



Full Length Research Paper

PREVALENCE, INTENSITY AND CLINICAL PROFILE OF MALARIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINICS IN ONITSHA-NORTH LOCAL GOVERNMENT AREA, ANAMBRA STATE, SOUTHERN NIGERIA.

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ABSTRACT

A study to determine the prevalence, intensity and clinical profile of pregnant women attending antenatal clinics in Onitsha-North Local Government Area, Anambra State Nigeria was carried out in four hospitals between May and September, 2013. A total of 200 blood samples were collected from systematically selected pregnant women. Malaria parasites were examined microscopically on thick and thin blood smear stained with Giemsa stain from each. Personal data were collected both orally and from maternity records of the women, analyzed using chi-square test. The results showed that of 200 pregnant women sampled in the study 116(58.0%) were positive for malaria parasites. Two *Plasmodia* species were encountered: *Plasmodium falciparum* (53.0%) and *P. vivax* (5.0%). The highest prevalence and intensity of malaria parasites (19.5% and 11.5% respectively) were found in those aged 21-25 years while the lowest prevalence and intensity (7.5% and 2.0% respectively) occurred in those aged 41 years and above. The highest prevalence (26.0%) of malaria were observed among those in primigravidae but least in those in multigravidae (12.5%). Mild infection was observed highest among those in primigravidae (16.5%) but least (8.0%) among those in multigravidae. Moderate infection followed the same trend, being highest (9.0%) in primigravidae and least in multigravidae (4.5%). Women in their first trimester were more infected (21.0%) than those in second trimester (19.0%) and third trimester (18.0%). The study demonstrated a high prevalence of malaria in the population evaluated, therefore it is important to develop coherent and effective policies and tools to tackle malaria and poverty.

Keywords: prevalence, intensity, clinical, profile, malaria, pregnant women, antenatal, clinics, Onitsha North,

Anopheles mosquitoes. Malaria is caused by a protozoan parasite of the genus *Plasmodium*. Four species namely, *P. vivax*, *P. ovale*, *P. malariae* and *P. falciparum* are responsible for human malaria (Ekanem *et al.*, 1999). The most

INTRODUCTION

Malaria is a preventable and treatable infectious disease, which is transmitted through the bites of infected female

serious forms of the disease are caused by *P. falciparum* and this accounts for about 80% morbidity and 90% mortality (Ekanem *et al.*, 1999; Carter *et al.*, 2005).

Malaria kills more than one million people every year, most of them in sub-Saharan Africa, where malaria is a leading cause of death for children under five years and pregnant women (WHO, 2008). Each year, 350 to 500 million cases of malaria occur worldwide (Ekanem *et al.*, 1999). However, the current status as reported by WHO (2013) was 219 million cases in 2010. In pregnancy, a woman's risk of having infection increases due to changes in her hormone levels and immune system (Ribera, 2007). A woman experiencing her first pregnancy (Primigravida) is especially vulnerable (Barbin, 1999). Symptoms like anaemia, fever, enlargement of the spleen, diarrhea and in some cases, convulsion (Arpita, 2011) are accrued to such a pregnancy (WHO 2004).

In sub-Saharan Africa, malaria in pregnancy is predominantly asymptomatic and yet a major cause of severe maternal anaemia and low birth weight babies (defined as birth weight less than 2500g) strongly associated with marked increase in infant mortality (Haji *et al.*, 1996; Saute *et al.*, 2002 Adefioye *et al.*, 2007, Greenwood *et al.*, 2005). The sequestration of malaria parasites in the placenta of pregnant women impairs foetal nutrition, thus adversely affecting the development of the foetus hence low birth weight recorded among new babies in sub-Saharan Africa (Aribodor *et al.*, 2009, Adefioye *et al.*, 2007).

The commonest symptoms observed in a clinical profile of a pregnant woman include anaemia, enlargement of spleen,

fever, nausea, vomiting, diarrhoea and convulsions in complicated cases (Arpita, 2011). The symptoms and complications of malaria during pregnancy have economic implications. Despite lack of evidence on the economic burden of malaria in pregnancy, it is highly likely that a substantial cost is imposed on the health service, household economy and the economy of the larger society (Agomo *et al.*, 2009; Akanbi *et al.*, 2010). Among vector-borne diseases, malaria occupies a predominant position since it is probably the leading cause of death in the world despite the intense national and international efforts to control it (WHO, 2002).

