



Original Article

**OCCURRENCE OF MALARIA PARASITES AMONG PREGNANT WOMEN ATTENDING  
KATAMEYA FIRST- CALL HOSPITAL, JEBBA, NIGER STATE, NIGERIA.**

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**ABSTRACT**

Malaria infections has been identified as a major challenge during pregnancy in tropical and subtropical regions all over the world .One hundred (100) blood samples were collected from the patients attending Katameya first- call hospital from May-July, 2016. Questionnaire was administered to the patients to obtain their socio-demographic factors before collecting their blood samples. Blood samples were obtained using syringe and needle, and tested for malaria parasite in thin film and rapid diagnostic test (RDT). *Plasmodium falciparum* occurred most, totalling 67 (72.04%), while the least Malaria parasite was found to be *Plasmodium ovale* 3 (3.23%). Statistical analysis using chi-square test of association between the socio-demographic factors of the patients and the occurrence of malaria in the patients indicated that Age, Parity, Use of long lasting insecticide treated nets (LLITNs), occupation and the stages of trimester of the patients were significant to the occurrence of Malaria in the patients ( $P < 0.05$ ). The Area of domicile of the patients and the Use of intermittent preventive treatment (IPT) were not statistically significant to the occurrence of malaria in the patients ( $P > 0.05$ ). Malaria could be effectively controlled with the administration of LLITNs and balanced diet during pregnancy. Community Health Education should be provided to positively control the attitude of pregnant women to malaria, including early ante-natal registration.

**Key words:** Incidence, Malaria, Infection, Women, Hospital.

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## INTRODUCTION

Pregnancy associated malaria (PAM) is a presentation of the common illness that is particularly life threatening to both mother and developing fetus. Malaria causes symptoms that typically include fever, fatigue, vomiting, and headaches. In severe cases, it can cause yellow skin, seizures, coma, or death (Caraballo *et al.*, 2014). Manifestation of symptoms is usually from ten to fifteen days after mosquito bite of a vulnerable individual. WHO (2014) reported that malaria disease may re-occur in people not properly treated. Milder symptoms emerge as a result of re-infection in individuals that have just survived an infection. Disappearance of partial resistance for a long period would be as a result of non-exposure to malaria (caraballo et-al., 2014). Female anopheles mosquito has been the common vector of malaria disease. The parasites are introduced into a victim's blood through mosquito's saliva when it bites (WHO, 2014). The parasites destination is the liver, where they increase in number and attain maturity. Caraballo *et al.* (2014) reported that five species of plasmodium can cause infection and eventually be spread by human.

Milder form of malaria results from infection by *P. vivax*, *P. ovale*, and *P. malariae*, however mortality cases are from *P. falciparum* infection (Nadjm and Beherens, 2012). *P. knowlesi* infection rarely occur in human. Diagnosis of malaria can be carried out with antigen-based rapid diagnostic tests or by the microscopic extermination of blood using blood films (caraballo *et al.*, 2014). Detection of parasite DNA using the

polymerase chain reaction technique has since been developed, however, its cost and complexity have not allowed it to be put to use in malaria endemic area (Nadjm and Beherens, 2012)

The use of malaria nets, insect repellants, spraying insecticides and draining standing water could reduce the risk of the disease (caraballo *et al.*, 2014). There are medications that would not allow malaria disease in people travelling to places where the disease is endemics. Doses of sulfadoxine/pyrimethamine may be recommended in infants, and could equally be use after the first trimester of pregnancy where malaria infection rates are high.

WHO (2014) reported that efforts are ongoing to develop an effective vaccine to prevent malaria. Combination of antimalarial medication that includes artemisin could be used to treat malaria (caraballo, 2014). Mefloquine or sulfadoxine/pyrimethamine can also serve to treat the disease as drugs of second choice (WHO, 2010) where there is non-availability of artemisin, quinine in combination with doxycycline may serve to replace it (WHO, 2010). In areas of high malaria endemics, the disease may be possibly confirmed before treatment commence as a result of drug resistance. Many antimalarial drugs have been resisted by parasites (WHO, 2014)

The tropical and subtropical areas around the equator are malarial endemics (caraballo *et al.*, 2014). Economic development of a nation could be negatively affected by malaria disease (Gollins and Zimmermann, 2007). Bojang *et al.* (2005) reported that 12 billion dollar is lost yearly in Africa as a result of increase in cost of health care and

inability to work. Malaria is commonly associated with poverty and has a major negative effect on economic development (Gollins and Zimmermann, 2007). In Africa, it is estimated to result in losses of US\$12 billion a year due to increased healthcare costs, lost ability to work, and negative effects on tourism (Bojang *et al.*, 2005). Malaria infections in pregnancy has been reported by Akaba *et al.* (2013) to be public health challenge in some parts of the world especially the rural setting whose major occupation is agricultural production.

