

**PREVALENCE OF MALARIA PARASITES IN PREGNANT WOMEN IN ABAJI  
AREA COUNCIL , FCT ABUJA, NIGERIA.  
RUNNING TITLE : MALARIA IN PREGNANCY IN ABAJI, FCT.**

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**ABSTRACT**

Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her fetus and the newborn child . This study was conducted to determine the prevalence of malaria parasite infection among pregnant women in Abaji Area Council, FCT, Abuja. A total of 300 pregnant women were sampled for malaria parasites infection using thick and thin film smears. Venous blood samples of 2mls were collected from pregnant women attending antenatal clinic in Primary Health Care Centres using needles and syringes to determine the presence of malaria parasite. Data was analysed using simple percentages and Chi-square analytical statistical tools. An overall prevalence of 111(37.0%; P= 0.171) was determined in the study, while the proportions of women infected were highest within the 36-40 years age cohort (80.0%) , followed by those in the age group of 21-25 years (43.0%) and 31-35 years (36.4%), those in 16-20 years and 26-30 years (28.6% and 25.0%) had the lowest. It is , however, believed that malaria infection is endemic (P=0.171) in the area council due to mosquito breeding grounds that abound in the council and poor environmental sanitation as noted during the study. Therefore, regular environmental sanitation and constant creation of awareness among the pregnant women will go a long way towards the reduction, if not total elimination of malaria in the area.

**KEYWORDS:**Malaria, Parasites, Pregnant, Bood, Woman, Abaji

## INTRODUCTION

Malaria is a life-threatening disease caused by malaria parasites that are transmitted to people through the bites of infected female *Anopheles* mosquitoes (WHO, 2016).

Nearly 600 million new infections and three million deaths each year are reported globally (Taura and Oyeyi, 2009). Burden of this disease falls heaviest among children below the age of five in sub-Saharan Africa and 30% of the annual mortality in the populations attributed to malaria. In 2015 there were 212 million cases of malaria and 429,000 deaths and between 2010 and 2015, malaria prevalence among populations at risk fell by 21% globally (WHO, 2016); during the same period, malaria mortality rates among populations at risk decreased by 29%. An estimated 6.8 million malaria deaths have been averted globally since 2001, and moreover, the WHO African Region continues to carry a disproportionate high share of the global malaria burden. And in 2015, the region was home to 90% of malaria cases and 92% of malaria deaths.

Approximately 35 million pregnant women are at risk of malaria infection each year in sub-Saharan Africa (McGregor, 1984). Adverse consequences of malaria infection during pregnancy include maternal anaemia, intra-uterine growth retardation (McGregor *et al.*, 1983), preterm delivery (Bader *et al.*, 2010), Still birth (Yatich *et al.*, 2010); Brabin, 1983), and low birth weight (Greenwood *et al.*, 1992). Low birth weight is associated with a marked increase in neonatal death (Guyatt and Snow, 2001).

Meta-analysis of malaria in pregnancy studies conducted in Eastern and Southern Africa between 1990 and 2011 showed that 32.0% of pregnant women attending antenatal care facilities had peripheral parasitaemia, and when the time period was restricted to studies conducted between 2000 and 2011, parasitaemia was 29.5% (Chico *et al.*, (2012).

In Nigeria malaria is highly endemic being one of the countries in the tropical and sub-tropical zones, thus increasing the susceptibility of pregnant women in the country, thereby raising the rate of infections since transmission is stable and occurs throughout the year (Onyenekwe *et*

*al.*, 2002). Previous studies have reported a variation in the prevalence rates of malaria ranging from as low as 5% to as high as 99% depending on the location of study, sample size used or the method of screening (Aliyu *et al.*, 2011, Wogu *et al.*, 2013, Chukwuocha *et al.*, 2012), Gunn *et al.*, 2015).

National Malaria Elimination Programme (NEMP, 2015) states that Nigeria accounts for 25% of the global burden of malaria and has the highest number of cases of any country, highlighting the need to focus on treatment as well as prevention.

Nationwide, malaria prevalence varies widely, ranging from 14% in the South East Zone to 37% in the North West Zone (NEMP, 2015). Prevalence of malaria varies across its range of distribution and is known to be influenced by weather, which affects the ability of the main carrier of malaria parasites, *Anopheles* mosquitoes to survive or otherwise (Mwangagia *et al.*, 2007), and tropical areas including Nigeria have the best combination of adequate rainfall, temperature and humidity allowing for breeding and survival for *Anopheles* mosquitoes (Okwa *et al.*, 2009). Moreover, malaria transmission in Nigeria takes place all year round in the South but is more seasonal in the far Northern regions (WHO, 2010), and based on climatic parameters, the infection occurs between April and October in FCT, Abuja (Ayanlade *et al.*, 2010).

