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### OCCURRENCE OF MALARIA AND UTILIZATION OF ANTIMALARIA PREVENTIVE MEASURES AMONGST PREGNANT WOMEN ATTENDING AJEROMI- IFELODUN GENERAL HOSPITAL, LAGOS STATE, NIGERIA

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#### ABSTRACT

Malaria in Pregnancy poses a serious health problem both for the mother and her unborn baby and this can be prevented with the use of Intermittent Preventive Treatment with sulphadoxine pyrimethamine (IPTp-SP), Long Lasting Insecticide-treated Nets (LLIN) and other preventive measures. This cross-sectional survey was carried out among pregnant women attending Ajeromi Ifelodun General Hospital between August 2013 and February 2014. A total of 414 pregnant women (with mean age of 29±8.7) in their first (84), second (124) and third (206) trimesters were recruited for this study. Blood samples for making both thin and thick smears were collected and semi-structured questionnaires administered to the respondents. The questionnaire probed into their knowledge on cause of malaria, the preventive measures taken against mosquito bite, use of IPTp-SP, possession and use of LLIN. The overall prevalence of malaria due to *Plasmodium falciparum* is 24 (5.8%) out of which 13 were primigravid, 5 were secundi-gravid, and 6 were multigravida with no significant difference ( $P>0.05$ ) amongst them. Two hundred and eighty-six (69.1%) pregnant women had good knowledge of the cause of malaria. 164 (39.6%) of the sampled population had a tertiary education while 182 (44.0%) had secondary education, 124 (30.4%) were traders and 80(19.6%) were civil servants. Preventive measures claimed to be adopted by the respondents in avoiding mosquito bites include the use of LLIN (62.6%), insecticides sprays (36.2%), and locally adopted measures (1.5%). The number of respondents who had not availed themselves of IPTp-SP was significantly higher 258 (62.3%) compared to those who had ( $P<0.05$ ). It was observed that educational status had no significant effect on the knowledge of the cause of malaria in sample population ( $p>0.05$ ). The findings of this study reveal that there is a good knowledge on the cause of malaria among pregnant women but low use of IPTp-SP. In order to meet the new target of reaching an elimination stage set by the World Health Organization, factors responsible for the low use of these preventive measures should be investigated and quickly addressed so as to reduce both maternal and child morbidity/mortality resulting from malaria infection.

Keywords: Malaria, Pregnant women, Prevention, Intermittent preventive treatment, Sulphadoxine-pyrimethamine, Long-lasting Insecticide treated net.

### L'OCCURRENCE DU PALUDISME ET DE L'UTILISATION DES MESURES PREVENTIVES ANTIPALUDIQUES PARMI LES FEMMES ENCEINTES FREQUENTANT HÔPITAL GENERAL D'AJEROMI - IFELODUN, ETAT DE LAGOS, NIGERIA.

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#### RESUME

Le paludisme pendant la grossesse pose un grave problème de santé pour la mère et son bébé à naître et ceci peut être évité avec l'usage d'un traitement préventif intermittent avec sulfadoxine pyriméthamine (IPTp-SP), des filets traités à l'insecticide de longue durée (LLIN) et d'autres mesures préventives. Cette enquête transversale a été réalisée chez les femmes enceintes fréquentant l'hôpital général d'Ajeromi Ifelodun entre août 2013 et février 2014. Un total de 414 femmes enceintes (avec l'âge moyen de 29±8,7) dans leurs premier (84), deuxième (124), et troisième (206) trimestres ont été recrutées pour cette étude. Des échantillons de sang pour faire des frottis minces et épais ont été recueillis et des questionnaires semi structurés administrés aux répondantes. Le questionnaire a sondé dans leur connaissance sur la cause du paludisme, la

