



## Methods employed in the prevention and treatment of malaria among pregnant women in a riverine community in Bayelsa State, Nigeria

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### ABSTRACT

**Background:** Malaria remains a major public health problem in Nigeria and is the most common cause of hospital attendance in all age groups, of which children and pregnant women are the major risk groups; therefore this study was designed to explore various methods of prevention and treatment of malaria among pregnant women in riverine community in Bayelsa State, Nigeria.

**Method:** A descriptive cross-sectional survey was used for the study and a pre-tested structured questionnaire was administered to 180 respondents' selected using purposive sampling technique. Results were presented as tables and charts.

**Results:** The study revealed that majority of the respondents were within 16-25years, with a minimum age of 16yrs, maximum age of 45yrs and a mean of 30yrs. More than half of the respondents agreed that malaria can be transmitted to the fetus and can lead to intrauterine fetal death. Most of the respondents used more than one preventive measures and the most commonly used methods employed in the prevention of malaria by the respondents were window and door nets (83.3%); clearing of bushes (72.2%), insecticide treated nets (ITNs) (67.2%) snapper(66.7%); insecticide spray (66.7%). Despite the fact that a good number of the respondents (91.7%) claimed to use drugs when they have malaria, most of which were prescribed by medical practitioners; only few of the respondents (31.7%) used prophylactic anti-malaria drugs during pregnancy.

**Conclusion:** Findings above revealed that, majority of the respondents had adequate knowledge of malaria and its consequences in pregnancy, and also employed good methods in the prevention and treatment of malaria. However, some of the respondents still used crude methods such as pouring kerosene in stagnant water, burning of bushes, and use of herbs, native chalk and broom etc in the prevention and treatment of malaria which may be detrimental to health and often ineffective. Therefore, there is need to concentrate on health education of these women on the hazards associated with the crude methods as well as importance of intermittent preventive treatment (IPT) during pregnancy so as to achieve effective control of malaria among pregnant women.

**Key words:** Malaria prevention, Malaria treatment, Pregnant women.

### INTRODUCTION

Malaria remains the most devastating human parasitic infection in the world.<sup>1</sup> It is the second leading cause of death from infectious diseases in Africa after HIV/AIDS and the fact that so many people are dying from malaria is one of the greatest tragedies of the 21st century.<sup>2,3</sup>



Several reports estimated 216 million cases of malaria resulting in 655,000 deaths worldwide and more than 90% of these casualties are from Africa.<sup>2,4,5</sup> African populations are extremely affected by Malaria caused by blood parasites transmitted from person to person through the bites of infected *anopheles mosquito*. In the absence of prompt and effective treatment, malaria often causes death.<sup>2</sup>

Malaria is avertable, treatable and curable, yet nearly one million people die from it every year.<sup>6</sup> In addition to the hundreds of thousands of mortality each year, available evidence indicates that malaria is the most common cause of hospital attendance in all age groups, of which children and pregnant women are the major risk groups.<sup>7</sup>

Despite the fact that malaria is preventable, the disease accounts for about 60 percent of outpatient visits and 30 percent of hospitalizations, as well as 25% of infant mortality, 30% of under-5 mortality and 11% of maternal deaths.<sup>2,8,9</sup> Malaria is a heavy burden on Nigeria's families, communities, health system, and workforce.<sup>8</sup> The financial loss due to malaria annually is estimated to be about 132 billion Naira [USD 906 million] in the form of treatment costs, prevention, loss of productivity and earning due to days lost from illness etc which whittle away Nigeria's prospects for development.<sup>9</sup>

Malarial infection during pregnancy is one of the factors responsible for the increased maternal morbidity and mortality rate in tropical and subtropical regions throughout the world<sup>10</sup>. The burden of malaria infection during pregnancy is caused chiefly by *Plasmodium falciparum*, the most common malaria species in Africa.<sup>9</sup>

WHO affirmed that every year at least 30 million pregnancies occur amongst women in malaria endemic areas of Africa and these pregnant women are 3 times more likely to suffer from malarial infection compared with their non-pregnant counterparts.<sup>8</sup>

