of the respondents, the majority (82.2%) were within 20-34yrs age bracket. This implies that most women in the sample married within the age bracket considered being maturity age group. On the marital status of the respondents, about 93.0% of the women were married, and 5.0% were single. 1.0% of the respondents were either cohabiting or separated/divorced. That the majority of the respondents were married may be attributed to their age at marriage.

The table also showed that the women in the study area were mostly literate; 56.0% and 23.0% of the respondents have secondary and post-secondary education respectively. With respect to religion, 64.0% of the respondents were Muslims, while 36.0% were Christians. On the nature of employment, although the women in the study area were literate, the majority of the respondents engaged in occupations other than formal employment. The table showed that only 12.6% of the respondents were civil servants. The majority (74.0%) of the respondents were self-employed, while 9.7% were unemployed. Education is a key determinant of the life style and the societal status an individual enjoys. Studies have consistently shown that educational attainment has a strong effect on health behaviours and attitudes.

Another look at the table showed that the monthly mean income was ₦8,519:34k. A significant portion (51.8%) of the respondents earn an income of less than ₦5,000, while the income of 30.1% of them ranged between ₦5000 and ₦10,000. The remaining 18.1% of the respondents had a monthly income of more than ₦10,000. On the issues of age at marriage, the table showed that about 50.0% of the respondents married within the 20-24 years age bracket; 36.7% married when they were between ages 25 and 29. A few of them (4.2%) married at above 30 years of age, while 11.8% of them married as teenagers. With respect to parity, most of the respondents 59.2% were primigavidae. Those with second pregnancy were 33.0%, while 7.9% were having their third pregnancy.

**Table 3: Chi-square analysis of respondents' choice of assistance by level of education**

<b>Educational qualification</b>	<b>RBM</b>	<b>Not RBM</b>	<b>Chi square</b>	<b>df</b>	<b>P-value</b>
No formal education	4	3			
Primary	48	31			
Secondary	120	100	9.848	6	0.131
Post Secondary	59	31			

Based on the analysis in Table 3 it was clear that formal education had no significant association with knowledge of malaria and where to seek for assistance. What was expected was that the higher the level of education, the greater the tendency to use formal health facilities; however, the contrary was what was seen in the study. The depth of knowledge was influenced by cultural values, norms and practices. It has been pointed out that since over 60% of our

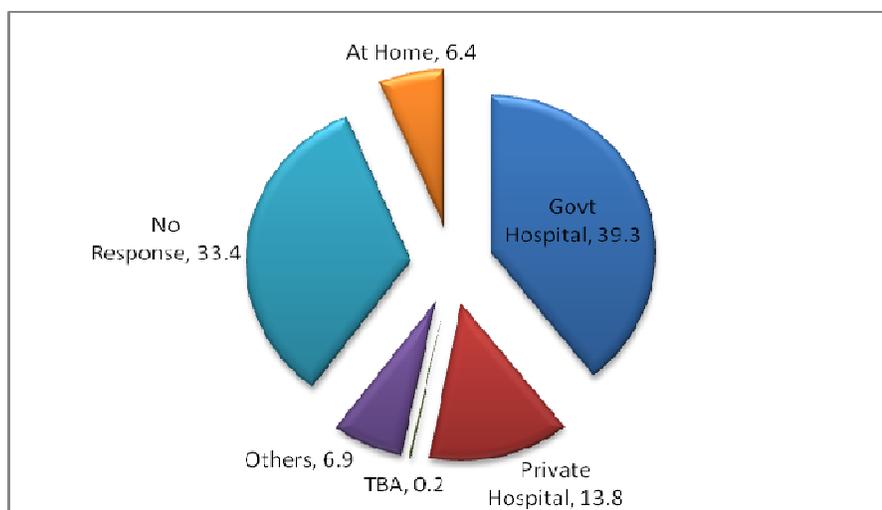
population were rural-based, cultural norms and practices still exert a strong influence on reproductive health care, especially in relation to pregnancy, delivery and child rearing. The implication is that women's contribution to maternal health is limited. Such limitations affect pregnancy-outcomes, generally, considering that some of these women are compelled to observe culturally approved activities, even when they undermine safe motherhood (Nwokocha, 2007). This brings to the fore the need to emphasize relevant information above formal education. Even though the respondents were well exposed to formal education, the impact was not felt in their decision as to where, when and how to seek healthcare. What was observed was more of experience sharing among pregnant women.