Malaria infection, during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her fetus and the newborn child. Moreover, malaria-associated maternal illnesses and low birth weights are mostly the result of *Plasmodium falciparum* infection and occurs predominantly in Africa. Each year, 50 million women living in malaria-endemic areas become pregnant; one-half of these women live in Africa, and it is estimated that 10,000 women and 200,000 infants die as a result of malaria infection during pregnancy. Severe maternal anaemia, prematurity and low birth weight contribute to more than half of these deaths (WHO, 2017). Thus malaria infection in pregnancy continues to be a major health issue in endemic countries with clinical consequences including death of both mother and child. In Nigeria, statistics show that as many as 300,000

lives especially those of children and pregnant women are lost annually to malaria (Raimi and Kanu, 2010).

A number of studies have been carried out on the prevalence of malaria parasite infection amongst pregnant women in Nigeria by different scholars and researchers (Alaku et al., (2015); Obianumba and Aribodor, (2012); Taura and Oyeyi, (2009); *Gajida et al.*, (2010); *Chimere et al.*, 2009); *Wogu et al.*, 1999). However, the report on this situation is scarce in Abaji area council, as well as in other five area councils of FCT Abuja, creating a very huge gap, and this is the rationale for this study in order to close the gap and present the updates and prevalence level in the area. For instance, *Alaku et al.*, (2015) and Obianumba and Aribodor, (2012) recorded 88.0% and 53.9% in their respective studies, while *Chimere et al.*, (2009) revealed 7.7% among pregnant women in Lagos South West of Nigeria. In Kano, Taura and Oyeyi, (2009), got 51.7% as *Gajida et al.*, (2010) recorded 36.2% in the same state of Kano. Moreso, *Wogu et al.*, (1999) in their survey captioned malaria in pregnancy: Two-year prevalence among women attending antenatal clinics in a Nigerian Hospital reported 17.4% and 23.1% respectively in 2013 and 2014 among pregnant women, saying that the prevalences were higher among younger ones in their second and third trimesters.

Malaria infection has quite serious impact on the most vulnerable people in society which include pregnant women and girls, children less than 5 years, internally displaced persons and the homeless among others. Additionally, pregnant women have two to three times higher risk of suffering from malaria and this increases their risks of miscarriages, still birth, premature births, low birth weight and anaemia in pregnancy. All these complications may even lead to death (WHO, 2010). The protection of pregnant women living in malaria-endemic countries has been of particular interest to many National Malaria Control Programmes because of their reduced immunity (WHO, 2017). The recent world malaria report (WHO, 2010), which indicated that Nigeria accounts for a quarter of all malaria cases in the 45 malaria-endemic countries in Africa,

clearly showed the challenge of malaria in Nigeria. The principal impact of malaria infection is due to the presence of parasites in the placenta causing maternal anaemia (potentially responsible for maternal death when severe) and low birth weight. Despite considerable efforts to control malaria, it is still the most prevalent and devastating disease in tropical Africa with pregnant women and children below five years the highest risk groups (*Andy et al.*, 2018). 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 likely that a substantial cost is imposed on the health services, household economy and the economy of the larger society (*Ayanlade et al.*, 2010).

With the interest of Nigerian government in controlling malaria through the various malaria control strategies and the theme for the 2016 world malaria day which is "End malaria for good with the slogan, it is Possible" and for the reason that report on the prevalence of malaria infection among pregnant women in Abaji Area Council is scarce and unavailable, it again becomes necessary to have this study "the prevalence of malaria infection among pregnant women attending antenatal clinic in Primary Healthcare Centres in Abaji Area Council" of the FCT Abuja, in order to provide part of the much needed baseline data to effectively plan and control malaria infection in the area (among the population at risk, the pregnant women).

The Hypothesis for this investigation are:

- (a) There is high prevalence of malaria infection among pregnant women in Abaji Area Council Abuja.
- (b) There is low prevalence of malaria infection among pregnant women in Abaji Area Council Abuja.
- (c) There is no malaria infection among pregnant women in Abaji Area Council Abuja.

## METHODOLOGY

### Study Area

Abaji area council is one of the six area councils that make up Federal Capital Territory (FCT) Abuja. It borders with Toto

LGA in Nasarawa state to the EAST, Kwali area council to the north, Koton-Karfe LGA in Kogi state to the South and Niger state to the West. Abaji area council has a land mass of 1100Km<sup>2</sup> with an estimated total population of 169,896 (projected 2006 census). Predominant tribes are Gbagyi, Ganagana, Bassa, Ebira, Hausa and other minority tribes. Their occupation is predominantly farming, trading, fishing and civil service. The area council is divided into 10 political wards and 27 primary health care centres or districts with 28 functional health facilities across the LGA.