mesure préventive prise contre les piqûres de moustiques, l'utilisation d'IPTp-SP, la possession et LLIN. La prévalence globale du paludisme en raison de *Plasmodium falciparum* est 24 (5,8%) dont 13 étaient primigeste et 5 étaient secundi-gravide et 6 étaient multi-geste d'aucune différence significative ( $P>0,05$ ) chez elles. Deux cent quatre-vingt-six (69,1%) femmes enceintes avaient une bonne connaissance de la cause du paludisme. 164 (39,6%) de la population échantillonnée avait l'enseignement supérieur tandis que 182 (44,0%) avait l'enseignement secondaire, 124 (30,4%) commerçantes et 80 (19,6%) étaient fonctionnaires. Les mesures préventives qu'on affirmait être adoptées par les répondantes pour éviter les piqûres de moustiques comprennent l'utilisation de LLIN (62,6%), pulvérisations d'insecticides (36,2%), et les mesures adoptées localement (1,5%). Le nombre de répondantes qui n'ont pas profité d'usage d'IPTp-SP est significativement plus élevé 258 (62,3%) par rapport à ceux qui en avaient ( $P<0,05$ ). Il a été observé que la situation éducative n'a aucun effet significatif sur la connaissance de la cause du paludisme dans la population échantillonnée ( $p>0,05$ ). Les résultats de cette étude ont révélé qu'il y a une bonne connaissance de la cause du paludisme chez les femmes enceintes, mais une faible utilisation d'IPTp-SP. Afin de répondre à la nouvelle cible d'atteindre un stade d'élimination fixé par l'Organisation Mondiale de la Santé, les facteurs responsables de la faible utilisation de ces mesures préventives devraient être étudiés et rapidement traités de manière de réduire la morbidité/ mortalité maternelle et infantile résultant de l'infection du paludisme.

**Mots clés :** Paludisme, Les femmes enceintes, Prévention, le traitement préventif intermittent, Sulphadoxine - pyriméthamine, des filets durables traités à l'insecticide.

## INTRODUCTION

Malaria is a life threatening disease that is caused by species of the genus *Plasmodium* and transmitted by the female *Anopheles* mosquito. It is the most prevalent tropical disease resulting in high morbidity with its consequent economic and social loss. Malaria accounted for an estimated 207 million cases in 2012 with 627 000 deaths occurring in same year, 90% of these deaths occurred in sub-Saharan African (1).

Malaria in pregnancy is a serious health problem in sub-Saharan Africa where it affects 24 million pregnant women. In Nigeria, malaria in pregnancy is responsible for 11% maternal mortality (2).

Malaria infection in pregnant women increases the risk of maternal anaemia, delivery of low birth weight baby, spontaneous abortion and neonatal death. The policy for malaria prevention and control during pregnancy in areas of stable transmission, as is the case in Nigeria, as stipulated by the World Health Organization (WHO), emphasizes the use of Intermittent Preventive Treatment in pregnancy (IPTp), the use of Long-lasting insecticide treated net (LLIN) and effective case management of malaria illness and anaemia (3).

Currently, the best available drug use during pregnancy as IPTp is sulphadoxine pyrimethamine (SP) because of its safety. It involves the administration of a curative dose of SP (1500mg/kg sulphadoxine and 75mg/kg pyrimethamine as a single dose) twice during the second and third trimester of pregnancy without reference to the status of the woman with regards to infection and it should be given free of charge using the Directly Observed Therapy (DOT) as advocated by WHO (3, 4). Nigeria adopted IPTp as a national strategy in 2005 replacing the weekly prophylaxis with chloroquine (5).

The current national malaria treatment guideline and policy in Nigeria recommends that SP should

be given as the first line drug for IPTp and quinine for treatment of clinical malaria in all trimesters, while artemisinin-based combination therapy (ACT) is considered safe in the second and third trimester and can also be used in the first trimester where there are no suitable alternatives. To further achieve this, the Lagos State Government has taken the initiative to build maternal and child centres in most of its hospitals where attention is paid only to the pregnant

woman, her unborn child and newly delivered infants. IPTp has been shown to reduce anaemia and parasitaemia in pregnant women (6, 7).

A number of studies have been reported on the use of IPTp, knowledge of the cause of malaria, the transmission dynamics, different preventive measures and factors hindering the use of IPTp (6, 7, 8). Given that the new target for malaria is that by the year 2020, more than half of endemic countries should reach pre-elimination stage, there is need to assess prevalence as well as preventive measures employed by this vulnerable group. This study evaluates the prevalence, knowledge of the cause of malaria, level of awareness and the use of malaria preventive measures among pregnant women in Ajeromi Ifelodun General Hospital, Lagos, Lagos State, Nigeria.

## MATERIALS AND METHODS

### Study area

The study was carried out at the Maternal and Child Centre (MCC) of Ajeromi-Ifelodun General Hospital, located in Ajeromi- Ifelodun Local Government Area of Lagos State, Nigeria (6°45'N; 3°33'E). The MCC is a three - storey 110 bed capacity secondary health facility that is owned by the Lagos State Government.