The existence of malaria in Nigeria is well recognized and surveys reporting the prevalence in various communities in Nigeria (Aribodor *et al.*, 2009; Abdullahi *et al.*, 2009; Ahmed *et al.*, 2001; Ejezie *et al.*, 1991; Epiidi *et al.*, 2008; Ukpai and Ajoku, 2001; Mbanugo and Emenalo, 2000; Obiukwu *et al.*, 2007; Onyido *et al.*, 2010; Onyido *et al.*, 2011a; Opara *et al.*, 2011). Many studies also pointed out that a lot of work can still be done to discover new endemic areas and to harness the predictive potential of malaria indicator to arrive at a cheap diagnosis protocol.

The general objective of this project was to determine the prevalence of malaria parasites and the clinical profile among pregnant women attending antenatal clinics in Onitsha-North Local Government Area, Onitsha, Anambra State, Nigeria.

This study aims at determining the overall prevalence, intensity, and clinical profile of women attending antenatal clinics determine the prevalence in relation to age, gravidity and trimester of pregnant women attending antenatal clinics in

Onitsha-North Local Government Area, Onitsha, Anambra State, Nigeria.

MATERIALS AND METHODS

Study Area

Onitsha is a city with an area of 36.19km² located on the eastern bank of the Niger River in Anambra State which lies between the latitude 6^o10'N and longitude 6^o47'E the rainforest belt of Nigeria. Onitsha experiences two distinct seasons – a wet season of abundant rainfall which begins in April and ends in October or early November and a practically rainless dry season which lasts from November to March. The temperature ranges between 22^oC to 38^oC and has an annual rainfall of between 152cm and 203cm (Onitsha Meteorological Station). Onitsha is a modern day urban society located in Anambra State. The people speak Igbo and English Languages. They are known for their strategic gateway for trade between the eastern and western regions. Onitsha is a large commercial, educational and religious centre which brings a huge influx of immigrants into the city for various purposes. The area is covered with a network of other forms of water bodies and low level of sanitation which has favored the breeding of mosquitoes which is a contributing factor in the high endemicity of malaria. The study was carried out in four hospitals in Onitsha-North Local Government Area in Anambra State

South East Nigeria.

Study population

The study population was pregnant women living in Onitsha. The occupation of the people ranges from traders to civil servants, teachers, tailors, students among others. In 2001, Onitsha had an estimated population of 511,000 with a

metropolitan population of 1,003,000 (NPC, 2007). The hospitals in Onitsha-North Local Government Area are eighteen (18) in number comprising both public and private hospitals. **Study sample**

The study sample of 200 pregnant women was systematically selected from a number of women who attended the antenatal clinics of the following hospitals: Onitsha-North General Hospital, Onitsha-North Primary Healthcare Centre, Onitsha Diagnostic Centre and Safety Medical Laboratory. The hospitals aforementioned were randomly selected. **Ethical consideration**

Ethical approval for this study was obtained from the Ministry of Health and the Chief Medical Director of each hospital. Informed consent of pregnant women participants was also obtained.

Collection of blood samples

Blood samples were collected employing the vein puncture technique as described by Epedi *et al*, (2008). The puncture site was swabbed with cotton wool dipped in methylated spirit (methanol) and the puncture was made using a new sterile 2ml syringe. The blood was transferred into a sterile EDTA container. Each sample was labeled correctly with the patient's personal data like name, age, date of collection to avoid any mix up. A total of 200 samples of blood specimens were collected.

Preparation of thick blood films (WHO, 2000)

A drop of each blood sample was placed on the center of a clean greasefree microscope glass slide. An applicator was used to spread the blood in small circular forms. The slides were kept to air dry. The blood films were dipped into field stain A (eosin) for 5 seconds. It was rinsed off

gently in clean water and then dipped into field stain B (methyl azure) for 5 seconds and rinsed off again in clean water. The slides were then allowed to air dry (WHO, 2000).