Furthermore, it was estimated that at least 25% of pregnant women are infected with malaria in malarial endemic areas, with the highest risk for infection and morbidity in primigravida and during the second trimesters.<sup>11</sup> Moreover, Orton and Omari stated that pregnant women are known to be one of the groups at high risk of the effects of malaria infection and need special protective measures to ensure their survival and improve birth outcome.<sup>12</sup>

World Health Organization (WHO) recommends a package of interventions for the prevention and control of malaria during pregnancy which comprises of intermittent preventive treatment (IPT), use of insecticide treated nets (ITNs), and access to effective case management for malaria illness and anaemia<sup>2,13</sup> which has been associated with reduced incidence of severe antenatal anaemia, higher birth-weight and fewer perinatal deaths.<sup>14</sup> Also, ITNs have been shown to have beneficial impact on pregnancy outcome in malaria-endemic regions of Africa when used by communities or individual women.<sup>15</sup> Presently, sulfadoxine-pyrimethamine (SP) is the only antimalarial medicine for which data on efficacy and safety for IPT is available from controlled clinical trials, and WHO recommends that at least 2 doses of SP are given after quickening during the second and third trimesters, at least one month apart. However even a single dose has been shown to be beneficial.<sup>16</sup>



According to World Health Organization, there has been increase in human and financial commitments to malaria control, nationally and internationally, partly due to the need to meet the development targets set in the millennium development goals (MDGs).<sup>8</sup> However, these efforts have not translated into significant decrease in the disease incidence and its impact in Nigeria especially in the community that are usually surrounded by water (riverine areas), thus making the community prone to malaria. Furthermore, experiences with malaria have shown that prevention is better and cheaper than cure; hence the researchers delve into exploring methods employed in the prevention and treatment of malaria among pregnant women in Amassoma community, Bayelsa State, Nigeria.

## **METHODOLOGY**

This was a community based cross-sectional study that explored methods employed in the prevention and treatment of malaria amongst pregnant women in a riverine community in Bayelsa State, Nigeria. Bayelsa State is a tropical rain forest in the Niger Delta region of Nigeria that shares boundaries with Delta state on the north, Rivers State on the east and on the west and south by the Atlantic Ocean. The area lies almost entirely below sea level with a maze of meandering creeks, rivers and mangrove swamps. The network of several creeks and rivers in the South, all flow into the Atlantic Ocean via the major rivers.<sup>17</sup>

This study was conducted in Amassoma community, southern Ijaw local government area of Bayelsa state, Nigeria. The community was chosen because it is an island and susceptible breeding grounds for the mosquito, thus making the community prone to malaria. Amassoma is a sub urban community and it is bounded in the north of Ogobiri community, Oporoma on the South, Otuan on the East and Toruebeni on the west. It is found on the Wilberforce Island along the Yenagoa road. The target population consists of all pregnant women in Amassoma community, Bayelsa State. However, purposive sampling technique was used to select 180 pregnant women from the study population. Only women who were pregnant and permanent residence of Amassoma community at the time of the study were included in this study. The data was collected using a pretested self-developed questionnaire which elicited information on socio-demographic characteristics, knowledge on malaria and its effect on pregnancy; various methods used in the prevention and treatment of malaria among the pregnant women. The administered questionnaires were retrieved immediately and the process of data collection lasted for two week. The completed questionnaires were coded in computer using SPSS version 20.0 and subsequently the data were analyzed using both descriptive statistics of frequency and percentages. The researchers obtained permission to carry out the research from the community leader through the office of the Public Relation Officer (PRO). Informed consent of the respondents was sought. Information provided by the respondents was treated confidentially and respondents' anonymity was maintained by ensuring that the filled questionnaire cannot be traced to the respondents. The necessary translation of the contents of the questionnaire was given for proper understanding by the researchers.

## RESULTS

Table 1, the highest age range 106 (58.8%) were within the age of 16-25, follow by 41 (22.7%) within the ages of 26-35 and 33 (30.5%) from 36-45 years of age with a minimum age of 16years, maximum age of 45years and a mean of 30. Most of the respondents 113(62.7%) were married and 45(25.0%) were single while the remaining 7(12.2%) were divorced. Almost all the respondents 149(82.8%) were Christians, 19(10.5%) were Muslims, while 10(5.5) were traditional religion. The table also showed that majority of the respondents 126(70%) were Ijaw, follow by Igbo 38 (21.1%), Yoruba 6(3.3%) and other ethnicity 10 (5.5%). Also 63(35.0%) of the respondents had tertiary education, 48 (26.6%) had secondary school education, 39(21.7%) were primary school holder, while 30(16.7%) were illiterate.

