

# Evaluation of the use of Intermittent Preventive Therapy and Long Lasting Insecticidal Nets for Malaria Prevalence among Pregnant Women in Nkpor, Nigeria

## Abstract

A study on the use of intermittent preventive therapy (IPT) and Long lasting insecticidal nets (LLINs) for malaria prevalence among pregnant women in Nkpor, Anambra State, Nigeria between May and July 2015. A total number of 176 pregnant women were examined microscopically using their peripheral blood for malaria parasites. A structured questionnaire was used to determine the usage of LLINs and compliance to IPT. The result showed 51.7 % (91/179) of the women were positive for malaria parasites. Malaria prevalence on the use of IPT was 54.5% (96/176) while the use of LLINs was 43.8% (77/176). The prevalence among primigravidae was 64.9% (50/77) and multigravidae was 41.1% (41/99). The use of LLINs has lower malaria prevalence than the use of IPT for malaria among pregnant women. Malaria is high among pregnant women and control efforts need to be improved urgently in Nkpor, Nigeria.

**Keywords:** IPT; LLINs; Malaria in pregnancy; Primigravidae; Multigravidae; Nkpor; Nigeria

## Research Article

Volume 6 Issue 2 - 2018

### Ezeugoigwe Nwachukwu<sup>1\*</sup> and Okoronkwo Chinemerem<sup>2</sup>

<sup>1</sup>Department of Microbiology, Nnamdi Azikiwe University, Nigeria

<sup>2</sup>Department of Parasitology and Entomology, Nnamdi Azikiwe University, Nigeria

**\*Corresponding author:** Ezeugoigwe Nwachukwu, Department of Microbiology, Faculty of Bio-Science, Nnamdi Azikiwe University, Awka, Nigeria, Email: nwachuss@yahoo.com

**Received:** December 21, 2017 | **Published:** January 10, 2018

## Introduction

Malaria is the world's most important parasitic disease ranking among the major health and developmental challenges for the countries of the world [1]. Malaria is an infectious disease caused by the protozoan parasites of the genus *Plasmodium*, transmitted by a vector, an infected female *Anopheles*-mosquito [2]. Malaria in pregnancy is an enormous public health problem in the whole of sub-Saharan Africa. It has severe consequences for a pregnant woman and her unborn infant. An infant born to a mother with malaria is more likely to have low birth weight (LBW), which is the single greatest risk factor for death during the first months of life. The risk of maternal death also increases considerably as a pregnant woman suffering from malaria is likely to develop severe maternal anaemia [3]. Malaria mostly affects pregnant women living in rural areas where access to health care and effective malaria treatment is greatly hampered by the poor state of the formal health care system. The main strategies to reduce the burden of malaria in pregnancy are promotion of intermittent preventive treatment (IPT) which is the public health intervention aimed at treating and preventing malaria episodes and use of long lasting insecticidal nets (LLIN). These are nets treated in the factory with an insecticide incorporated into the net fabric through the antenatal clinic platform [4]. Although malaria during pregnancy puts all pregnant women at risk, clinical evidence shows that primigravidae are particularly more susceptible to severe forms of *P. falciparum* infection than multigravidae [5]. Absence of clinical symptoms such as fever makes it difficult to recognize the disease which therefore often remains untreated. Findings from clinical studies suggest that placental malaria is

common and approximately one in four pregnant women has evidence of malaria infection at the time of delivery [6].

Maternal anaemia and low birth weight are the two important consequences of malaria in pregnancy. *Falciparum* malaria during pregnancy has long been recognized as an important determinant of low birth weight [5]. The reduction in birth weight is usually more marked in primigravidae, but can extend to the second and third gravidae in areas of low malaria transmission. The major adverse effect of malaria in pregnancy on the mother is anaemia [7]. In malarious areas like New Guinea, malaria and anaemia are likely to act together to reduce birth weight [7]. However, a study conducted in the same country, which attempted to quantitate the separate effects of anaemia and malaria attributed to low birth weight, concluded that in malarious areas, malaria was a more important risk factor for low birth than was anaemia [8]. The broad objective of this study is the evaluation of the use of intermittent therapy and long lasting insecticidal net to determine malaria prevalence among pregnant women in Nkpor, Anambra State, Nigeria.

## Materials and Methods

### Study area

The study was carried out in Nkpor in Idemili North Local Government Area of Anambra State, Southeastern Nigeria. Nkpor has a population of about 47,920 according to 2006 National Census but with the annual 3% growth rate it is estimated that present population of 60,703,623 making it the fourth biggest city in Anambra State Southeast of Nigeria [9]. Nkpor is a low land area

located within the tropical rainforest. It has two marked seasons: the dry season, which is from November to March (4 Months), and the wet season, which is from April to October (8 Months). There are ditches and gutters created by erosions, pot-holes riddle almost all of the untarred streets. The few available drains which do not flow are filled with refuse which could provide ideal breeding and resting places for mosquitoes.

### Sample population and sample size

The sample population comprised pregnant women attending antenatal clinics in Nkpor. Two hospitals namely Iyienu Mission Hospital and Nkpor Primary Health Center were used for the study. A total of 176 pregnant women were required for this study.