This was evident again in the mode of malaria transmission as found in the interview. The research found another outlook on malaria transmission that was not popular. And this was buttressed more through the IDI with the RBM manager:

The anopheles mosquito breeds and lays its eggs in water. The anopheles has its preponderance for clean water unlike the culex which can breed in dirty water. The anopheles that is more implicated with the falciparum parasite is more interested in clean water. This is pertaining to behavior change communication. That scope has not been well articulated but we intend to start. Now USAID is interested in showing us some supports through the thematic areas of malaria control. (*State RBM Manager, Oyo State Secretariat*)

Obvious from the research was the fact that relevant information has a great part to play in the success of RBM program. The more informed or knowledgeable the populace about the cause, prevention, and treatment of malaria, the higher their inclination to adopt and use the RBM measures in combating the scourge of the disease. This is corroborated by Weber's position that explanation of social affairs have to account for the way in which individuals attach subjective meaning to situation and direct their actions in accordance with their perception of those situations. It implied that individuals interpret, define situation and act accordingly. Thus, better enlightenment on malaria and its prevention has a great implication in preventing malaria in pregnancy in order to reduce its adverse effect on the health of mothers. With these, RBM should focus its enlightenment more on the information that the anopheles breeds on clean water rather than the usual notion of dirty water or dirty environment.

Also, an investigation into the general healthcare facility use of the respondents revealed that 39.3% of the respondents made use of Government hospitals, 13.8% made use of Private hospitals, 6.4% claimed home treatment, 0.2% used TBAs and 6.9% patronized others (Mission Homes, Chemists, Patent Medicine etc). However, the observed challenge was the sizeable number of those that gave no response (33.4%).



This was noteworthy because there could be many reasons for their action. According to d'Ambruso, Abbey, and Hussein (2005), women expect humane, professional and courteous treatment from health professionals and a reasonable standard of physical environment. This may not be available at most health facilities due in part to the work load of the staff as most health facilities were short staffed and the available staff were under great pressure.

This was corroborated by an IDI with an RBM staff:

We are short staff and the government had refused to employ more skilled workers. In an ANC clinic, like this, somebody is doing blood pressure check, another is checking weights, somebody would record the card, while another would be chatting the card, and another is doing the screening, another is administering treatment. If there is any emergency case or visitation are the staff sufficient? (*RBM Staff, Egbeda LGA*)

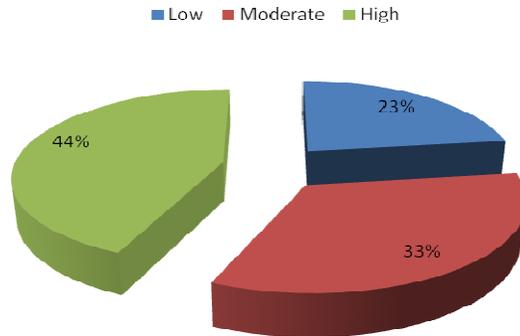
Human resources are fundamental to a functioning health system and are in many developing countries a major constraint to scaling up health intervention. Human resources for health must be adequate in number and well-trained. In sub-Saharan Africa, there are only two (2) physicians per 10,000 people compared with 32 per 10,000 people in the European Region (WHO, 2009). In many countries, health systems are under-resourced and poorly accessible to those most at risk of malaria. In 2015, large proportions (36%) of children with fever were not taken to health facility for care in 23 Africa countries (WHO, 2016).