## MATERIALS AND METHODS

### Sample collection

One hundred (100) blood samples were aseptically collected from pregnant women attending Katameya First Call Hospital, Jebba, Nigeria, from May-July, 2016 by a process of venom puncture with a sterile syringe and needle after an accurate or thorough cleaning of the particular site with a swab containing spirit moistened-cotton. Questionnaire was administered to the pregnant women to ascertain their Age, Area of domicile, Educational status, Parity (Number of children gotten), Use of intermittent preventive treatment (IPT), Use of long lasting insecticide treated net (LLITN), Occupations and Trimester.

### Microscopy

Blood samples were also obtained for thin blood smear for malaria parasite using staining technique. Two (2) mls of blood sample were collected from the out-patients into an E.D.T.A container which was used for the preparation of thin blood film. Using a completely clean grease-

free microscope slide, a drop of blood sample was made onto the slide and then spread the blood on the microscope slide to make a thin blood film using a smooth edged slide spreader. A black lead pencil was used to label the slide with the date and the patient's name and number. Thin blood film was flooded with Giemsa stain for two minutes and then diluted with tap water for five minutes before washing away the staining reagent and the water on the slide. The slides were later viewed under the microscope for the presence of malaria parasites (Cheesbrough, 2006).

### Rapid Diagnostic Test (RDT)

A drop of Blood sample was made on the test strip and five drops of Buffer solution was added at the other end of the strip and was allowed to stand for fifteen minutes to see if there is an appearance of both test and control line which indicates positive test (Presence of malaria parasite) or if only the test line appears which is an indication of Negative result (Absence of malaria parasite).

### Data Analysis

Chi-square test of association was used to determine the association between the socio-demographic factors and the occurrence of Malaria infections in pregnant women. Test of association to determine the association between the socio-demographic factors and the occurrence of malaria was carried out with the use of Chi square statistical tool. The socio-demographic considered in the research are age of the patient, education, area of domicile, parity, use of IPT and LLITN, occupation of the patients and the stages of trimester in which the patients were.

## RESULTS

The highest occurrence of malaria parasites was found to be *Plasmodium falciparum*, 67(72.04%), while the *Plasmodium ovale*, 3(3.23%) occurred as

the least, *Plasmodium vivax* was found to be absent among the pregnant women that consented to take part in the research (Table 1) showed analyses of the species.

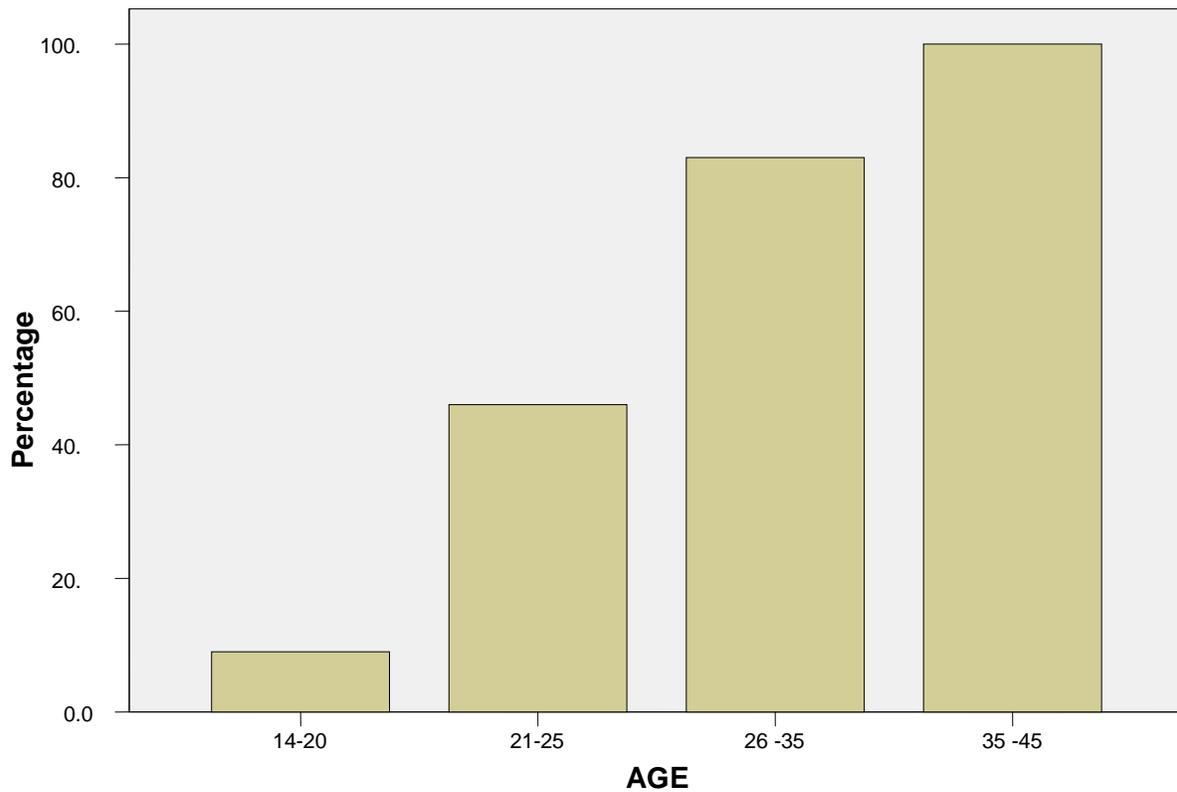
Table 1: Percentage occurrence of *Plasmodium* parasites among pregnant women attending Katameya First – call Hospital, Jebba, Niger State.