**Table 1. Demographic Characteristic of the Respondents (n=180)**

Variables	Response	Frequency	Percentage
<b>Age</b>	16-25	106	58.8
	26-35	41	22.7
	36-45	33	30.5
<b>Marital status</b>	Single	45	25.0
	Married	113	69.2
	Divorced	22	12.2
<b>Religion</b>	Christianity	149	82.8
	Islam	19	10.5
	Traditional	10	5.5
<b>Ethnicity</b>	Ijaw	126	70
	Igbo	38	21.1
	Yoruba	6	3.3
	Others	10	5.5
<b>Educational level</b>	None	30	16.7
	Primary	39	21.7
	Secondary	48	26.6
	Tertiary	63	35.0

Table 2 showed that all the respondents 180 (100%) had heard about malaria. All the respondents said that malaria is a common health problem in the area and 165 (91.6%) said that is most common in a water-logged area. 131 (72.2%) of the respondent believed that malaria is not contagious, and 124 (68.8%) opined that it can be transmitted to the fetus. 146 (81.1%) of the respondents agreed that malaria can result in fetal death. Almost all the respondent 172 (95.5%) affirmed that malaria can be treated easily when diagnose early and can reoccur when not properly treated. 163(90.5%) of the respondents agreed that malaria can cause anaemia in pregnancy; 93(51.6%) concord that it can lead to premature delivery, and 124 (68.9.7%) believed that malaria



can lead to low birth weight. Furthermore, 118(65.5%) of the respondents stated that pregnant women are more likely to suffer from severe malaria comparing to their non-pregnant counterparts.

Table 3 above showed that majority 121 (67.2%) of the respondents used bednets, 150 (83.3%) used window and door nets, 120(66.7%) used insecticide spray and snapper. However, few of the respondents 57 (31.7%) used prophylactic anti-malaria drugs, 77 (42%) used mosquito coil, 30 (16.7%) used repellent cream; and 38 (21.1%) pour kerosene in stagnant water. More so, 69 (38.3%) of the respondents wash drainage; 130 (72.2%) clear bushes; 49 (27.2%) used herbs and lastly, 54 (30%) used broom stick to kill the mosquitoes. Only 22 (12.2%) of the respondents mentioned maintenance of clean environment, as other methods of preventing malaria.

Table 4 above showed that most of the respondent 165(91.7%) used orthodox medicine when they have malaria, 84 (46.7%) took prescribed drug, while 81(45.0%) were self-medication. Also 51 (28.3%) of the respondent treated malaria with local herbs while 30 (16.7%) of the respondent combine the herbal medicine with orthodox drugs.

**Table 2. Knowledge of the Respondents on Malaria and its effects (n=180)**

Variables	Response	Frequency	Percentage
Have you heard of malaria before?	Yes	180	100
	No	0	0
What is the cause of malaria?	mosquito	180	100
	Sun fly	0	0
	housefly	0	0
Is Malaria common in this areas	Yes	180	100
	No	0	0
Malaria is more common in the water lodge areas?	Yes	165	91.6
	No	15	8.3
Is malaria contagious?	Yes	49	27.2
	No	131	72.7
Can malaria be transmitted from mother to the fetus?	Yes	124	68.8
	No	47	26.1
	No response	9	5
Malaria is one of the leading causes of maternal and fetal death?	Yes	146	81.1
	No	21	11.6
	No response	13	7.2
Does malaria reoccur if not properly treated?	Yes	175	97.2
	No	5	2.7
Can malaria be easily treated when diagnosed early	Yes	172	95.5
	No	8	4.4
Malaria can cause severe anaemia in pregnancy if not promptly treated?	Yes	163	90.5
	No	8	4.4
	No response	9	5
Malaria can lead to premature delivery	Yes	93	51.6
	No	61	33.8
	No response	26	14.4
Does malaria cause low-birth-weight if not treated	Yes	124	68.9
	No	35	19.4
	No response	21	11.7
Are pregnant women more likely to suffer from severe malaria comparing to their non-pregnant counterpart	yes	118	65.5
	No	44	24.4
	No response	18	10