Preparation of thin blood films (WHO, 2000)

A drop of each blood sample was placed at one end of a clean grease-free microscope glass slide using a pasture pipette. A cover slip was placed on the drop of blood allowing blood to spread along the edge of the cover slip. The cover slip was then held at a suitable angle of 45° and pushed along the slide, drawing blood behind it, until the whole blood was smeared. It was then fixed briefly in methanol and allowed to dry. The thin film was placed over the staining rack and Giemsa stain poured over it. This was diluted and allowed to stand for about 10-20 minutes, before being rinsed with a large quantity of water. Underneath the slide was cleaned with cotton wool and placed on a rack to air dry (WHO, 2000).

Examination of microscopic slides For the examination of thin and thick blood films, a drop of immersion oil was placed at the center and tongue (tip) of the blood films respectively. The slides were examined under the microscope using x 100 objective lens. The slides were examined systematically to detect malaria parasites. Species specific characteristics of human *Plasmodium species* as listed by WHO (2004) and Brooks *et al* (2004) were utilized in identifying the species of *Plasmodium* encountered.

Clinical data collection

The pregnant women who attended antenatal clinics with the intention to treat for malaria were eligible for inclusion and no patient refused participation. Informed consent to participate was obtained from patients

or their relatives in every case. Age, brief clinical history and village of residence were recorded, followed by an assessment for criteria of potentially severe disease based on World Health Organization criteria (WHO, 2004).

Statistical data analysis

Data analyses using X^2 (Chisquare) statistics were carried out to determine any statistical differences between the variables at 5% and 1% levels of significance, and at specified degrees of freedom (Rao, 2007).

RESULTS

Results revealed that of 200 pregnant women sampled between May and June 2013, only 116(58.0%) were positive for malaria parasites. Table 1 shows the *Plasmodium* species encountered in the study. 106(53.0%) species of *Plasmodium falciparum* and 10(5.0%) cases of *Plasmodium vivax* were encountered in this study. *Plasmodium falciparum* had the higher prevalence of 53.0% while *Plasmodium vivax* had the prevalence of 5.0%. Table 1 – Prevalence of *Plasmodium* species encountered

<i>Plasmodium</i> Encountered	Number	Percentage (%)	species
<i>P. falciparum</i>	106	(53.0)	
<i>P. vivax</i>	10	(5.0)	
Total	116	(58.0)	

The prevalence of *Plasmodium species* with respect to age is shown in Table 2. Among the 65 pregnant women examined within the age group of below 21-25, 39(19.5%) were positive with 38(19.5%) cases of *Plasmodium falciparum* and 1(0.5%) case of

Plasmodium vivax. Fourty-three (43) were examined within the age group of 26-30, 23(11.5%) were positive with 20(10.0%) cases of *P. falciparum* and 3(1.5%) of *P. vivax*. Of the 31-35 age group, 37 pregnant women were examined, 21(10.50%) were positive with 19(9.5%) cases of *P. falciparum* and 2(1.0%) cases of *P. vivax*. 34 women were also examined within the age group of 36-40. 18(9.00%) were positive with 16(8.0%) of *Plasmodium falciparum* and 2(1.0%) of *P. vivax*. Among the age range of 41 and above, 21 pregnant women were examined.

15(7.5%) were positive with 13(6.5%) cases of *P. falciparum* and 2(1.0%) of *P. vivax*. The age group of 20-25 had the highest prevalence of malaria parasites 39(19.50%) while the least prevalence of malaria parasites of 15(7.5%) was observed among the women with ages ranging from 41 and above. The statistical analysis shows that age is not significantly dependent on the prevalence of malaria in pregnant women ($X^2 = 2.401$, $df = 4$, $p > 0.01$).