Also in a study by Barat, Palmer, Basu *et al.* (2004), it was found that the cost of malaria treatment as well as distance covered to reach health centers, were some of the barriers to accessing treatment of malaria in pregnancy. In addition, richer households were more likely to use anti-malaria drugs to which

there was less parasites resistance. The study showed that differences in the types of care sought by the wealthy and the poor, with the poor more frequently opting for care outside the modern sector and the wealthy more frequently opting for care involving the modern sector.

**Level of Knowledge of Malaria among Pregnant Women**

From the data gathered, 44.0% of respondents had a high knowledge of malaria, while 33.0% and 23.0% of the respondents had moderate and low knowledge of malaria, respectively.



**Figure 2:** Respondents' knowledge of malaria

**Table 4: Percentage distribution of respondents by knowledge of malaria by selected variables**

Selected variables	Knowledge			Total	$\chi^2$	Df	p-value
	Low	Moderate	High				
<b>Decision-maker</b>							
Self	18(42.9)	15(35.7)	9(21.4)	42	23.029	6	.001
Husband	17(27.9)	21(34.4)	23(37.7)	61			
Self and husband	29(17.4)	56(33.5)	82(49.1)	167			
Other family member	-	1(12.5)	7(87.5)	8			
<b>Total</b>	<b>64(23.0)</b>	<b>93(33.5)</b>	<b>121(43.5)</b>	<b>278</b>			
<b>Use of Mosquito Net</b>							
Use Mosquito Net	59(21.7)	97(35.7)	116(42.6)	272	10.952	2	.004
Don't Use	47(36.7)	42(32.8)	39(30.5)	128			
<b>Total</b>	<b>106(26.5)</b>	<b>139(34.8)</b>	<b>155(38.8)</b>	<b>400</b>			

A cross tabulation of malaria knowledge level by decision maker showed that 49.1% of the respondents that made decision in conjunction with their husband had a high knowledge of malaria. However, only 21.4% of the respondents that took decision by themselves had a high knowledge of malaria; while 37.7% of the respondents whose husbands too decision for, had a high knowledge of malaria. This picture suggested that couples took better decisions compared to individual spouses. "Two good heads are better than one." Table 4 showed that  $\chi^2$  value = 23.029, df = 6 and p-value = 0.001 indicated a significant association between decision maker and the knowledge of malaria since  $p < 0.05$ .

Knowledge of malaria (low, moderate or high) had a significant influence on who took health related decision in the family of the respondents.

With respect to the use of mosquito net, 42.6% of the respondents that used it had a high knowledge of malaria. On the other hand, 36.7% of those that did not use it had low knowledge of malaria. This study found a disturbing gap between knowledge and practice. Most of the women were not aware of RBM as a program, although most of them were aware of the protective nature of ITNs, a significant component of RBM. However, it was discovered that very few of them were actually using ITNs for reasons advanced later in this section.

No! I don't use ITN and I don't know RBM program. – Pregnant Woman (30yrs). (*Oluyole LGA*)

More efforts need to be geared towards education pertaining to behaviour change. For instance, an assessment of Nigeria's RBM implementation in 2003 identified gaps in malaria information and prompted the country to develop a comprehensive behaviour change strategy (RBM 2003). The essential actions needed to reach the intended audience include mass media campaigns, training of patent medicine vendors, Community Based Organization mobilization and advocacy for appropriate medicines and preventive measure. This study found that the behaviour change communication has not been well utilised, hence, the need for more up-to-date information on preventive measures rather than curative ones.

The analysis of the interaction between the respondents' knowledge of malaria and their use of mosquito nets (ITN and non-ITN) reveals a strong relationship between the two.  $\chi^2$  calculated = 10.952, df = 2 and *p*-value = 0.004. The strength of the relationship between the two variables is established by *p* < 0.05. Thus, the higher the respondents' knowledge of malaria, the higher their use of mosquito nets, whether ITN or non-ITN. Without the fear of over emphasis, the need to resume and step up the publicity for RBM again came to the fore. The place of relevant information cannot be over emphasized.

The IDI of pregnant women and RBM staff further supported the poor ITN coverage.