SPECIES	No. Examined	No. +v (%)
<i>Plasmodium falciparum</i>	67	72.04
<i>Plasmodium malariae</i>	23	24.73
<i>Plasmodium ovale</i>	3	3.23
<i>Plasmodium vivax</i>	0	0.00
TOTAL	93	100

## AGE

The association of age to the occurrence of malaria in pregnant women indicated that percentage occurrence of malaria increases with increase in age as shown in the figure below. The Chi square analysis

result showed that age of the patient attending Katameya First call Hospital Jebba, Niger state, is significant to occurrence of malaria at 5% with a **P – value = 0.000**.

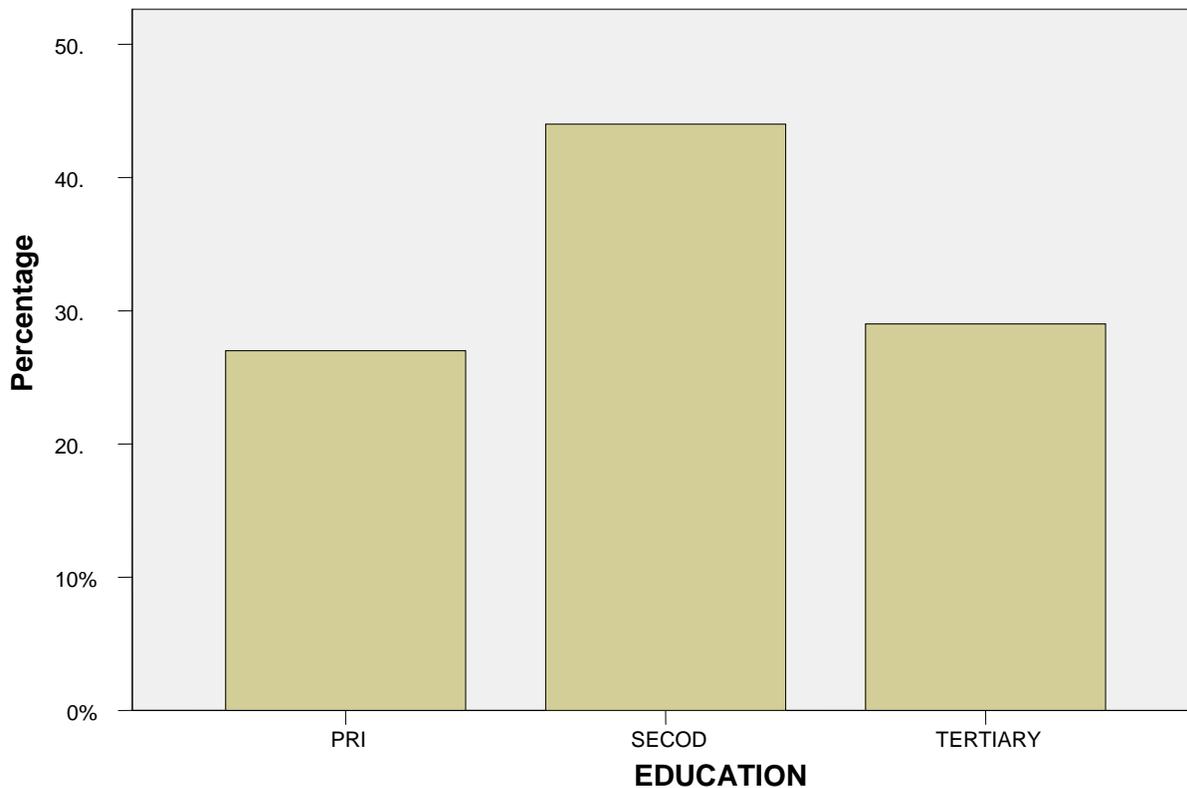


**P - value = 000. (P < 0.05)** Fig 1: Occurrence of malaria by age of pregnant women attending Katameya Hospital, Jebba.

**EDUCATION**

The percentage occurrence of malaria in pregnant women with regards to their level of education indicated that those in Secondary class had the highest percentage of malaria prevalence, while those in the primary class had the lowest

percentage of malaria prevalence. The statistical analysis using Chi square test showed that education of the respondents is statically significant to the occurrence of malaria with **P- value = 0.075**



P - value = 0075.