**Table 3. Various Methods Employed by the Respondents in the Prevention of Malaria (n=180)**

<b>Variables</b>	<b>Responds</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Use ITN bed net</b>	Yes	121	67.2
	No	59	32.7
<b>Use snapper</b>	Yes	120	66.7
	No	60	33.3
<b>Use insecticide spray</b>	Yes	120	66.7
	No	60	33.3
<b>Use mosquito coil</b>	Yes	77	42
	No	103	57.2
<b>Use repellent cream</b>	Yes	30	16.7
	No	150	83.3
<b>Use window and door nets</b>	Yes	150	83.3
	No	30	16.7
<b>Pouring of kerosene in stagnant water</b>	Yes	38	21.1
	No	142	78.9
<b>Use prophylactic anti malaria drugs</b>	Yes	57	31.7
	No	123	68.3
<b>Cleaning of drainage/gutter</b>	Yes	69	38.3
	No	111	61.7
<b>clearing bushes</b>	Yes	130	72.2
	No	50	27.8
<b>Use of herbs</b>	Yes	49	27.2
	No	131	72.8
<b>Use of native chalk</b>	Yes	18	10
	No	162	90
<b>Use of broom</b>	Yes	54	30
	No	126	70
<b>Other Ways</b>	clean environment	22	12.2
	Avoid contaminated food	3	1.7
	Do not use any other method	155	86.1

**Table 4. Various Methods Employed by the Respondents in the treatment of Malaria (n=180)**

Variables	Respondents	Frequencies	Percentages
Treatment of malaria with orthodox medicine	Yes	165	91.7
	No	15	8.3
Are these drugs prescribed by medical practitioners?	Yes	84	46.7
	No	81	45.0
	No response	15	8.3
Treatment of malaria with local herbs	Yes	51	28.3
	No	129	71.7
Treatment with drugs and local herbs	Yes	30	16.7
	No	150	83.3

Table 5 showed that 15 (8.4%) of the respondents took amalar, 12 (6.7%) took amartem, 10 (5.5%) Artesunate, 5 (2.7%) Chloroquine, 13 (7.2%) coartem, 4(2.2%) coartem with amartem, 18(10%) Fansidar, 5 (2.8%) Lonart and Maloxine 4 (2.2%) while 79 (43.9%) of the respondents could not recall the drug they took and 15 (8.4%) did not use orthodox medicine at all.

**Table 5. Various Anti-malaria Drugs Taken by the Respondents (n=180)**

Antimalaria drugs	Frequency	Percentage
Amalar	15	8.4
Amartem	12	6.7
Artesunate	10	5.5
Chloroquine	5	2.7
Coartem	13	7.2
coartem&amartem	4	2.2
Fansidar	18	10
Lonart	5	2.8
Maloxine	4	2.2
I don't know	79	43.9
Do not use orthodox medicine	15	8.4
Total	180	100%

Table 6 showed that few 12(6.7%) of the respondents treat malaria with alcohol (local gin), and cymbopogoncitratu; 14(7.8%) with Vernoniaamygdalina and ocimumgratissimum; 9 (5%) boiled Vernoniaamygdalina leaf, Carica papaya leaf, Citrus Aurantifolia and telfairaoccidentalis; 17(9.4 %)



AzadirachtaIndica, Cymbopogoncitratatus, Carica papaya leaf, mangifera leaf and Citrus Aurantifolia; while 21(11.7%) used Cymbopogoncitratatus, Citrus Aurantifolia and lipton tea. Although 107(59.4%) claimed that they do not use herbs to treat malaria.

**Table 6. Various Herbs Used by the Respondent in the Treatment of Malaria (n=180)**

Variables	Frequency	Percentage
Alcohol (local gin) with Cymbopogoncitratatus( lemon grass)	12	6.7
Vernoniaamygdalina (bitter leaf or ironweed) & scent leaf(ocimumgratissimum)	14	7.8
Vernoniaamygdalina (bitter leaf), Carica papaya (pawpaw leaf), Citrus Aurantifolia (lime), & telfairaoccidentalis (pumpkin leaf)	9	5
AzadirachtaIndica (Dogonyaro or Neem), Cymbopogoncitratatus ( lemon grass), Carica papaya (pawpaw leaf), mangifera (mango leaf) & Citrus Aurantifolia (lime)	17	9.4
Cymbopogoncitratatus ( lemon grass), Citrus Aurantifolia (lime), & lipton tea	21	11.7
do not use herb to treat malaria	107	59.4