I have at home, but I used it only after delivery. I am not even using it now, until when I am delivered of my baby. (*Pregnant Woman (34yrs) (Ibadan Southwest LGA)*)

The government should regularly supply the ITN because of the increasing number of pregnant women and the new set of pregnant women who just registered and have not collected before. For example, those we gave mosquito net to last year have delivered and we have another set of pregnant women who had never collected ITN. So, government should make a regular supply like quarterly. People are now learning how to sleep separately in different rooms, unlike seven in a room like before.

So, government has to regularly supply enough ITN and provide money for people to buy.

ITN has really improved health against malaria to a reasonable extent and what they are trying to do is to cut down the price of this commodity. The government should make drugs and ITN always available and sufficient. (*RBM Staff, Ibadan Southeast LGA*)

The foregoing buttressed what Jegede, Amzat, Salami, Adejumo *et al.* (2006) noted that ITN usage is still very low in Nigeria with many people not aware of its existence. This signified that the implementation of the strategies had not been effective enough. Although there have been publicized repeated distributions of ITNs in the last few years across the various states in the country, the reality on ground points to the fact that so much still more need to be done. Possible militating factors might be the country's large population and the poor state of logistic infrastructure across the land.

However, the 2008 NDHS reported an increase in household ownership of mosquito nets since 2003. Seventeen percent (17.0%) of households have a mosquito net and 8.0% have an insecticide treated net (ITN), as against 2.0% in 2003. The 2010 Nigeria Malaria Indicator Survey showed that 33.0% of urban and 45.0% of rural households own at least one Insecticide Treated Net (ITN), giving a national average of 42.0%. Conversely, the 2010 WHO, World Bank Report showed that less than 5.0% of Nigerian children sleep under ITNs. This leaves much to be desired!

At the zonal level, the South West had the lowest average number of nets per household. The IDI with RBM state manager corroborated this poor coverage of ITN in Oyo State.

We have not had the ITN distributed yet. As we speak, we have not taken full delivery of the nets that we need. (*State RBM Manager, Oyo State Secretariat*)

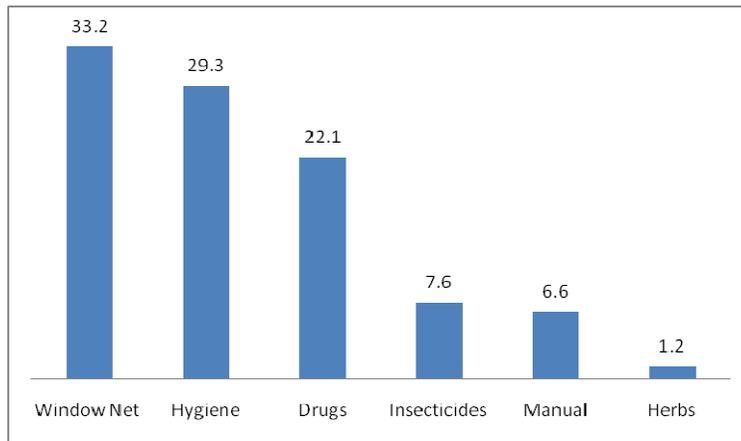
According to Morbidity and Mortality Weekly Report (MMWR, 2011), ITNs coverage is low in Nigeria, as equally confirmed by this research. ITNs evaluation, through field trials, have demonstrated a protective efficacy of 17.0% against all cause of childhood mortality in sub-Saharan African and could save up to 5.5 lives each year for every 1,000 children protected. Follow up field trial data show that the child survival benefit from ITNs can last for up to 6 years. Additionally, expanding the availability of nets beyond the target group (pregnant women and children aged 5 years) to cover at least 65.0% of older children and adults provides some protection even for those without nets (e.g. by reducing mosquito survival and decreasing community parasitemia). There are still substantial gaps in the coverage of core malaria control tools. In 2015, an estimated 43% of the population in sub-Saharan Africa was not

protected by treated net or indoor spraying with insecticides, the primary method of malaria vector control (WHO, 2016).