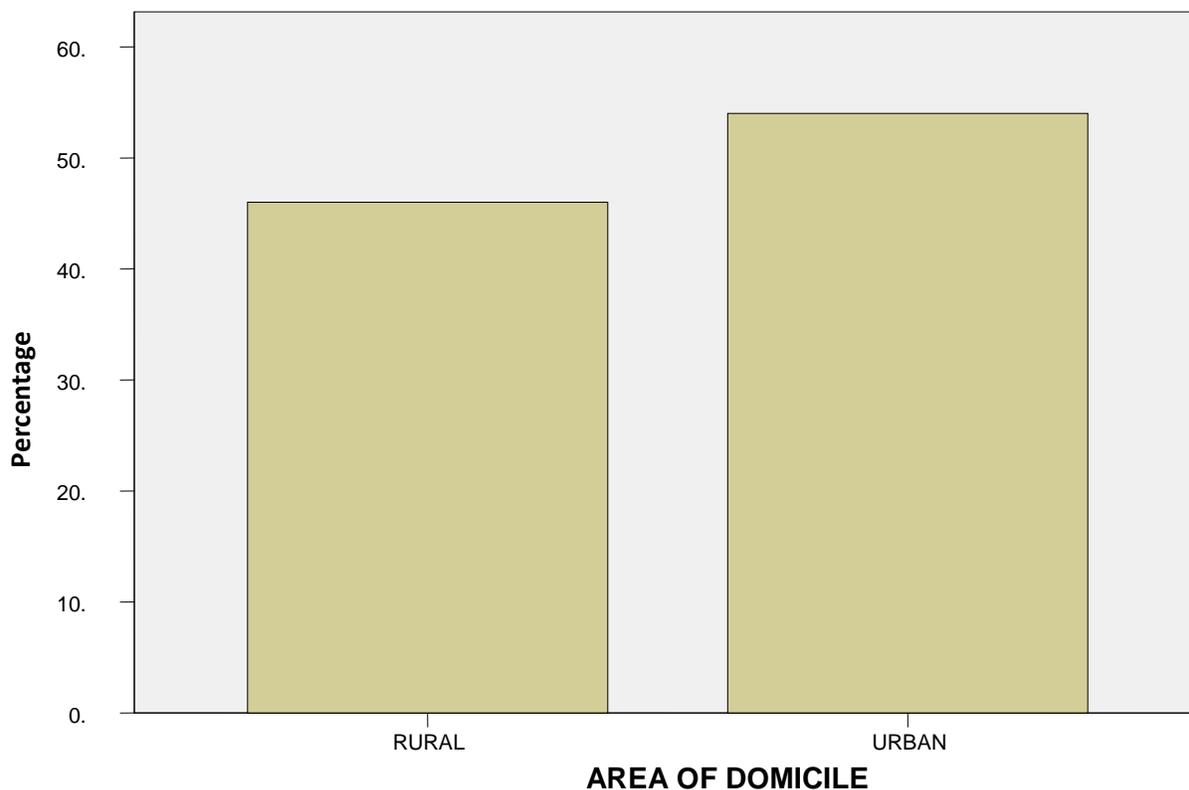
(P < 0.05)

Fig 2: Occurance of malaria by educational status of pregnant women attending Katameya Hospital, Jebba.

**AREA OF DOMICILE**

Area of domicile and the occurrence of malaria in pregnant women indicated that those in the Urban centres had the highest percentage of malaria prevalence than those in the rural areas as indicated below. The Chi square result showed that the area of domicile of the respondents

did not have any association with the occurrence of malaria, as it was not significant at 5% level. This is evident in the curve distribution. The descriptive analysis in fig 3 below indicated that people living in the urban do have malaria than the people in the rural area, however with minimal disparity.