This centre was constructed to provide quality service for the restoration, improvement and promotion of the health and well-being of women,

infants and children in the locality focusing essentially on obstetrics, gynecology and family planning. Patients visit the clinic on Wednesday for registration and Fridays for booking of appointment.

This Local Government Area is home to 684,105 inhabitants and covers an area of about 12km<sup>2</sup>. It is an urban area and one of the four Local Government Areas under the Badagry administrative division of Lagos State. It has only one Local Council Development Area (Ajeromi Ifelodun LCDA) with six primary health centres. Residents in the study area are of different Nigerian ethnic groups and are mainly involved in trading with some of them engaging in corporate activities ([www.lagosstate.gov.ng](http://www.lagosstate.gov.ng)).

It shares boundary with Surulere Local Government Area in the North, Apapa Local Government Area in the South-East and Amuwo-Odofin Local Government Area in the South-West. Settlements in this area are mostly close to each other and rainfall period covers April to September with a peak period in June and a break in August called 'August break'. The presence of stagnant water in different locations in the area enhances mosquito breeding.

#### **Study design**

The study was a cross-sectional survey involving 414 pregnant women determined by the WHO formula for calculating sample size (9) in their first and second visit selected randomly from the pool of registered pregnant women from August 2013 to February 2014 at the health facility.

The inclusion criteria were registration at the antenatal clinic, having no sign of severe malaria, and pregnancy gestational age of at least two months before term. Women who had severe malaria (detected clinically and microscopically) and/or having just a month before delivery were excluded from the study.

#### **Sample and data collection**

Blood samples were collected from the respondents by finger prick by applying little pressure. The first drop of blood was cleaned off with cotton wool soaked in 70% ethanol and subsequently drops of blood were collected with a clean microscopic slide for the preparation of thin and thick blood films.

Semi-structured questionnaires were administered to the consenting pregnant women by the principal investigator and captured information on their knowledge on malaria, attitude, malaria control practices and compliance with IPTp-SP.

#### **Smear Preparation**

Thick and thin blood films were prepared according to the technique outlined by the World Health Organization (10). Briefly, a drop of blood was spread on a clean, grease free microscopic slide to a

moderate thickness and allowed to air dry. The thickness was such that prints could be seen through it when still wet. The air dried film was stained with 10% Giemsa stain. The stain was allowed to stay for 10 minutes before washing off with clean water. The slide was then placed vertically and allowed to dry, after which a drop of immersion oil was placed on the slide and examined under the microscope with ×100 magnification.

Thin film was prepared by immediately placing the smooth edge of a spreader slide on a drop of blood, adjusting the spreader to an angle of 45° and then smearing the blood swiftly and steadily along the surface. The film was then allowed to air dry, fixed with 70% ethanol and stained with 10% Giemsa for 10 minutes before washing off with clean water. The slide is then allowed to air dry in a vertical position and examined under oil immersion microscope (10, 11).

Positive specimens were identified on the basis of microscopy using standard methods. Presence of ring forms of *Plasmodium falciparum* trophozoites indicates positive results. A blood smear can be considered negative if no parasite is seen after 10 minutes of examination. The prevalence was calculated as the proportion of those infected in relation to the total number of women examined.

#### **Ethical consideration**

Approval was obtained from the Lagos State Ministry of Health and the ethics committee of the hospital. The study was discussed with the Chairman, ethics committee of the hospital as well as the head of the Laboratory Department of the same hospital. Informed verbal consent was also sought from each respondent included in the study.

#### **Data analysis**

Data were entered in Epi-Info version 2002 statistical software (Centre for Disease Control and Prevention). Frequencies and proportions were used to compare respondent's knowledge on cause of malaria, preventive measures used against mosquito bite, use of IPTp-SP, gestational age, gravidity and educational status. For all statistical tests in this study,  $P < 0.05$  was considered significant.

### **RESULTS**

#### **Socio-Demographic Characteristics and Pregnancy History**

The mean age of the 414 pregnant women included in the study is 29 (S.D ±8.7) years with the youngest aged 17 years and the oldest 42 years. Majority of the respondents had received post primary education; tertiary 164 (39.6%) and secondary education 182 (44.0%). The respondents were mainly traders (36.7%), civil servants (19.3%), students (16.4%) and housewives (13.5%); and

majority were of the Yoruba 119 (28.7%) and Igbo 94 (22.7%) ethnic group while others were from the northern 45 (10.9%) and south-southern 61 (14.7%) parts of the country. However, 95(23.0%) did not reveal their ethnicity (Table 1).