Most of the pregnant women interviewed in the course of this research complained of government not “giving them” ITNs and their inability to afford same due to high procurement cost. This, points to the fact that much more still needs to be done to provide ITNs for pregnant women and young children, the most vulnerable population.

### ***Methods used by Pregnant Women in Malaria Treatment***

When respondents were asked how they were preventing malaria before RBM, Figure 3 showed that they were aware of mosquito and well informed on what to use before the program came on board. With their existing knowledge about what to use, RBM objectives became complementary, i.e. the introduction of: (1) Long lasting insecticide – treated mosquito nets (LLITN), (2) Indoor residual spraying (IRS) and (3) Diagnosis and treatment of infected persons with artemisinin-based combination therapy (ACT), and protection of women with intermittent preventive treatment during pregnancy (IPT).



***Figure 3: ways of preventing malaria***

A closer look at the ways of preventing malaria prior to the introduction of RBM showed that non-chemical intervention (window net, hygiene and manual) was greater (69.1%) than chemical intervention (drugs, insecticide and herbs). While this was commendable given the side effects of chemicals, it was, however, ironic that RBM has not been able to build on this foundation with its inability to provide sufficient ITNs for the people.

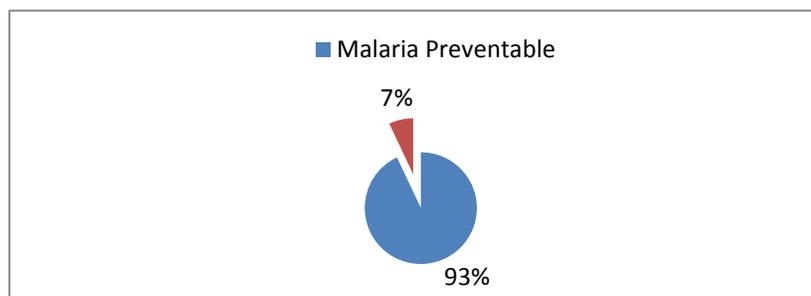
**Table 5: Frequency table on ways of preventing Malaria**

Means	Frequency	Percent
Hospital	167	72.3
Self Medication/Chemist	54	23.4
TBA	10	4.3
<b>Total</b>	<b>231</b>	<b>100</b>

This finding is consistent with other reports from Southwest Nigeria which showed that the majority of the people used screens and sprays to protect against malaria while the use of ITNs was poor. The study confirmed the awareness of vector control measures but poor use of these measures by these pregnant women. Mostly, the reason for not using these measures was prohibitive cost.

Findings from a study conducted in Ogun State by Adeneye, Jegede and Nwokocha (2007) also concluded that there was the need to intensify efforts to make adequate information and materials relating to the different malaria control strategies more available and accessible at the community level to achieve and sustain the RBM goals. It was reported that 63.2% of the 68 respondents (mothers of children under five years and pregnant women) interviewed knew about insecticide treated nets (ITNs); however, only 22.1% were using the material. Reasons given by those not using ITNs included: ignorance of ITN prior to the interview (43.3%), lack of money (41.5%) and ignorance of where to get it (7.6%). Only 5.8% of mothers of children less than five years old, and none of the pregnant women, had taken the new combination drug. 23.5% of the pregnant women interviewed knew about intermittent preventive treatment (IPT) of malaria for pregnant women, while only two of these women had received a preventive treatment dose.

As shown in the Figure below (Fig. 4), most of the respondents (93.0%) were aware that malaria is preventable, which means that if given the opportunity, armed with the right knowledge on prevention, malaria in pregnancy can be averted, putting a stop to a lot of the salient complications that go with it.