Table 2 – Prevalence of Malaria Parasites with respect to Age

Age (years)	No. examined	No. Positive (%)	No. positive for <i>P. falciparum</i> (%)	No. positive for <i>P. vivax</i> (%)
< 21 – 25	65	39 (19.5)	38 (19.0)	1 (0.5)
26 – 30	43	23 (11.5)	20 (10.0)	3 (1.5)
31 – 35	37	21 (10.5)	19 (9.5)	2 (1.0)
36 – 40	34	18 (9.0)	16 (8.0)	2 (1.0)
41+	21	15 (7.5)	13 (6.5)	2 (1.0)
Total	200	116 (58.0)	106 (53.0)	10(5.0)

The intensity of malaria infection with respect to age was recorded for the 200 pregnant women as shown in Table 3. Women less than 21 years to twentyfive years recorded the highest prevalence of 19.5% which comprises

11.5% mild infection, 7.0% moderate infection and 1.0% severe infection. While the age group 41 years and above had the least prevalence of 7.5% (2.0% mild infection, 4.0% moderate infection and 1.5% severe infection)

Table 3 – Intensity of malaria among pregnant women with respect to age

Age (years)	No. examined	No. with Positive infection (%)	No. with mild infection (1-10/100hpf) (%)	No. with moderate infection (11-100/100hpf) (%)	No. with severe infection (1-10/hpf) (100/100hpf) (%)
< 21 – 25	65	39 (19.5)	23 (11.5)	14 (7.0)	2 (1.0)
26 – 30	43	23 (11.5)	17 (8.5)	5 (2.5)	1 (0.5)
31 – 35	37	21 (10.5)	13 (6.5)	3 (1.5)	5 (2.5)
36 – 40	34	18 (9.0)	11 (5.5)	5 (2.5)	2 (1.0)
41+	21	15 (7.5)	4 (2.0)	8 (4.0)	3 (1.5)
Total	200	116 (58.0)	68 (34.0)	68 (34.0)	13 (6.5)

The prevalence of malaria with respect to gravidity is shown in Table 4. Of the 65 primigravidae examined, 52(26.0%) were positive with 49(24.5%) cases of *Plasmodium falciparum* and 3(1.5%) cases of *Plasmodium vivax*. Among the 56 secundigravidae examined, 39(19.5%) were positive with 36(18.0%) cases of *P. falciparum* and 3(1.5%) cases of *P. vivax*. Out of the 79 multigravida examined, 25(12.5%) were positive with 21(10.5%) cases of *P. falciparum* and 4(2.0%) cases of *P. vivax*. Of all the

gravidity, the highest prevalence of 52(26.0%) was observed among the primigravidae followed by the secundigravidae (19.5%) while the least prevalence of 25(12.5%) was observed among the multigravida. The primigravidae also recorded the highest intensity of infection (Table 5). There is a gradation of prevalence and intensity from primigravidae to the multigravidae. The statistical analysis shows that prevalence and intensity of malaria parasitaemia among the study population is dependent on gravidity at 5% level of significance ($X^2 = 38.555, df= 2, p<0.05$).

Primigravidae	65	52 (26.0)
Secundigravidae	56	39 (19.5)
Multigravidae	79	25 (12.5)
Total	200	116 (58.0)

Intensity of malaria infection with respect to gravidity was recorded for the 200 pregnant women who attended antenatal clinics as shown in table 5. 65 primigravidae were examined with 52(26.0%) positive cases. Out of the 52 cases, 33(16.5%) were diagnosed of mild infection (1-10/100hpf) followed by 18(9.0%) cases of moderate infection (11-100/100hpf) and 1(0.5%) cases of severe infection (1-10/hpf). Of the

Table 4 – Specific Prevalence of malaria (*Plasmodium* Infection) with respect to gravidity

Gravidity	No. examined	No. Positive (%)
Primigravidae	65	52(26.0%)
Secundigravidae	56	39(19.5%)
Multigravidae	79	25(12.5%)
Total	200	116(58.0%)

No. positive for <i>P.</i> <i>falciparum</i> (%)	No. positive for <i>P.</i> <i>vivax</i> (%)
49 (24.5)	3 (1.5)
36 (18.0)	3 (1.5)
21 (10.5)	4 (2.0)
106 (53.0)	10 (5.0)

cases were recorded from the 56 women examined. 27(13.5%) cases of mild infection were recorded followed by 11(5.5%) cases of moderate infection and 1(0.5%) case of severe infection. Among the 79 multigravidae examined, 25(12.5%) were positive with 16(8.0%) cases of mild infection followed by 9(4.5%) cases of moderate infection and no cases of severe infection. Figure 2 represents the intensity of malaria infection with respect to gravidity.

