COMPLIANCE TO MALARIA PREVENTION RECOMMENDATIONS AMONG PREGNANT WOMEN: IMPLICATION FOR POPULATION GROWTH AND DEVELOPMENT IN NIGERIA

Introduction: Compliance to prevention and treatment regiments is a serious clog to the wheel of health progress in most resource-poor countries of the world. Malaria has always been a serious public health issue that calls for concerted efforts in the present day world. Nigeria has the highest malaria incidence out of the 15 countries that accounted for 80% of global malaria deaths in 2016. Report from the 2013 Nigeria Demographic and Health Survey shows that an estimated 97% of the country with approximate population of 160 million residents is at risk of malaria in which pregnant women and children under age 5 are the most vulnerable. This is obviously at an alarming rate which needs intense attention. It is no gain-saying that malaria has been a scourge that has continued to ravage the country and has contributed in no small measure to maternal morbidity and mortality. Newman et al (2004) presents a breakdown of the dangers and risks that malaria poses during pregnancy to the mother, her foetus and the neonate. According to the study, malaria infection contributes as much as 15% of maternal anaemia, 30% of low birth weight, 70% of intrauterine growth retardation, 36% of premature deliveries and 8% of infant mortality all over the world.

A peep into the works of several scholars' reveals that their focus has been on investigating the rate of prevalence of malaria among pregnant women in certain focus areas. Some went further to identify several other malaria prevention methods. However, one major area of neglect by scholars is researching into the rate of compliance to the identified malaria prevention recommendations, whereas, this is very important in stemming the tide of malaria scourge. In view of the fact that no matter how much governmental and non-governmental

agencies as well as medical personnel try to provide malaria prevention means, if the rate of compliance to the recommendations is not monitored and evaluated, these efforts would amount to waste. Hence, this study attempts to fill the gap by examining the rate of compliance to the malaria prevention recommendations that have been specified by the World Health Organization (WHO).

Literature review: A brief review of the existing literature on the prevalence of malaria, its prevention among pregnant women in Nigeria as well as the rate of compliance to the malaria prevention recommendations reveals a general consensus that there is a low compliance rate to the recommended therapy despite an alarming rate of malaria prevalence among pregnant women which has led to a high rate of maternal deaths yearly. For instance, Adefioye *et al.* (2007) examined the prevalence of malaria parasite infection among pregnant women in Osogbo, Osun State, Nigeria. The research was based on some randomly selected pregnant women who had their antenatal clinic at Ladoke Akintola University of Technology Teaching Hospital, Osogbo between April to June 2004. The outcome of the study shows an insight of prevalence of malaria parasite in pregnant women is 72% across all age groups. It was also reported that those who refused to take drugs perhaps due to their religious belief had the highest rate of 89.3%. Okwa (2003) focused on the status of malaria among pregnant women in Lagos, Nigeria. The result of the study indicated that 60% were diagnosed as having malaria. It was also shown that the pregnant women who were infected with malaria were mainly in the first trimester of their pregnancy.

Over the years, there have been various efforts to prevent malaria infection generally and especially among pregnant women. Before the advent of modern medicine, herbs were usually taken by women to prevent or cure malaria infection. For thousands of years, these herbs were

used to treat malaria and it was generally believe that the herbs were the sources of the two main groups of modern anti-malaria drugs known as artemisinin and quinine derivatives.

The World Health Organization (WHO) in 2003 chronicles the history of the use of drugs in treating malaria. Quinine was introduced in 1932 but resistance to the drug manifested shortly after. Chloroquine was introduced in 1945 and its first case of resistance was in 1957. After this, Proguanil was introduced in 1948 and its first case of resistance was in 1949. SP was introduced in 1967 and its first case of resistance was in 1967, Mefloquine was introduced in 1977 and its first resistance was in 1982, Atovaquine was introduced in 1996 and its first case of resistance was in the same year. Despite the first case of resistance of SP the same year it was introduced, it is still widely used during pregnancy till date.

The use of SP seems to be the most common malaria prevention recommendations among pregnant women today. In fact, Nigeria's national policy on malaria control, recommends the use of intermittent preventive treatment with sulfadoxine/pyrimethamine (IPT-SP) for chemoprophylaxis against malaria in pregnancy and use of quinine and arthemisinin based combination therapy (ACT) for the treatment of malaria in the first and second/third trimester (Ugwu, 2013).