**Figure 4: Respondents' belief about whether malaria is preventable or not**

Diagnosis and management of patients with malaria is a cornerstone of malaria control because this can cure clinical disease and blunt transmission. During a period of poor malaria control in the 1990s, *P. falciparum* infection accounted for an estimated 30.0% of childhood deaths in sub-Saharan Africa (WHO, 2003); a large proportion of these malaria-related deaths could be attributed to the high prevalence of parasites resistant to chloroquine, the first line treatment during the period. But since the year 2000, a new potent class of drug made from derivatives of artemisinin has been introduced. To forestall the development of resistance to artemisinin derivatives, the World Health Organization (WHO) recommends that the derivatives not be used alone, but rather as artemisinin based combination therapy (ACT) (using an artemisinin in combination with another anti-malaria with different mode of action). ACT regimens have been adopted as first line treatment globally. Rapid and accurate diagnoses enhance malaria case management by directing ACTs to patients with a confirmed diagnosis of malaria. Malaria rapid diagnostic test based on lateral flow immunochromatography have been introduced, which can detect malaria parasite antigens from finger prick blood specimens in 10-15 minutes, and their availability has begun to increase the ability of health care workers to diagnose cases, especially in rural area without laboratory capacity. However, this technology is yet to gain ground in Nigeria, thus, still making proper malaria diagnosis a trial and error process.

In sub-Saharan Africa, an estimated 28% of women are infected with *P. falciparum* during pregnancy. Because pregnancy alters immunity, women living in moderate to high transmission areas who are pregnant for the first or second time are at greater risk of adverse event from malaria than women who have had three or more pregnancies (WHO, 2005). In this context, IPTp, the preventive treatment of all pregnant women with curative regimen of sulfadoxine pyrimethamine (SP) during the second and third trimesters, can decrease both placental malaria parasitemia and maternal anemia. In many areas where SP is used as IPTp, a high prevalence of parasites with SP resistance genes and concomitant failures of SP immunotherapy for clinic malaria treatment in children have been observed (MMWR, 2011). Whether SP resistance might alter the effectiveness of SP for IPTp is unclear and underscores the need to continue monitoring its efficacy in curing *P. falciparum* infection in pregnant women and the need for support to research into new medications for IPTp (MMWR, 2011).

**Table 6: Chi-square Analysis of the Impact of Preventing Malaria and RBM Use**

Seeking Assistance	Malaria prevention		Chi square	Df	p- value
	Yes	No			
RBM	208	127	10.43	1	0.001
Not RBM	19	31			

An analysis of the impact of preventing malaria and the respondents' use of the RBM methods revealed a significant relationship between the two. Table 6 showed that  $\chi^2$  calculated = 10.43, df=1 and *p*-value = 0.001. Since the *p*-value calculated is lower than 0.05, then, there is a significant relationship between seeking assistance and preventing or treating malaria during pregnancy. The impact of RBM measures were well felt here. Although RBM was not really known by name to the pregnant women, they were soundly benefited by the intake of the IPT and ACT drugs given at ANC clinics. This can be adduced to the fact that majority (93.0%) of the respondents believe that malaria is preventable, a result of their having relevant information.

**Conclusion**

It is generally believed that a woman's level of education helps in her ability to recognise symptoms of pregnancy, associated complications, healthy nutrition during pregnancy and how and when to use contraceptives to control fertility. However, it is noted that the depth of knowledge is influenced by cultural values, norms and practices. Even though the literature points in the direction of formal education playing a significant role in health seeking behaviour in Nigeria cultural environment, this study revealed otherwise. It is not formal education, but specific or relevant information, that plays a significant role in health seeking behaviour in the Nigerian cultural environment.

Low level of information and education among individuals in most rural communities in sub-Saharan Africa are implicated as proximate variables affecting a woman's ability to recognise symptoms of pregnancy, especially at very early stages and even of related complications later in pregnancy. The socioeconomic status of women in terms of low education impinges negatively on women's health, including reproductive events: studies show that the socioeconomic status of women in terms of education, involvement in reproductive health decision, nutrition and work as revealed in their subordinate statues contributes to poor pregnancy outcomes and maternal health. Nonetheless, relevant or disease specific information, and not just formal education, is the key to improving the health of pregnant women, and women in general. Indeed, the importance of adequate information on the impact of malaria on maternal health cannot be over-emphasised and should be prioritized by relevant stakeholders.

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