### Study Population

This study was carried out among pregnant women attending antenatal clinics in primary healthcare centres (Ayaura Primary Health centre; New Township clinic; Low cost clinic; Naharati Primary Health centre and Agyana Primary Health centre ) of Abaji Area Council, FCT, Abuja.

### Research Design

This is a cross-sectional descriptive study of the prevalence of malaria parasite infection among pregnant women in Abaji area council.

### Sample Size Determination

A suitable sample size of pregnant women in Abaji area council was selected within the target population. Thus sample size was derived as follows:

A prevalence rate of 26.6% was chosen (Naing *et al.*, 2006), margin of a sampling error or precision tolerated was set at 5%, at 95% confidence interval using the formula:

$n = \frac{N^2 P(1-P)}{d^2}$   $n$  = sample size,  $N = 1.96$  (Statistical constant),  $P = 26.6\%$  (Population based)  $d = 5\%$  (marginal error or precision).

$$n = \frac{(1.96)^2 \times 0.266(1-0.266)}{(0.05)^2} = \frac{3.8416 \times 0.266 \times 0.734}{0.0025} = 300.01976 = 300$$

### Sampling Technique

The blood samples from the pregnant women attending antenatal clinic in primary healthcare centres were randomly collected for laboratory tests to determine the presence of malaria parasites as the evidence of infection.

30 minutes and allowed to dry. The films were examined under the light binocular microscope using x100 objective lens, with a drop of oil immersion (Ochei and Kolhatkar, 2008; WHO, 2000).

The presence of malaria parasite in either of the films is regarded as positive, either with one plus (+), two pluses (++) or three pluses (+++).

### Sample Collection, Processing and Analysis.

A venous blood sample of 2mls was collected from the pregnant women using needle and syringe. Standard and careful laboratory procedures were adopted in collecting blood samples from the pregnant women. Thick and thin blood films of the blood samples were made on clean dry grease free slides, labelled and allowed to dry. The thin films were fixed in 70% alcohol to avoid lysis, allowed to dry and then stained with Leishman stain for 10 minutes, while the thick films were stained with diluted Giemsa stain for 25-

### Data Analysis

Data obtained were analysed using simple percentages and Chi-square analytical method.

### Ethical Consideration

Permission to carry out the study was obtained from the Committee in charge of health in the Area Council and informed consent was obtained from the pregnant women after explaining what they would gain by participating.

## Results

Table.1 Prevalence of malaria parasite infection among the pregnant women

No. Examined	No. Positive(%)	No. Negative(%)
300	111(37.0)	189(63.0)

Table 1. shows the overall prevalence(37.0%) of malaria infection among the pregnant women in Abaji Area Council.

Table 2. Chi-square analysis of the data obtained.

	Value	Df	Asymptomatic Significance (2-sided)	Monte Carlo Sig.(2-sided)	95% Confidence interval	
				Significance	Negative result	Positive result
Pearson Chi-Square	7.243 <sup>a</sup>	4	0.124	0.110 <sup>b</sup>	0.049	0.171
Likelihood Ratio	7.276	4	0.122	0.160 <sup>b</sup>	0.088	0.232
Fisher's Exact Test	6.936			0.110 <sup>b</sup>	0.049	0.171
N of Valid Cases	300					

Table 2 is the Chi-Square analysis of the data obtained showing the endemicity of malaria parasite infection among the pregnant women in Abaji Area Council.

In hypothesis one , there is high prevalence of malaria infection among pregnant women in Abaji area council Abuja, from the Chi-square test in table 2, the P-value for a positive result is 0.171 which is higher than the appropriate level of significance of 0.05, therefore, the hypothesis that there is high prevalence of the infection among pregnant women in Abaji area council is rejected. In hypothesis two, there is low prevalence of malaria infection among pregnant women in Abaji area council, but in table 2 the P-value for a negative result is 0.049 which is lower than the appropriate level of significance of P= 0.05, therefore , the hypothesis that there is low prevalence of malaria infection among pregnant women in Abaji area council Abuja is accepted. And in hypothesis three, there is no malaria infection among pregnant women in Abaji area council Abuja, however, the Chi-square analysis in table 2 shows that the P-value for a positive result is 0.171 which is higher than the appropriate level of significance of 0.05, and the P-value for a negative result is 0.049 which is lower than the appropriate level of significance of 0.05, there fore, this hypothesis is rejected. That is malaria infection among pregnant women in Abaji area council prevails and it is endemic.