trimester were examined with 42(21.0%) positive cases. Out of the 42 cases, 31(15.5%) were diagnosed of mild infection (1-10/100hpf) followed by 9(4.5%) cases of moderate infection (11-100/100hpf) and 2(1.0%) cases of severe infection (1-10/hpf). Of the women in their second trimester, 38(19.0%) positive cases were recorded from the 59 women examined.

26(13.0%) cases of mild infection were recorded followed by 11(5.5%) cases of moderate infection and 1(0.5%) case of severe infection. Among the 76 women in their third trimester examined,

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The intensity of malaria infection with respect to trimester was recorded as shown in Table 7. 65 women in their first Iwueze et al., 2014

36(18.0%) were positive with 31(15.5%) 4(2.0%) cases of moderate infection and cases of mild infection followed by 1(0.5%) case of severe infection. Figure

Table 7– Intensity of malaria (*Plasmodium* infection) among pregnant women with respect to trimester

Trimester	No. examined	No. Positive (%)	No. with mild infection (110/100hpf) (%)	No. with moderate infection (11100/100hpf) (%)	No. with severe infection (1-10/hpf) (%)
First	65	42 (21.0)	31 (15.5)	9(4.5)	2(1.0)
Second	59	38 (19.0)	26 (13.0)	11 (5.5)	1 (0.5)
Third	76	36 (18.0)	31 (15.5)	4 (2.0)	1 (0.5)
Total	200	116 (58.0)	88 (44.0)	24 (12.0)	4 (2.0)

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The clinical profile of the 200 pregnant women examined for malaria parasites is shown in fig 4. Signs and symptoms diagnosed by the clinician were reported for each woman. The 200 women examined showed signs of fever (100%), 83(41.5%) had symptoms of vomiting, 150(75.0%) had headache symptoms, 43(21.5%) women had anaemia, 10(5.0%) had convulsion, 200(100%) suffered from fatigue and breathlessness. 4(2.0%) cases of hypoglycemia, 103(51.5%) cases of pallor, 40(20.0%) cases of diarrhoea, 59(29.5%) cases of oliguria were also reported. There were no reports of hypotension, hypertension, hepatomegaly and splenomegaly among the women.