Due to the various resistance of malaria parasite to different drugs one of the recommendations of the WHO on prevention of malaria especially among pregnant women is the distribution and use of long lasting insecticide-treated bed nets (LLINs). However, before the advent of LLIN, conventional bed nets were being used as a means of preventing malaria. The conventional bed nets serve as a physical barrier that prevents mosquitoes from gaining access to their prey.

Insecticidal Treated bed nets (ITNs) were later introduced for use. Besides being a physical barrier, ITNs also act as a chemical barrier. The insecticides on the net repel or even kill the mosquitoes when they come in physical contact with the net. Since 2007 however, the WHO has been on the campaign for the distribution and use of Long Lasting Insecticide bed nets (LLINs). As mentioned earlier, LLIN act both as physical and chemical barrier to mosquitoes. LLIN is a great improvement compared to the ITNs in view of the fact that the insecticide is bound around the fibers of the netting materials. Unlike ITNs which are just dipped in insecticide, and has to be treated from time to time, LLINs are found to be lightly resistant to mosquitoes and do not need to be retreated from time to time.

Pulkki-Branstrom *et al.* (2012) opined that LLINs provide effective insecticide protection for a duration of at least three years compared to ITNs which must be treated every 6-12 months. Some pregnant women prefer to use the net instead of IPT fearing that taking of drugs may have negative impact on the foetus in their wombs. On the other hand, some dislike using the net claiming that it could cause heat and some measure of inconveniences. Some even feared using the net claiming that the net could contain harmful chemicals that could affect them negatively.

It is a well-known fact that the use of insecticides also prevents malaria. Fumigation of the environment drives away mosquitoes which is the major cause of malaria. When insecticides are sprayed in the house from time to time, mosquitoes are kept at bay, hence malaria is prevented.

Onasoga *et al.* (2016) researched into preventive measures and methods commonly employed by pregnant women to prevent malaria in a riverine community in Bayelsa State of Nigeria, and from the study, 83.3% of the respondents used window and door nets; 72.2% ensured clearing of bushes in the surroundings; 67.2% used insecticide treated nets (ITN); 66.7% used insecticide spray. Some of the respondents still made use of crude methods such as pouring

of kerosene into stagnant water; burning of bushes; use of herbs; use of mosquito coils; use of repellant cream; use of native chalks and brooms. Some of these methods are detrimental to the health of the pregnant women. Akinleye *et al.* (2009) examined the knowledge and the utilization of intermittent preventive treatment for malaria among pregnant women. Their focus was on pregnant women attending Antenatal Clinic in Primary Health Care Centres in rural Southwest of Nigeria. Their findings revealed that yearly more than thirty (30) million women in malaria endemic areas among Africa became pregnant and face the risk of being infected with Plasmodium falciparum.

Ameh *et al.* (2016) also researched the use of intermittent preventive treatment of malaria in pregnancy but with a focus on Cross River State of Nigeria. Their research showed that the use of sulfadoxine–Pyrimethamine for intermittent preventive treatment of malaria in pregnancy is low in malaria endemic areas. The study identified some of the barriers to the use of sulfadoxine-Pyrimethamine for malaria prevention among pregnant women attending antenatal clinic in primary health care facilities among the state.Their recommendation was that there is the need to ensure that primary health care system is strengthened.

Part of the findings in Newman et al. (2004) reveals that IPT with two doses of SP is safe and very efficient for the prevention of maternal anemia, placental parasitemia and low birth weight. They also recommend in line with the World Health Organization (WHO) recommendations, that pregnant women living in areas that are malaria endemic need to ensure that they sleep under an ITN and they should also take at least two doses of SP. Ayubu et al. (2017) monitored the rate of compliance to the use of IPT as a means of controlling malaria during pregnancy in malaria endemic areas of Tanzania. The study revealed that 63% of the

respondents were not willing to take SP during pregnancy, despite the fact that a whopping 82% of the women were quite aware that malaria during pregnancy had adverse effects.

Research Objectives: With a view to providing information on solving the menace of malaria morbidity and maternal mortality among pregnant women in Nigeria, this study seeks to determine the level of compliance to malaria prevention recommendations among pregnant women. It also seeks to assess the associated factors predicting compliance to malaria prevention recommendations and examine the relationship between the level of compliance to malaria prevention recommendations and infection status among pregnant women in Nigeria.