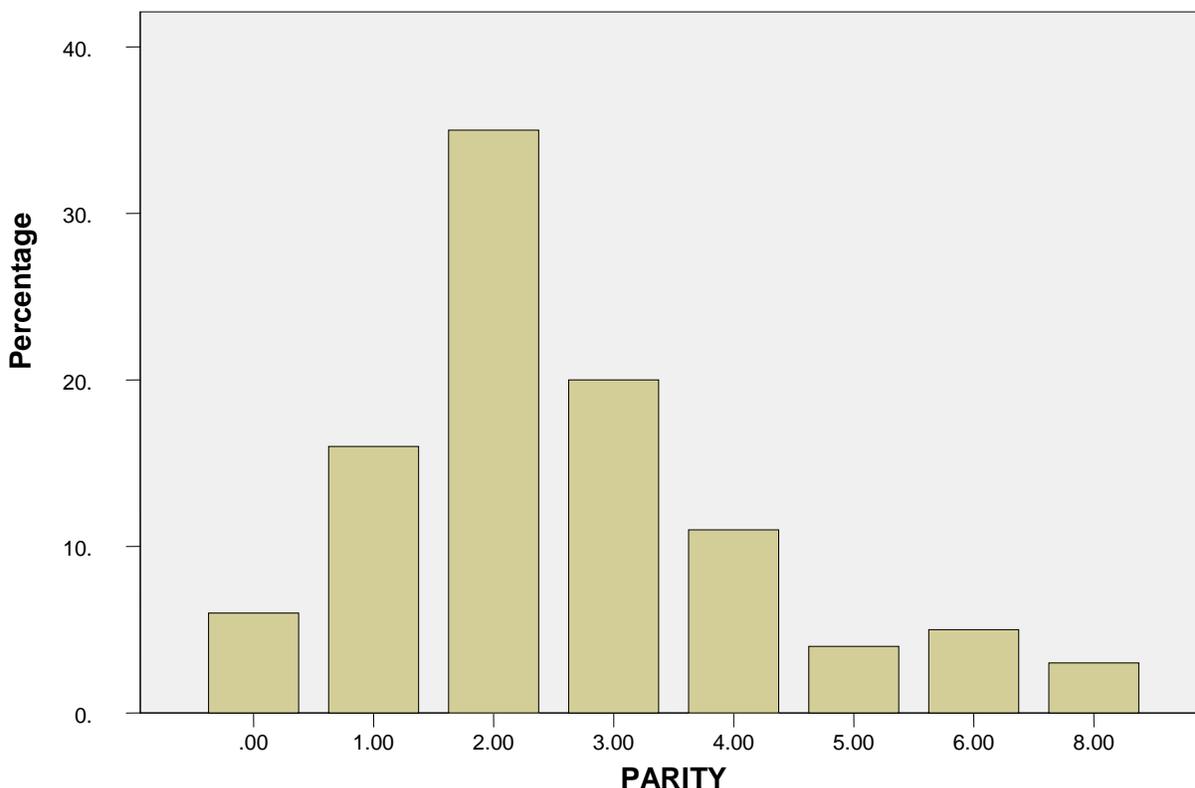
P -Value = 0.424      P > 0.05

Fig 3: Occurrence of malaria by area of domicile of pregnant women attending Katameya Hospital, Jebba.

**PARITY**

Occurrence of malaria in the pregnant women by the number of parity as indicated below in the graph showed that those in the class of 2.00 had the highest percentage of malaria prevalence, while those in the class of 8.00 had the least percentage. There is association between the number of parity of the respondents,

and the occurrence of malaria as the Chi square result showed that parity is significant with **P- value = 0.000**, this means that the number of birth experienced by the patients is related to the occurrence of malaria in them, this is evident in the fig 4 above, with the great disparity in the curve distribution



P - value = 0.000

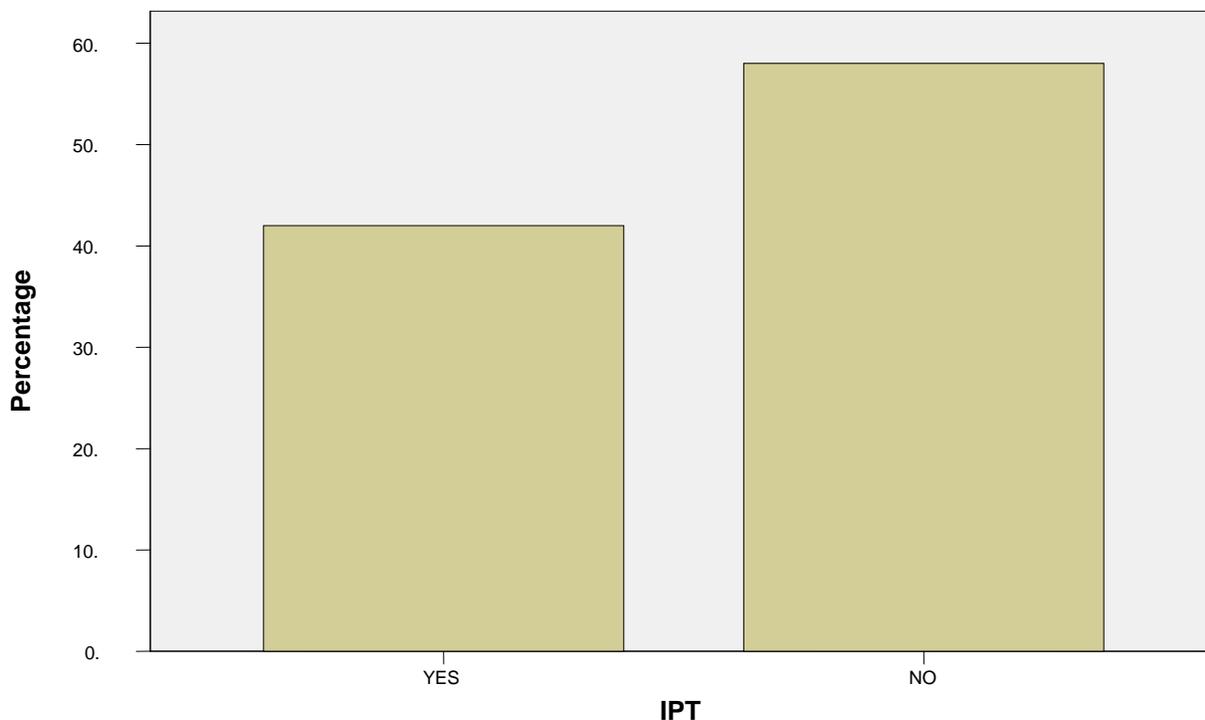
(P < 0.05)

Fig 4: Occurrence of malaria by number of parity of the pregnant women attending Katameya Hospital, Jebba.