Table 3 : The age distribution and prevalence of malaria parasite infection among pregnant women in Abaji Area Council FCT, Abuja.

Age group	No examined	No positive(%)	No negative(%)
16-20	21	6(28.6)	15(71.4)
21-25	123	54(43.9)	69(56.1)
26-30	108	27(25.0)	81(75.0)
31-35	33	12 (36.4)	21(63.6)
36-40	15	12 (80.0)	3(20.0)
Total	300	111(37.0)	189(63.0)

Table 3 showed that, pregnant women aged 36-40 years had the highest infection rate of 80.0% followed by 21-25 with 43.9% and others , 31-35, 16-20 and 26-30 years with 36.4%, 28.6% and 25.0% respectively.

## Discussion

Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her fetus and the newborn child. The result of this study showed that malaria infection is prevalent ( $P=0.171$ ) among the pregnant women in Abaji Area Council (see table 2). The overall prevalence of 37.0% (see table 1) observed in this study, though low, it is disturbing and constitute a major health threat among pregnant women in the area. Pregnancies in women living in malaria endemic region, particularly in Sub-saharan Africa are associated with a high frequency and density of malaria parasite, with high rates of maternal morbidity (Niganda and Romero, 2003). This prevalence of 37.0% is low when compared with the results obtained from other parts of Nigeria. For instance, *Alaku et al.*, (2015), Obianumba and Aribodor, (2012); Taura and Oyeyi, (2009) and *Odikamnoro et al.*, (2014) recorded 88.0%, 53.9%, 51.7% and 42.0% in their respective studies. It is however, high when compared with the studies reported in *Chimere et al.*, (2009) and *Gajida et al.*, (2010) who revealed 7.7% and 36.2% respectively. The relatively lower prevalence rates of malaria infection among pregnant women in the council, may not be as a result of the development of higher levels of the acquired anti-malaria immunity among them, but could be attributed to increased malaria awareness among women of child-bearing age in the council.

Moreso, other studies, for example *Adefioye et al.*, (2007) and *Nwagha et al.*, (2009) reported high prevalences of 72.0% and 60.0% respectively. The cause of high prevalence of malaria in pregnancy is unknown but studies by *Okpere et al.*, (2010) have explained this increased risk to be due to changes in the cellular immune responses that otherwise should offer protection, and increased attractiveness of the pregnant to mosquitoes. In addition, cellular immune responses change, result from the increased level of circulating maternal steroids in pregnancy. This has caused pregnant women to attract twice the number of mosquitoes compared with their non-pregnant counterparts (*Lindsay et al.*, 2000).

The variations in the reported prevalences is due to skill and experience of the laboratory personnels (Microscopists) involved in preparation of the films, staining and reading of the films (*Agomo et al.*, 2009). Other factors that may have contributed to the differences could be due to several environmental factors such as socio-economic condition of the study population (*Worral et al.*, 2003) ignorance as well as level of education of the people (*Anthonio-Nkonjio et al.*, 2006; *Dicko et al.*, 2003) including level of exposure, disparities in nutritional status and unhygienic living conditions (*Worral et al.*, 2003). The result of this work and others mentioned, showed the need for this group of women to always go for malaria check to avoid undesirable consequences arising from it.

The relationship between the ages of the pregnant women and prevalence of malaria parasite is shown in table 3, there were more infections (80.0%) in the 36-40 years age group while 21-25 years age cohort recorded an infection rate of 43.9%. Meanwhile, 36.4% of those in 31-35 years age group were infected. 16-20 years age group had 28.6% while 26-30 years has 25.0%. This observation is in agreement with the statement made by WHO, (2000), that malaria infection is significantly high in pregnant women within the age bracket of 36-39 years and are more susceptible. However, this did not corroborate the work of *Anthonio-Nkonjio et al.*, (2006), who posited that younger women appeared to be more susceptible to malaria infections by recording a prevalence of 68.8% among the age group of 21-25 years old, and this has the support of *Dicko et al.*, (2003) who opined that adolescents and young adult pregnant women were more susceptible to malaria infection than the older ones, due to continuous development of immunity against malaria in older women.

In conclusion, malaria infection among pregnant women in Abaji Area Council is endemic, hence, effort should be geared towards improving their environmental conditions and educational backgrounds. Moreso, insecticide treated mosquito nets should be provided. Also government

and area council should not only target the treatment of the age groups, but go further by creating more awareness on the importance of sleeping under insecticide treated nets . Nevertheless, early antenatal booking for effective monitoring and prompt treatment of malaria infection in pregnancy will contribute significantly in reducing maternal morbidity and mortality due to malaria infection.

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