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS (N=414)

Categories	Frequency (%)
Age Group (Mean Age of 29 ±8.7)	
16-20	28(6.8)
21-25	82(19.8)
26-30	195(47.1)
31-35	66(15.9)
36-40	35(8.4)
41-45	4(1.0)
No response	4(1.0)
Education	
Tertiary	164(39.6)
Secondary	182(44.0)
Primary	22(5.3)
No formal education	6(1.4)
Non-response	40(9.7)
Occupation	
Traders	152(36.7)
Civil servant	80(19.3)
Students	68(16.4)
Housewives	56(13.5)
Others	30(7.3)
Artisans	22(5.3)
No response	6(1.5)
Ethnicity	
Yoruba	119(28.7)
Igbo	94(22.7)
Hausa	45(10.9)
Others (Delta, Edo, Akwa Ibom)	61(14.7)
No response	95(23.0)

Their classification by parity revealed that 302(72.9%), 62(15.0%) and 50 (12.1%) were primi-graviida, secundi-graviida and multi-graviida respectively. Almost half of them 206 (49.8%) were in their third trimester (Table 2).

### Malaria Prevalence

The overall prevalence is 5.8% (24) with the primigravid women (13) being more infected than the secundi-gravid (5) and the multi-gravid (6) women with no significant difference ( $P>0.05$ ). In like manner, women in their first trimester were the most (9) infected than those in other trimesters (Table 3).

TABLE 2: PREGNANCY HISTORY OF RESPONDENTS

Categories	Frequency (%)
Gravidity	
Primi-gravidae	302(72.9)
Secundi-gravidae	62(15.0)
Multi-gravidae	50(12.1)
Gestational age of pregnancy	
First trimester	84(20.3)
Second trimester	124(30.0)
Third trimester	206(49.7)

TABLE 3: PREVALENCE OF MALARIA ACROSS VARIOUS CATEGORIES OF THE RESPONDENTS

Categories	Examined	Positive
Primi-gravidae	302	13(4.3%)
Secundi-gravidae	62	5(8.1%)
Multi-gravidae	50	6(12%)
First trimester	84	9(10.7%)
Second trimester	124	7(5.6%)
Third trimester	206	8(3.9%)

### Knowledge of the cause of malaria and preventive measures

Assessing their knowledge of the cause of malaria revealed that majority of the respondents 286 (69.1%) had a good knowledge of the cause of malaria, ascribing it to mosquito bite, while 15.2% attributed it to cold, and tiredness (1.2%) (Table 4).

Thirty-seven percent of the respondents had used IPTp-SP which is significantly lower ( $P<0.005$ ) than those 258 (62.6%) who had not taken IPTp-SP since pregnancy. Only one hundred and sixteen (45.0%) of the total two hundred and fifty-eight pregnant women who possess LLIN affirm to sleep under it daily Lack of use of LLIN by others 142(55.0%) was attributed to sweating and itching experienced during it use. One hundred and fifty (36.2%) used indoor insecticide spray as a major control option, while a few 6 (1.5%) resort to use of orange peels in preventing mosquito bites (Table 5).

TABLE 4: KNOWLEDGE OF THE CAUSE OF MALARIA (N=414)

Cause of malaria	Frequency (%)
Mosquito bite	286(69.1)
Stress	18(4.3)
Sun	7(1.7)
Tiredness	5(1.2)
Cold	63(15.2)
Dirty water	14(3.4)
Fever	10(2.4)
Do not know	11(2.7)

TABLE 5: MALARIAL PREVENTIVE MEASURES (N=414).

Preventive measures against mosquitoes bite	Frequency (%)
Insecticide treated nets	116(45.0)
Local measures (e.g orange peels)	6(1.5)
Synthetic insecticides (e.g Mosquito coil)	150(36.2)
Nothing	58(14.0)
No response	84(20.3)
Use of IPTp-SP during pregnancy	
Yes	154(37.2) <sup>a</sup>
No	258(62.3)
No response	2(0.5)

a: statistical significance between IPTp-SP usage, p=0.015

### Impact of education on knowledge and malaria and use of preventive measure

Assessing the impact of education on the respondents knowledge of the cause of malaria revealed a significant ( $p < 0.05$ ) difference between those with post-primary education 272 (95.1%) and primary education 10 (45.5%) (Table 6). Pregnant women with tertiary education 86(52.4%) reported to have used IPTp-SP more, followed by those with secondary education 61(33.5%) and only 16.7% of those without formal education reportedly use IPTp-SP (Table 7).