**INTERMITTENT PREVENTIVE TREATMENT ( IPT)**

Pregnant women that do not use intermittent preventive treatment had a higher percentage of malaria prevalence than those do not use intermittent preventive treatment as indicated below in the curve. The use of intermittent preventive treatment (IPT) was found

not having association with the occurrence of malaria, as it was not significant at p-value of 0.005. The P-value for the use of Intermittent Preventive Treatment was found to be = 0.110. Fig 5 below showed the graph for the use of Intermittent Preventive Treatment, as there is no much disparity in the curve distribution.



P - value = 0.110

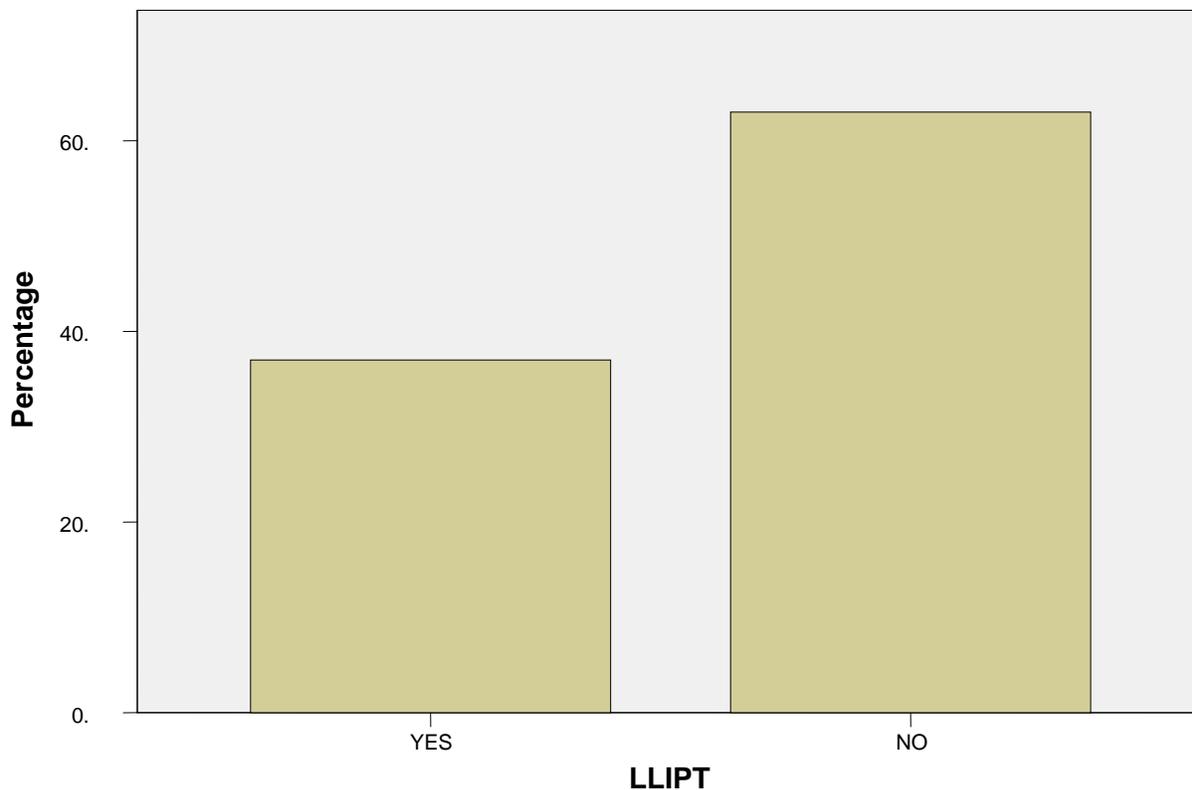
(P > 0.05)

Fig 5: Occurrence of malaria by number of pregnant women with the use of IPT attending Katameya Hospital, Jebba.

**LONG LASTING INSECTICIDE TREATED NETS (LLITN)**

Pregnant women that subscribed to the use of Long Lasting Insecticide Treated Net had a higher percentage of malaria prevalence than those who do not use it as shown in the curve below. Long Lasting Insecticide Treated Net of the

patient was found to be significant to malaria occurrence at 5% statistical significance. There is significance difference (P < 0.005) in the trend of distribution of Long Lasting Insecticide Treated Net as evident in the distribution below in the curve