### Collection of blood samples

Peripheral blood sample were collected using syringe. Peripheral blood was used because the malaria parasite resides at the periphery of the red blood cells. This was transferred immediately to a properly labeled slide.

### Determination of parasite

Malaria parasites were determined using microscopy. The field staining technique for identification of malaria parasites was used. A thin film was prepared to determine the intensity of parasitaemia. The thin films are similar to usual blood films and allow species identification because the parasite's appearance is best preserved in this preparation. With the pros and cons of thin smears taken into consideration, it is imperative to utilize the thin smears while attempting to make a definitive diagnosis.

### Preparation of thin films

A completely clean, grease free and scratch free slide was placed on a template and a drop of peripheral and venous blood were dropped and spread using a spreader slide. This was aimed at getting a region called the monolayer where the cells are spaced far enough apart to be counted and differentiated. The slide was left to air dry, after which the blood was fixed using absolute methanol briefly for 30 seconds. The remaining alcohol was tipped off and the film was allowed to air dry. The fixative is essential for good staining and presentation of cellular detail. The fixed slide was then stained with 6% Giemsa solution for 45 minutes and the stained slide was washed off with tap water and allow to air dry. The stained slide was placed on stage and viewed with microscope using 40x for identification and 100x oil immersion objective lens to examine the characteristic morphology of the parasite.

### Determination of the use of IPT and LLINs

A closed ended type of questionnaire was used to collect data from pregnant women during their antenatal visit to the hospital which was aimed at determining their knowledge and use of IPT and LLIN. Respondents were only intended to answer YES or No to questions asked.

### Results

This result showed that out of 176 pregnant women sampled for malaria parasites using peripheral blood 52% (91/176) were positive. Of the 91 positive cases the age group 15-19 years had

the highest 75% (3/4) followed by age group 20-24 which is 56% (14/25), age 25-29 had 58% (41/71), age 30-34 had 49% (21/43), age 35-39 had 38% (9/24), while age 40-45 had 33% (3/9). There was no significant difference. The prevalence of malaria among primigravidae was 65% (50/77) and that of multigravidae was 41% (41/99). The use of long lasting insecticidal nets (LLINs) has lower malaria prevalence than the use intermittent preventive therapy (IPT) for malaria among pregnant women (Table 1). This Table 2 result also showed that the prevalence of malaria among primigravidae was 65% (50/77) and that of multigravidae was 41% (41/99). This Table 3 results showed that 70% (124/176) of pregnant women had knowledge of intermittent preventive treatment (IPT) while 55% (96/176) showed compliance with taking IPT. This Table 4 showed the usage rate of pregnant women with the knowledge of the LLINs. The groups are as follows; 15-19 years 100%(3/3), 20-24years86%(12/14), 25-29years 61%(25/41), 30-34years (96%)(21/22), 35-39years (75%)(9/12), 40-44years 100%(3/3). This Table 5 showed that pregnant women who had tertiary education complied most with intake of IPT at 73% (50/69) followed by secondary education and Primary education. This Table 6 showed that the usage rate of LLINs was highest among pregnant women with tertiary education 58% (40/69) followed by primary education 40% (2/5) and then secondary education 34% (35/102).

**Table 1:** Prevalence of malaria among pregnant women according to age in Nkpor in Idemili North Local Government Area, Anambra State.

Age (Years)	No Sampled	No Positive	% Positive
15-19	4	3	75
20-24	25	14	56
25-29	71	41	58
30-34	43	21	49
35-39	24	9	38
40-44	9	3	33
Total	176	91	52

**Table 2:** Prevalence of malaria among pregnant women according to parity in Nkpor in Idemili North Local Government Area Anambra State.

Parity	No Sampled	No Positive	% Positive
Primigravidae	77	50	65
Multigravidae	99	41	41
Total	176	91	52

**Table 3:** Prevalence of Malaria among pregnant women according to age and IPT compliance in Nkpor in Idemili North LGA Anambra State.

Age (Years)	No Examined	Knowledge	Compliance	% Compliance
15-19	4	2	1	50
20-24	25	18	13	72
25-29	71	54	47	87
30-34	43	30	20	67
35-39	24	14	11	79
40-44	9	6	4	67
Total	176	124	96	77

**Table 4:** Prevalence of malaria among pregnant women according to age and LLIN-compliance in Nkpor in Idemili North L.G.A Anambra State.

Age (Years)	No Examined	Knowledge	Compliance	% Compliance
15-19	4	3	3	100
20-24	25	14	12	86
25-29	71	41	25	61
30-34	43	22	21	96
35-39	24	12	9	75
40-44	9	3	3	100
Total	176	91	73	80

**Table 5:** Prevalence of malaria among pregnant women according to Educational level and IPT-compliance in Nkpor, Idemili North LGA, Anambra.