## DISCUSSION

### Demographic Characteristic of the Respondents

The study revealed that the majority of the respondents were within 16-25, with a minimum age of 16years, maximum age of 45 years and a mean of 30 years. Most of the respondents were married and almost all the respondents were Christians, majority of them were Ijaw, and most of them had tertiary education. This indicates that the community is dominated by Christians and Ijaws.

### Knowledge of the Pregnant Women on Malaria and Its Consequences

The study showed that all the respondents knew about malaria and the cause of malaria. This corroborates similar studies conducted in northern and southern part of Nigeria where 93% and 89% of the study participants correctly attributed malaria to mosquito bites, respectively.<sup>18,19</sup>

In another study done in southern Mozambique, majority of pregnant women (74%), perceived the mosquito bite as the main mode of malaria.<sup>20</sup> However, this is in contrast to another study in Southern Ethiopia where only 15.6 % of the mothers associated mosquitoes with malaria.<sup>21</sup>

It was observed that all the respondents affirmed that malaria is a common health problem in the area and 91.6% said that, it is most common in a water-logged area. This is similar to the findings at antenatal clinics in Edo state, Nigeria where 75% consider malaria an important health problem during pregnancy.<sup>19</sup> In addition, Prothero<sup>22</sup> stated that malaria is prevalent in tropical regions because of the significant amounts of rainfall, consistent high temperatures and high humidity, along with stagnant waters in which mosquito larvae readily mature, providing them with the environment they need for continuous breeding. A good percentage of the respondent affirmed that



malaria is not contagious but can reoccur when not properly treated, almost all the respondents agreed that malaria can easily be treated when diagnosed early which is in line with some studies that malaria is not spread from person to person like a cold or the flu, and it cannot be sexually transmitted neither can it be contacted from casual contact with malaria-infected people.<sup>16, 23</sup> More than three quarter of the respondents had good knowledge of effect of malaria in pregnancy which is in contrary with study in Nigeria where knowledge of the consequences of malaria during pregnancy was found to be poor.<sup>19</sup>

Majority of the respondents opined that pregnant women are more likely to suffer from severe malaria compared to their non-pregnant counterparts. This is in line with World Health Organization<sup>8</sup> statement that pregnant women are three times more likely to suffer from malarial infection compared with their non-pregnant counterparts. In addition, WHO<sup>24</sup> stated that pregnant women infected with malaria usually have more severe symptoms and outcomes, with higher rates of miscarriage, intrauterine demise, premature delivery, low-birth-weight neonates, and neonatal death. This is because pregnancy aggravates malaria through a nonspecific hormone-dependent depression of the immune system, as well as the suppression of the protective anti-plasmodial activity in pregnancy, which has clinical consequences with important public health implications on pregnant women.<sup>25</sup>

In the light of the above, the results indicated that generally, most of the respondents in this study had good knowledge of malaria as observed by other studies<sup>18,19,26</sup> and it was noted that good knowledge of malaria is expected for a population in a malaria endemic area.<sup>26,27</sup>

### **Various Methods of Malaria Prevention among the Pregnant Women**

Most of the respondents used more than one preventive measures and the most commonly used methods employed in the prevention of malaria by the respondents were window and door nets (83.3%); clearing of bushes (72.2%), insecticide treated nets (ITNs) (67.2%) snapper (66.7%); insecticide spray (66.7%), However, this finding is at variance with the study conducted in Yaounde where majority of the pregnant women (82.5%) used one or more malaria prevention methods.<sup>28</sup> The most commonly used methods were insecticide treated bednets (82.5%) and SP (82.0%), However, in this study, few of the respondents 57 (31.7%) used prophylactic anti-malaria drugs during pregnancy despite the fact that studies had shown that the use of these drugs during pregnancy could reduce the morbidity caused by the malaria parasite<sup>28</sup>. The use of drugs especially, intermittent preventive treatment (IPT), consists of administration of curative dose of an efficacious anti-malarial drug at least twice during the second and third trimesters of pregnancy during routinely scheduled antenatal clinic visits regardless of whether the woman is infected or not.<sup>18,29</sup>

It is not surprising that some of the respondents said they prevent malaria with crude methods such as pouring kerosene in stagnant water, burning of bushes, and use of herbs, native chalk and broom. About 13.9% associated prevention of malaria with clean environment and avoid contaminated food. This implies that that the respondents perceived malaria to be associated with dirty environment and contaminated food.