P - value = 0.009

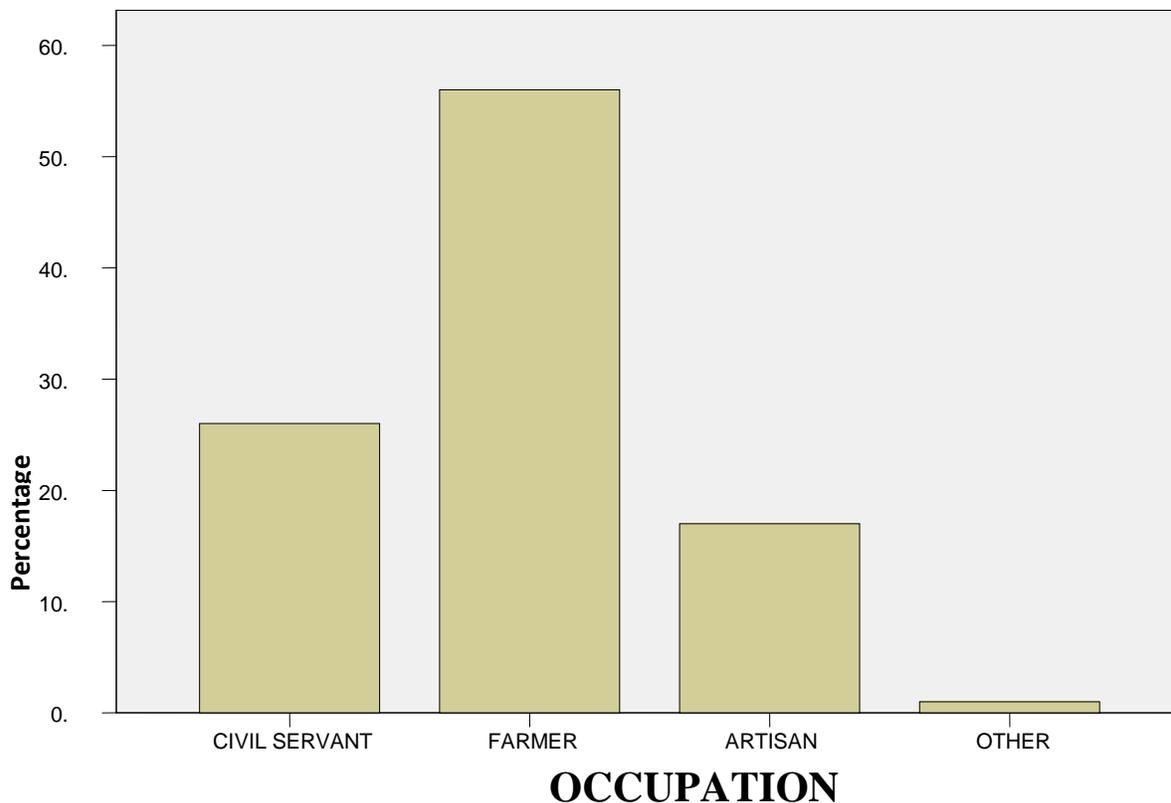
(P < 0.05)

Fig 6: Occurrence of malaria by number of pregnant women with the use of LLITN attending Katameya Hospital, Jebba.

**OCCUPATION**

Pregnant women in the farming occupation had the highest percentage of malaria prevalence, while those in the other category of occupation had the least. The occupation of the respondent was found to be significant to the

occurrence of malaria at 5% statistical significance. There is significance difference (P < 0.005) in the trend of distribution of Occupation as evident in the distribution below in the curve.



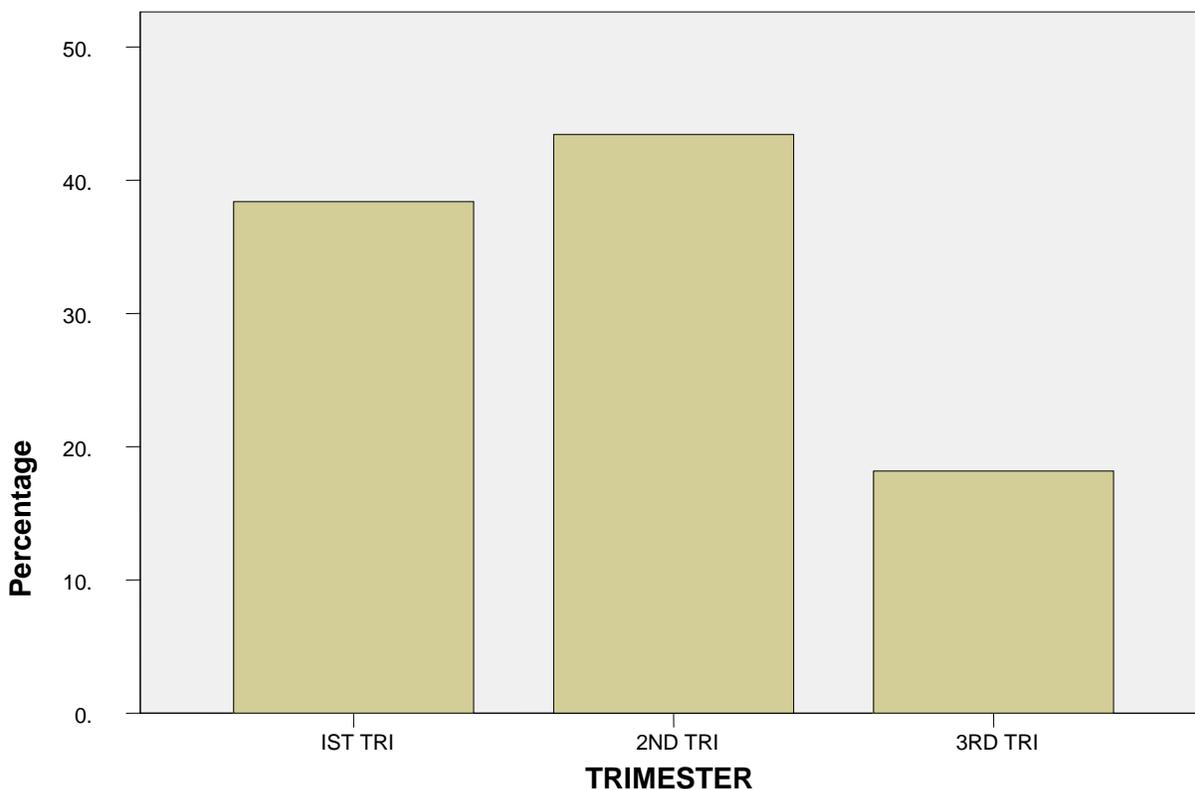
P - value = 0.000 (P < 0.05)