Education	No Examined	Compliance	% Compliance
Primary	5	3	60
Secondary	102	42	41
Tertiary	69	50	73
Total	176	95	54

## Discussion

The Study on malaria prevalence in pregnant women in Idemili North L.G.A Anambra was carried out between May to July 2015 using intermittent preventive therapy (IPT) and long lasting Insecticide treated nets (LLINs). Ages of all pregnant women were taken into consideration making up 6 groups with a mean difference of 4. The first range started among 15-19 through 44. The highest prevalence was found among the age group 15-19 years which is in accordance with the previous report that age may be independent risk factors, as younger pregnant women have been found to be more susceptible to malaria in some settings [10]. Furthermore, adolescent and young adult women have been observed to have higher incidence of parasitaemia than older adults. These findings showed that age plays a dominant role in the susceptibility of pregnant women to malaria. From this study, the prevalence of malaria was higher in primigravidae than in multigravidae. The multigravidae are presumably less affected because of immunological memory from the first pregnancy retained. The compliance rate for IPT usage was 54.5% for the age group 15-19 years which had the highest prevalence 75% of malaria parasite showed less compliance to IPT but had the highest percentage of ITN usage.

This implies that ITN alone is not enough to protect pregnant women from malaria attack. This agrees with who reported that [11]. His prevalence of severe anaemia (hemoglobin 7.0g/dl) or less was 3.4% in women who had received 2 doses or more sulfadoxine pyrimethamine and that maternal peripheral malaria parasitaemia was present in 39.3% of women who had yet received all 3 doses. In his findings it was reported that ITN and SP appeared to contribute independently to the reduction of maternal malaria parasitaemia. In this study, pregnant women who had higher educational attainment used IPT and LLINs

more because educated people are more exposed to correct knowledge and better perception about the disease and are therefore equipped to control and manage it better. This contrast with the findings of Merchant et al who stated that marital status, educational qualification and household socio-economic status were not associated with second dose of SP. From the study, it was seen that the level of education among pregnant women tend to increase the compliance rate of LLINs usage, this is in accordance with studies on malaria carried out in other parts of Africa [12]. This also supports the assertion of Tresserras et al [13] that high literacy level is needed to function adequately in the society and that literacy empowers the people to accept health-related information or ideas.

## Conclusion

In conclusion, malaria prevalence at 51.7% among pregnant women is still high and needs to be addressed urgently as Nigeria moves towards malaria elimination in pregnancy. The use of long lasting insecticidal nets (LLINs) has lower malaria prevalence than the use intermittent preventive therapy (IPT) for malaria among pregnant women. Nigerians especially pregnant women should be enlightened on the effectiveness and the use of insecticidal nets for prevention of malaria parasites invasion in their body through mosquito bites in their homes.

## Acknowledgement

None.

## Conflict of Interest

None.

## References

- Gallup JL, Sachs JD (2001) The economic burden of malaria. *Am J Trop Med Hyg* 64(1-2 Suppl): 85-96.
- White NJ (2008) *Plasmodium knowlesi*: The fifth human parasite. *Clin Infect Dis* 46(2): 172-173.
- Dellicour S, Tatem AJ, Guerra CA, Snow RW, Ter Kuile FO (2010) Quantifying the number of pregnancies at risk of malaria in 2007: A Demographic Study. *PLoS Med* 7(1): e1000221.
- Global Malaria Action Plan (2008) Roll Back Malaria Partnership, Switzerland.
- Menendez C (1995) Malaria during pregnancy: A priority area of malaria research and control. *Parasitol Today* 11(5): 178-183.
- Desai M, Terkuile FO, Nosten F, Mc Gready R, Asamoah K, et al. (2007) Epidemiology and Burden of Malaria in Pregnancy. *Lancet Infect Dis* 7(2): 93-104.
- Brabin B, Piper C (1997) Anaemia and malaria attributed to low birth weight in two populations in Papua New Guinea. *Ann Hum Biol* 24(6): 547-555.
- Nosten F, Mc Gready R, Simpson JA, Thwai KL, Balkan S, et al. (1991) Malaria during pregnancy in an area of unstable endemicity. *Trans R Soc Trop Med Hyg* 85(4): 424-429.
- National Population Commission (2006) National population census of the Federal Republic of Nigeria, Nigeria.

10. Saute F, Menendez C, Mayor A, Aponte J, Gomez Olive X, et al. (2002) Malaria in pregnancy in rural Mozambique: The role of parity, submicroscopic and multiple Plasmodium falciparum infections. Trop Med Int Health 7(1): 19-28.
11. Bourvier P, Doumbo O, Robert CC, Piequest A, Mauris A, et al. (1997) Seasonality, Malaria and Impact of prophylaxis in West Africa village I. Effect of Anaemia in pregnancy. Am J Trop Med Hyg 56(4): 378-383.
12. Mazigo DH, Obasey E, Muaka W, Manyuri P, Zinga M, et al. (2010) Knowledge, Attitudes, and Practices about Malaria and Its Control in Rural Northwest Tanzania. Malaria Research and Treatment 2010: 9.
13. Tresseras R, Canela J, Alvarez A (1992) Infant mortality per capital income and adult literacy: an ecological approach. Am J Public Health 82(3): 435-438.