Research methodology: The study is based on data extracted from the 2015 Nigeria Malaria Indicator Survey (NMIS). The NMIS is a representative probability sample designed to produce estimates for the country as a whole. A two-stage sampling strategy was adopted for the 2015 NMIS and the data was collected from 8,034 women aged 15-49 years in randomly selected households across all states of the federation. The sample size for this study was 903 women who were pregnant as at the time of the survey. Women's questionnaire was used to collect information from all women age 15-19 and analysis will be performed using STATA version 13.0. The univariate analysis will show the percentage distribution of the respondents while chi-square test will be used to show the level of association at the bivariate analysis. Also, multinomial logistic regression will be employed at the multivariate level of analysis to show the level of compliance.

Key Findings: This study examined the level of compliance to the WHO recommended malaria prevention means among pregnant women in Nigeria, using NMIS 2015 as the source of data. The WHO malaria prevention recommendations are: use of LLIN; use of SP; and prompt diagnosis for malaria. The study also considered the factors associated with the level of compliance.

From the univariate analysis, only fifty percent complied with the use of LLIN as well as with the use of SP. It is worthy of note that the most effective form of malaria prevention means known and used by the pregnant women was the use of LLIN. This is in consonance with Onasoga *et al.* (2016) who examined malaria preventive methods used by pregnant women in Bayelsa State.

Since prevention is better than cure, the primary prevention would have been for pregnant women to regularly go for prompt diagnosis for malaria so that it could be early treated before the potential devastating effects. However, the result of this analysis showed that only a paltry 3 percent complied with going for prompt diagnosis for malaria. This is an area where governmental and non-governmental organizations need to beam their searchlight on and strive to ensure that pregnant women comply with the third WHO malaria prevention recommendation.

The multinomial analysis from this study reveals that women who had at least primary education and also lived in rural areas complied most with the MPRs. The reason for this is not far-fetched. It is a well known fact that there is a higher prevalence rate of malaria in rural areas compared to urban cities. This is in consonance with Onyeneho *et al.* (2013). Akinleye *et al.* (2009) also clearly confirms this assertion. Their focus was on rural areas of Southwest Nigeria. Their findings revealed that the prevalence of malaria among pregnant women was between 60% and 72%. In view of the high rate of the tendency of contracting malaria in rural areas, it would

be proper for the pregnant women living in these rural areas to comply more with recommendations meant to prevent malaria.

The analysis further reveals that the pregnant women who were richer had the highest level of compliance to the MPRs than those from the poorer background. This is not far-fetched. Health, they say, is wealth. Their wealth index therefore greatly affects their health-seeking behavior. This is in consonance with previous studies such as Dutta *et al.* (2014) and Titilayo *et al.* (2016), their findings revealed that women who are wealthier had a greater level of compliance to the prescribed recommendations. For instance, if there are no freely distributed LLINs, the pregnant woman with a good financial standing would not mind purchasing one at all cost. Furthermore, she would be ready and willing to purchase her pills (SP) regularly.

It was interesting to find out that the traditionalist had the least level of compliance to the MPRs. This is quite understandable. Most of these traditionalists do not really believe in the modern means of preventing malaria. Their strong belief is in the use of local herbs. Adefioye *et al.* (2007) confirms this assertion. In fact, their research discovered that none of the pregnant women who took herbs had malaria parasite in their blood. That was probably why one of their main recommendations was that more research needed to be carried out on the use of herbs in preventing malaria. Onasoga *et al.* (2016) also asserts that some pregnant women still used herbs as a means of preventing malaria.

Findings from the analysis also revealed that pregnant women in the northern part of the country complied more with MPRs compared to their southern counterparts. This is in consonance with previous studies. Illiyasu *et al.* (2012) finding was that 55.6 % of the pregnant women in Kano State in Northern Nigeria were concerned about taking drugs during their pregnancy. There is therefore the likelihood for them to comply with the use of SP. On the other

hand, Onyeneho *et al.* (2013) revealed that among the pregnant women in Enugu State in Southern Nigeria, only 25.9% used IPTp2 and only 15.4% slept under ITN every night as recommended.