TABLE 6: RELATIONSHIP BETWEEN LEVEL OF EDUCATION AND KNOWLEDGE OF THE CAUSE OF MALARIA

Education	Knowledge of the cause of malaria.	
	Yes	No
Tertiary	134(81.7)	30(18.3)
Secondary	138(75.8)	44(24.2)
Primary	10(45.5)	12(54.5)
No Formal Education	2(33.3)	4(66.7)
Others	2(5.0)	38(95.0)

TABLE 7: LEVEL OF EDUCATION AND USE OF INTERMITTENT PREVENTIVE TREATMENT WITH SULPHADOXINE PYRIMETHAMINE BY THE RESPONDENTS (N=154)

Education	IPTp use	
	Yes	No
Tertiary	86(52.4)	78(47.6)
Secondary	61(33.5)	121(66.5)
Primary	4(18.2)	18(81.8)
No formal education	1(16.7)	5(83.3)
Others	2(5.0)	38(95.0)

### DISCUSSION AND CONCLUSION

Malaria in pregnancy poses a serious problem both for the mother and her unborn baby and this can be prevented with the use of IPTp-SP, ITN and other preventive measures.

The overall prevalence of this study is quite low and this could be due to a number of factors which include; the time of collection of sample which was more of dry season than the rainy season, the prevailing environmental condition which does not support the breeding of mosquitoes. Prevalence was gravidity dependent as primigravid women were heavily infected than the other group explaining the acquisition of immunity with repeated pregnancy by both the secundigravid and multigravida women (12, 13).

Most of the respondents of this study were literate, thus reflecting in the large number of the respondents who had good knowledge of the cause of malaria attributing it to mosquito bite. This finding is similar to previous study carried out in Federal Capital Territory of Nigeria (14), Midwestern part of Nigeria (15) and in northern Ethiopia (16).

There are some erroneous beliefs about the cause of malaria as some respondents attributed it to drinking dirty water, staying under the sun, cold and fever. This will have negative implication on malaria control because the respondents may be unwilling to embrace malaria preventive practices. This may also affect the treatment seeking behaviour of the respondents, as those with good knowledge of the infection are likely to seek prompt treatment when infected while those who have wrong view of the cause of malaria may not embrace the interventions.

The result from this study shows that only 45% of the 258 respondents who possess LLIN actually sleep under the net. This is higher than that obtained in previous study in Nigeria (17) but lower than what was observed in Mukono district in Uganda (18) and Southern Tanzania (19). This finding did not meet the target of 80% coverage of antimalarial preventive measures in vulnerable groups which include pregnant women set by the World Health Assembly in 2005, this therefore calls for more sensitization to instill the benefit of ITN use in the populace.

More than a quarter of the respondents had assessed IPTp -SP which is consistent with the result of a study carried out in a rural south-western area in Nigeria (20) and in southern Mozambique (21) but lower than what was obtained in a study carried out in Calabar, (22) and Oyo State, Nigeria where more than half of the respondents reported to have used IPTp-SP (23). Although the literacy level in this study translated into having good knowledge of the cause of malaria, nevertheless it did not result into high use of IPTp -SP. This also falls below the WHO expectation of administration of IPTp to 80% of all pregnant women in areas of high malaria transmission (24).

and child morbidity/mortality resulting from malaria infection.

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Furthermore, the study showed that there is a relationship between education and knowledge of malaria as those who have had both tertiary and secondary education had a good knowledge of the cause of malaria. This is quite expected as those with certain level of education are enlightened and knowledgeable and as such will take certain preventive measures against malaria infection. This same association was also observed between education and IPTp-SP, however, the use of SP was frequent among the primigravidae than the secundigravid and multigravidae. This is quite unexpected as women with previous pregnancy are expected to know the importance of IPTp and as such embrace its use more than the primigravidae.

Almost half of the respondents reported to the antenatal clinic (ANC) in their third trimester of pregnancy as reflected in time of their first visit to ANC. The importance of early registration for ANC will enhance high level of IPTp-SP use. Awareness should therefore be created through the use of Information Education and Communication (IEC) materials for early registration.

In order to meet the new target of reaching a pre-elimination stage set by the World Health Organization, factors responsible for the low use of IPTp-SP and LLIN should be investigated, the benefits emphasized so as to reduce both maternal Laboratory Unit for their technical assistance and the participants

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