### Various Methods of Malaria Treatment among Pregnant Women

A good number of the respondents claimed to use drugs when they have malaria, most of which were prescribed by medical practitioners but half of the respondents could not recall the name of drug they used. However, few of the respondents treat malaria with different herbs and concoction. This contradicts Lora et.al<sup>30</sup> who described the widespread use of traditional treatments ranging from mantra-reading to the ingestion of exotic concoctions in the prevention and treatment of malaria in their study carried out among pregnant women in Eastern India.

### CONCLUSION

Majority of the respondents had adequate malaria related knowledge and its consequences in pregnancy, and also employed good methods in the prevention and treatment of malaria. Most of the respondents used more than one preventive measures and the most commonly used methods employed in the prevention of malaria by the respondents were window and door nets, clearing of bushes, insecticide treated nets (ITNs), snapper, insecticide spray. However, there is still poor use of prophylactic anti-malaria drugs during pregnancy which has been recommended by WHO for the reduction of morbidity and mortality associated with malaria in pregnancy. In addition, some of the respondents still used crude methods such as pouring of kerosene into stagnant water, burning of bushes, and use of herbs, native chalk and broom. These methods used are detrimental to health and are not effective in the prevention and treatment of malaria. Therefore, there is need to explore and concentrate on use of multiple effective methods in the prevention and treatment of malaria as well as encourage the use of antimalaria (IPT) during pregnancy.

**Competing interests:** The authors declare that they have no competing interests.

### REFERENCES

1. Oshikoya KA. Malaria Treatment in Lagos Private Clinics/Hospitals: Physicians' Compliance with the World Health Organisation Recommendations. *Nig Med Pract*; 2006; 49 (5): 102-110.
2. United States Embassy in Nigeria. Nigeria Malaria Fact Sheet 2011 <http://nigeria.usembassy.gov>. Accessed 14 May 2016.
3. Department for International Development (DFID). Annual Report and Accounts 2013-14. Accessed 14 May 2015.
4. Murray CJ, Rosenfeld LC, Lim SS, Andrews KG, Foreman KJ, Haring D, Fullman N, Naghavi M, Lozano R and Lopez AD. "Global Malaria Mortality Between 1980 and 2010: A Systematic Analysis". *Lancet* 2012; 379 (9814): 413-31.
5. Olver, C. Global Malaria Mortality Between 1980 and 2010: A Systematic Analysis". [journalistsresource.org](http://journalistsresource.org). 2012. Accessed 14 May 2016.
6. World Malaria Report World Health Organization Global Malaria Programme Geneva, 2013 WHO at: [http://www.who.int/malaria/publications/world\\_malaria\\_report\\_2013/en/](http://www.who.int/malaria/publications/world_malaria_report_2013/en/). Accessed 1 May 2015.