Table 1: Percentage distribution of respondents by compliance to malaria prevention recommendations

Socio demographic/economic Characteristics	Frequency (N=903)	Percentage (100%)
Dependent variables		
slept under mosquito bed net		
No	450	49.8
Yes	453	50.2
Took sp/ for malaria		
No	280	50.8
Yes	271	49.2
Seek treatment for malaria		
No	878	97.3
Yes	25	2.8
Level of compliance		
No	128	23.2
Partial	283	51.3
Full	140	25.5

Source: NMIS, 2015 (Data computed by the author, 2019)

Table 2. Chi-Square test of association between some selected demographic and socio-economic factors and malaria prevention recommendations.

Socio-demographic Characteristics	Level of Compliance		
Independent Variables	**No Compliance**	**Partial Compliance**	**Full Compliance**
Age			
15-19	9 (22.90%)	20 (51.3%)	10 (25.8%)
20-24	36 (24.7%)	71 (48.8%)	39 (26.5%)
25-29	37(22.5%)	84 (51.1%)	44 (26.4%)
30-34	28 (21.7%)	71 (54.7%)	31 (23.6%)
35-39	13 (28.2%)	23 (51.5%)	9 (20.2%)
40-44	3 (15.5%)	12 (54.3%)	6 (30.3%)
45-49	2 (27.4%)	3 (37.3%)	2 (35.3%)

Chi-Square χ^2	3.2600		
P-Value	0.9950		
Region			
North Central	22 (28.9%)	37 (49.4%)	16 (21.6%)
North East	13 (13.8%)	42 (45.5%)	37 (40.7%)
North West	40 (19.1%)	123 (58.3%)	48 (22.6%)
South East	16 (29.1%)	28 (50.9%)	11 (20.0%)
South South	18 (29.4%)	28 (45.8%)	15 (24.8%)
South West	19 (33.3%)	25 (43.7%)	13 (23.0%)
Chi-Square χ^2	23.5488		
P-Value	0.0350		
Religion			
Christian	56 (26.8%)	108 (52.1%)	44 (21.1%)
Islam	71 (20.8%)	172 (50.7%)	97 (28.5%)
Tradition	1 (32.0%)	3(68.0%)	0 (0%)
Chi-Square χ^2	5.8961		
P-Value	0.4242		
Socio-economic Characteristics			
Educational Status			
No Education	58 (23.3%)	135 (53.9%)	57 (22.8%)
Primary	18 (18.3%)	47 (48.3%)	33 (33.3%)
Secondary	38 (25.2%)	79 (52.5%)	34 (22.3%)
Tertiary	13 (25.8%)	21 (41.1%)	17 (33.1%)
Chi-Square χ^2	7.5742		
P-Value	0.3417		
Wealth Status			
Poorest	25 (18.3%)	88 (64.0%)	24 (17.7%)
Poorer	26 (21.4%)	66 (54.3%)	30 (24.3%)
Middle	26(27.3%)	35 (35.9%)	36 (36.8%)
Richer	24 (29.5%)	38 (46.3%)	20 (24.1%)
Richest	25(22.8%)	55 (49.6%)	31 (27.6%)
Chi-Square χ^2	20.9751		
P-Value	0.0566		
Residence			
Urban	36 (20.5%)	80 (45.9%)	59 (33.6%)
Rural	92 (24.4%)	202 (53.9%)	82 (21.7%)
Chi-Square χ^2	8.6129		
P-Value	0.0608		

Source: NMIS 2015 (Data computed by the author, 2019)

Table 3: Multinomial analysis examining the level of compliance to malaria prevention recommendations for selected demographic/economic variables and intervening variables.