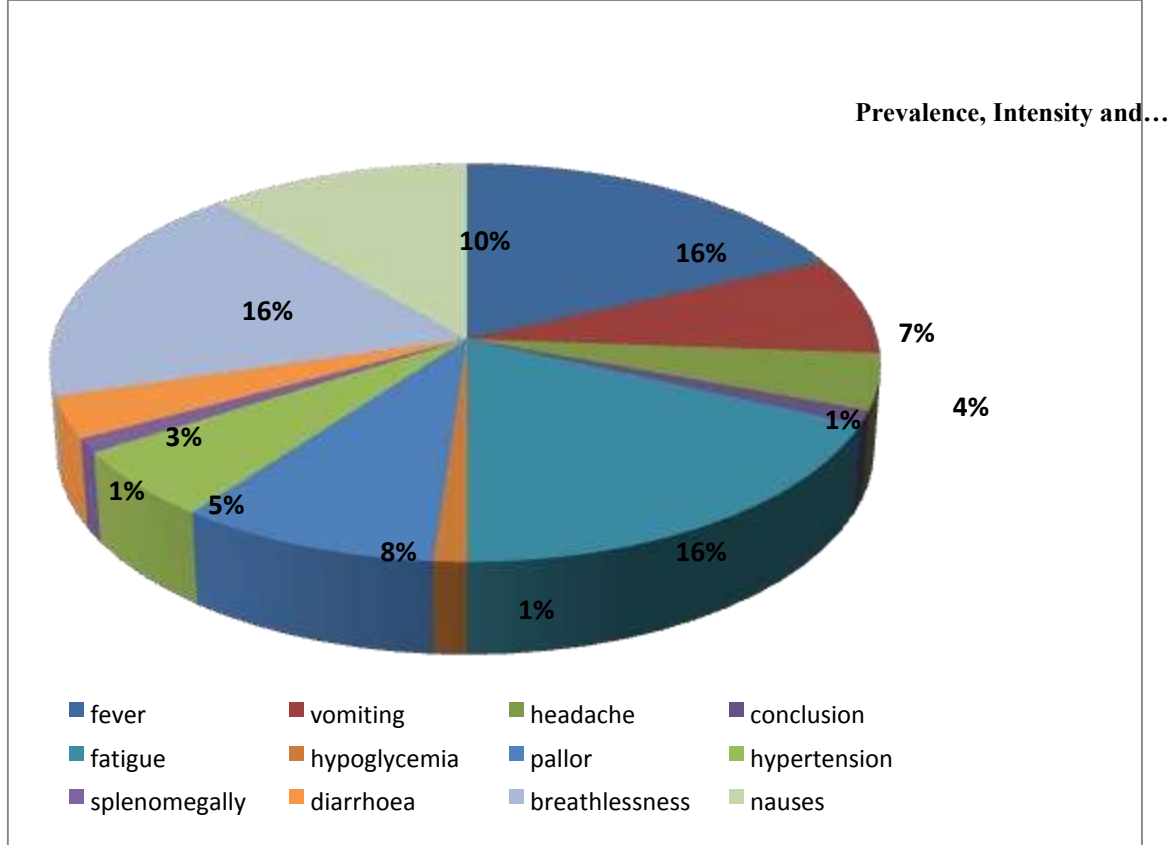


Figure 1: A pie-chart representing the clinical profile of malaria among pregnant women attending antenatal clinics in Onitsha-North Local Government Area, Anambra State, Nigeria.

DISCUSSION

Two-third of pregnant women in sub-Saharan Africa attend ante natal clinics at least once during pregnancy, an opportunity to provide them with health education, counseling, and Intermittent Preventive Treatment, to prevent malaria (National Population Commission, 2007). Results showed that the prevalence and intensity of malaria varied considerably between ages, gravidity and trimester of pregnant women screened. This study revealed that 116(58.0%) of the 200 pregnant women screened had detectable *Plasmodium falciparum* and *Plasmodium vivax* in their peripheral blood sample. This finding (58.0%) is slightly higher than those of Kisumu 95(51.1%) of the 186 pregnant women screened and 62(40.5%) of the 153 pregnant women screened in Mombasa, Kenya (Praise *et al*, 2003). The prevalence

recorded in this study (58.0%) is lower than the 67% recorded in Central India (Praise *et al*, 2003) and 60% recorded in Lagos, Nigeria (Okwa *et al.*, 2006). Even much higher than the 36.2% recorded in another study conducted in Jos, Bauchi and Eku regions of Nigeria (Egwunyenga *et al.*, 2001).The differences in the prevalence of malaria in these areas could be attributed to the climatic differences,

Table 5 – Intensity of malaria (*Plasmodium* infection) among pregnant women with respect to gravidity

Gravidity	No.	No. mild	No. with moderate infection (%)	No. with 10/hpf infection (1-100/100hpf) (%)	No. with severe infection (11-100/100hpf) (%)	Prevalence, Intensity and...
						examined Positive
						(%) 10/100hpf
Primigravidae	65	52 (26.0)	33 (16.5)	18 (9.0)		1(0.5)
Secundigravidae	56	39 (11.5)	27 (13.5)	11 (5.5)		1 (0.5)
Multigravidae	79	25 (12.5)	16 (8.0)	9 (4.5)		
Total	200	116 (58.0)	76 (38.0)	38 (19.0)		2 (1.0)