7. Anumudu CI, Adepoju A, Adediran M, Adeoye O, Kassim A and Oyewole I. Malaria Prevention and Treatment Seeking Behaviour of Young Nigerian Adults. *Annals of Africa Med* 2006; 5 [2]: 82-88.
8. World Health Organization: World Malaria Report 2009. [[http://whqlibdoc.who.int/publications/2009/9789241563901\\_eng.pdf](http://whqlibdoc.who.int/publications/2009/9789241563901_eng.pdf)]. Accessed 21 March 2011.
9. National Population Commission (NPC) [Nigeria], National Malaria Control Programme (NMCP) [Nigeria], and ICF International. Nigeria Malaria Indicator Survey 2010. Abuja, Nigeria. Accessed 14 May 2016.
10. Shulman CE and Dorman EK. Importance and Prevention of Malaria in Pregnancy. *Trans R Soc Trop Med Hyg.* 2003; 97(1): 30-35.
11. Desai M, terKuile FO, Nosten F., et al. Epidemiology and Burden of Malaria in Pregnancy. *Lancet Infect Dis.* 2007; 7:93-104.
12. Orton LC and Omari AA. (2008) Drugs for Treating Uncomplicated Malaria in Pregnant Women. *Cochrane Database Syst Rev*; CD004912.doi: 10.1002/14651858.CD004912.pub3. Accessed 14 May 2016.
13. World Health Organization. A Strategic Framework for Malaria Prevention and Control during Pregnancy in the Africa Region. WHO Regional Office for Africa, Brazzaville: 2004. AFR/MAL/04/01. Accessed 14 May 2016.
14. Garner P and Gulmezoglu AM. Drugs for Preventing Malaria Related Illness in Pregnant Women and Death in the Newborn. *The Cochrane Database of Systematic reviews.* 2008 (4). Accessed 14 May 2016.
15. Gamble C, Ekwaru J.P and terKuile FO. Insecticide Treated Nets for Preventing Malaria in Pregnancy. *The Cochrane Database of Systematic Reviews*, 2006 (2). Accessed 14 May 2016.
16. USA Government Centres for Disease Control and Prevention. Malaria 1600 Clifton Rd. Atlanta, GA Accessed 14 May 2016.
17. Bayelsa State Government <http://www.bayelsa.gov.ng>. Accessed 14 May 2016.
18. Akaba GO, Otubu J, Agida ET, Onafowokan O. Knowledge and utilization of malaria preventive measures among pregnant women at a tertiary hospital in Nigeria's federal capital territory. *Niger J Clin Pract* 2013; 16: 201-6.
19. Enato EF, Okhamafe AO, Okpere E. A survey of knowledge, attitude and practice of malaria management among pregnant women from two health care facilities in Nigeria. *Acta Obstetrica et Gynecologica* 2007; 86: 33-36.
20. Boene H, González R, Valá A, Rupérez M, Velasco C, Machevo S, et al. Perceptions of Malaria in Pregnancy and Acceptability of Preventive Interventions among Mozambican Pregnant Women: Implications for Effectiveness of Malaria Control in Pregnancy. *PLoS ONE* 2014; 9 (2): e86038.
21. Fuge, Terefe G., Ayanto, Samuel Y., Gurmamo Fiseha L. Assessment of knowledge, attitude and practice about malaria and ITNs utilization among pregnant women in Shashogo District, Southern Ethiopia *Malaria Journal.* 2015; 14[1]: 235-44.
22. Prothero, R.M. Malaria, Forests and People in Southeast Asia. *Singapore Journal of Tropical Geography* 1999; 20 [1]: 76-85.
23. Nadjm, B. and Behrens, R.H. Malaria: an update for physicians. *Infectious Disease Clinics of North America* 2012; 26 (2): 243-59.
24. World Health Organisation. World Malaria Report, Geneva 2005. Accessed 14 May 2016.



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25. Omolade O Okwa. The Status of Malaria among Pregnant Women: A Study in Lagos, Nigeria Afr J Reprod Health 2003; 7(3): 77- 83.
26. Tobin-West CI, Kanu EN. Factors influencing the use of malaria prevention methods among women of reproductive age in peri-urban communities of Port Harcourt City, Nigeria. Niger Postgrad Med J 2016; 23(1):6-11.
27. Curtis, C.F., and Mnzava, A.E.P. Comparison of House Spraying and Insecticide Treated Nets for Malaria Control. Bulletin of the World Health Organization 2000; 78 [12].
28. Calvin E Bisong and Clemence M Dongmo. Utilization of malaria prevention *methods* by pregnant women in Yaounde. Pan African Medical Journal. 2013; 15:89.
29. Akinleye SO, Falade CO, Ajayi IO. Knowledge and utilization of intermittent preventive treatment for malaria among pregnant women attending antenatal clinics in primary health care centers in rural South West, Nigeria: A cross-sectional study. BMC Pregnancy Childbirth.2009; 9(28): 1-9.
30. Lora LS., Abanish R., Mohamad IB., Mrigendra PS., Jordan T., Blair JW., et.al Attitudes, Knowledge, and Practices Regarding Malaria Prevention and Treatment among Pregnant Women in Eastern India. Am. J. Trop. Med. Hyg. 2010; 82 (6):1010-1016.

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