	LEVEL OF COMPLIANCE					
Socio-demographic characteristics	**Full Compliance**			**Partial Compliance**		
	RRR	**95% Confidence Interval**	**P.value**	**RRR**	**95% Confidence Interval**	**P.value**
Age group						
15-19	RC					
20-24	1.88	0.81-4.38	0.143	0.53	0.23-1.24	0.143
25-29	1.97	0.85-4.57	0.113	0.51	0.22-1.17	0.232
30-34	1.98	0.82-4.80	0.130	0.50	0.21-1.22	0.466
35-39	1.52	0.55-4.18	0.421	0.66	0.24-1.82	0.828
40-44	2.13	0.54-88.33	0.278	0.45	0.12-1.84	0.801
45-49		0	0	0		
Educational Status						
No formal	RC			RC		
Primary Education	1.66	0.84-3.26	0.143	0.60	0.30-1.87	0.143
Secondary Education	1.33	0.65-2.70	0.438	0.75	0.37-1.54	0.438
Tertiary Education	1.20	0.42-3.48	0.732	0.83	0.29-2.40	0.732
Place of Residence						
Rural	RC			RC		
Urban	0.56	0.32-0.98	0.043	1.80	1.02-3.16	0.043
Wealth Index						
Poorest	RC			RC		
Poorer	0.84	0.42-1.68	0.620	1.19	0.59-2.39	0.620
Middle	0.62	0.29-1.32	0.214	1.63	0.76-3.50	0.214
Richer	0.79	0.31-2.01	0.622	1.26	0.50-3.21	0.622
Richest	0.94	0.32-2.78	0.915	1.06	0.36-3.13	0.915
Region of Residence						
NorthCentral	RC			RC		
NorthEast	2.11	0.97-4.58	0.060	0.47	0.22-1.03	0.060
Northwest	1.63	0.76-3.50	0.208	0.61	0.29-1.31	0.208
Southeast	0.47	0.18-1.24	0.127	2.14	0.81-5.69	0.127
Southsouth	0.50	0.20-1.25	0.138	1.98	0.80-4.89	0.138
SouthWest	`0.42	0.17-1.03	0.058	2.39	0.97-5.89	0.058
Religion Affiliation						
Christianity	RC			RC		
Islamic	0.75	0.38-1.47	0.403	1.33	0.68-2.6	0.403
Traditional	0.58	0.41-8.26	0.690	1.71	0.12-24.29	0.690

Sources of Water						
Improved	RC			RC		
Non-improved	0.85	0.51-1.41	0.522	1.18	0.71-1.97	0.522
Type of Toilet facilities						
Improved	RC			RC		
Non-improved	1.16	0.69-1.96	0.578	0.86	0.51-1.46	0.578

Source: NMIS 2015 (Data computed by the author, 2019)

Conclusion: This study employed secondary data from the Nigeria Malaria Indicator Survey (NMIS) 2015 to examine the socio-economic and demographic factors affecting compliance to the WHO malaria prevention recommendations among pregnant women in Nigeria. The study revealed that of all the MPRs, the most used prevention means by pregnant women is the use of the net. It also highlights the fact that several factors affect the rate of compliance with the MPRs by pregnant women. Some of the socio-economic and demographic factors identified are age, level of education, place of residence, wealth status and religion.

This study concludes that the rate of compliance to malaria prevention recommendations by pregnant women needed to be improved. With an improvement in the rate of compliance, it is believed that it will surely lead to a reduction in the prevalence of malaria among pregnant women. Subsequently, if the incidence of malaria among pregnant women reduces, the associated negative outcomes such as maternal anaemia, low birth weight and perinatal mortality are bound to reduce. This is line with the submission of Sharifi-Mood, 2015.

Recommendations: Several efforts have been put in the fight against the scourge of malaria, especially among pregnant women. Both governmental and non-governmental organizations have embarked on the distribution and campaign for the use of LLINs. However, the findings of this study revealed that some of the pregnant women collect the nets but do not regularly make

use of them. Thus, the potentials of these nets are not fully maximized. It is therefore recommended that the same quantum of efforts being put into the distribution of the LLINs should be employed in ensuring that the nets are used as recommended. There is the need for proper monitoring of the pregnant women to ensure the proper utilization of the nets.

Furthermore, medical personnel need to devise ways of monitoring the level of compliance with the intake of drugs (SP) given to pregnant women. It is not just enough to continue to dispense these drugs to the women. Some of the pregnant women do not value the drugs but just see it as a mere routine which sometimes are later confined to the dustbin. It is important therefore, to ensure that these women take their drugs as often as prescribed. For instance, the pregnant women could be requested to take the drugs prescribed to them right there at the ante-natal clinic before going home, as it is been done in more civilized countries.

Also, this study revealed that the third WHO recommended malaria prevention means which is prompt diagnosis for malaria is not being employed by pregnant women. It is recommended that pregnant women should be encouraged to go for prompt diagnosis for malaria from time to time. Prevention, they say, is better than cure. If the pregnant women are properly diagnosed, they may be treated before the malaria degenerate into maternal anaemia, etc.

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