The prevalence of malaria parasites with respect to trimester is shown in Table 6. There were 42(21.0%) positive cases of *Plasmodium* infection comprising 39(19.5%) cases of *P. falciparum* and 3(1.5%) case of *P. vivax* among the 65 women examined in their first trimester. Fifty-nine (59) women in their second trimester were also examined. 38(19.0%) were positive with 35(17.5%) cases of *P. falciparum* and 3(1.5%) of *P. vivax*. Among the 76 women examined in their third trimester, 36(18.0%) were positive

with 32(16.0%) cases of *P. falciparum* and 4(2.0%) of *P. vivax*. Of all the trimesters examined for malaria parasite infection, the highest prevalence of 42(21.0%) was seen in women in their first trimester while the least prevalence of 36(18.00%) was seen in women in their third trimester. The statistical analysis shows that prevalence of malaria parasitaemia in pregnancy is not dependent on trimester ($X^2 = 5.688, df = 2, p > 0.01$).

Table 6 – Specific Prevalence of Malaria Parasites with respect to trimester

Trimester	No. examined	No. Positive (%)	No. positive for <i>P. falciparum</i> (%)	No. positive for <i>P. vivax</i> (%)
First	65	42 (21.0)	39 (19.5)	3 (1.5)
Second	59	38 (19.0)	35 (17.5)	3 (1.5)
Third	76	36 (18.0)	32 (16.0)	4 (2.0)
Total	200	116 (58.0)	106 (53.0)	10 (5.0)

behavioural and cultural heritage of the people in these areas. This study revealed that at least 58.0% of pregnant women had evidence of malaria which was quite high. This correlates with a study reported in Onitsha where 47.5% prevalence was recorded (Nwokedi, 1992) and in Awka, Anambra State where 64% prevalence was recorded (Aribodor *et al*, 2009). However, it does not correlate with 72% prevalence obtained in a similar study carried out during the rainy season from April to June in Oshogbo which was attributed to the rainy season. Nevertheless, the factor responsible for the significant decrease is probably due to the quality of antenatal care services received by pregnant mothers as recommended by the Roll Back Malaria Programme (WHO, 2000).

The reason for the high outcome recorded in this study may be attributed to poor level of sanitation of these women. Littering of the environment with cans, empty containers and bottles tend to provide breeding sites for mosquitoes. The environment is surrounded by water and vegetation which are also natural breeding sites for mosquitoes. Rainfall during the wet season of the year also provides water in potholes, gutters, drainage systems, footprints and small ponds in which mosquitoes can breed.

Results of this study are not in agreement with reports of similar prevalence's of *Plasmodium falciparum* parasitaemia in other places (Singh, 1999), but consistent with findings in Chandigarh, Northern India, which reported highest parasite concentration in the third trimester which had no influence in parasite concentration (Brabin, 1999; Akanbi *et al.*, 2010). This trend may be attributed to physiological status of the pregnant women and variations in prevailing environmental factors.

Finally, results of this study show high prevalence of *Plasmodium falciparum* infection in pregnant women attending antenatal clinics in Onitsha-North Local Government Area of Onitsha despite the periodic Intermittent Preventive Treatment (IPT) that started in year 2000 as recommended by World Health Organization for the prevention of malaria in pregnant women. Insufficient data in the performance of IPT in Nigeria supports the recommendation and imperative to develop a strategic framework for malaria control with a data based component. Health professionals should be encouraged to include IPT as part of ante natal care, education of women of childbearing age about the dangers of malaria in pregnancy and the potential benefits available to expectant mothers who use ITNs, make early and consistent attendance at ante natal clinics.

This study results indicates an increased risk of clinical malaria early in pregnancy, so an intervention encouraging pregnant women to visit the antenatal clinics early in pregnancy may significantly diminish the burden of the infection among pregnant women in malaria endemic areas.

CONCLUSION

Pregnancy seems to increase the risk of malaria transmission. Owing to the severity of malaria infection in pregnancy, it is important that increasing awareness at all levels about integrated strategies for control and prevention of malaria during pregnancy which includes ensuring that all health facilities and staff in the country are fully equipped to provide Intermittent

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Preventive Treatment (IPT) with Sulphadoxine Pyrimethamine (SP) according to national guidelines and

assessing the effectiveness of the drugs used for IPT. People should always be educated on the effects of malaria in pregnancy, importance of antenatal visits during pregnancy and the importance of Intermittent Preventive Treatment.

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