Fig 7: Occurrence of malaria by occupation of the pregnant women attending Katameya Hospital, Jebba.

**TRIMESTER**

Pregnant women in the second trimester had the highest percentage prevalence of malaria, while those in the third trimester had the least. There is association between the stages of trimester of the respondents and

occurrence of malaria as the Chi square result showed that trimester is significant with **P- value = 0.005**, this means that stages of trimester by the patients is related to occurrence of malaria in them, this is evident in the fig 8 below, with the disparity in the curve distribution



P - value = 0.005

(P < 0.05)

Fig 8: Occurrence of malaria by the stages of trimester of the pregnant women attending Katameya Hospital, Jebba.

The result of the Chi square analysis indicated that the age of the patients, Number of Parity, the use of long lasting insecticide preventive treatment, occupation and the stages of trimester of the patients were significant to the occurrence of malaria at 5% level of significance (P<0.05), while the area of domicile and intermittent preventive treatment (IPT) were statistically not significant at 5% level of significance (P>0.05).

## DISCUSSION

Sixty-seven, 67(72.04%) malaria parasites discovered in this study were found to be *Plasmodium falciparum*. The disease caused by this species of *Plasmodium* is called falciparum malaria. It is the specie of plasmodium that causes the malaria with the highest rate of mortality (WHO, 2014). This finding is not suprising, 80% of 438,000 deaths caused by malaria in Africa is said to be traced to *falciparum* species (Gollin and Zimmerman, 2007). Almost every malaria deaths are caused by the *falciparum* (Steffen *et al.*, 2003; WHO, 2008) where he also reported the presence of the species of *Plasmodium* in blood. Twenty three 23(24.73%) of the malaria parasites were *Plasmodium malariae*, this report agrees with the work of Laudau etal. (2014), who reported that plasmodium falciparum causes as high as 80 - 95% malaria infection in tropical Africa.

This research finding reported the association between maternal age and malaria pervasiveness; statistics showed that a woman with pregnancy in an old maternal age has a very high chance of getting infected with malaria, and might likely have parasites of the highest densities, since increase in age could lead to the decrease in immunity. Other discoveries have been reported by researchers in Gabon and Eastern Sudan that malarial predominance decreases with increase in age (Marielle *et al.*, 2003). As found out in this study, the effects of malaria is highest in the 2<sup>nd</sup> trimester, and lowest in the 3<sup>rd</sup> trimester, the effect of the disease in pregnancy has always been found to be very low in 3<sup>rd</sup>

trimester in comparison to other trimesters due to the attainment of specific immunity to the disease that occur in the placenta as a result of early exposure which is in accordance with the findings of staalsoe (2004). Subsequently infection and pregnancies leads to the accumulation of acquired specific immunity (Terkuile *et al.*, 2003). In a malaria endemic area such as Gungu, i.e. one of the study areas of this research, there is the likelihood that the women may have been down with the disease before reporting at the antenatal clinics considered in this research study

In this study, correlations existed between the level of education of the participants and malaria infection. In the patients, it could be that those that have primary education adhere strictly to medication, hence low level of malaria parasites in them. The high level of malaria parasites among patients at the level of secondary education, may be attributed to drug abuse by them, leading to resistance to drugs by the parasites, hence the high percentage of malaria parasites recorded, the variation at the tertiary education level could be attributed to the awareness of the patients at this level, complying to the medication instruction, hence that again reduces the parasites level in these patients. However, in contrast to this finding, research study conducted earlier in Lagos showed that educational status has no significant association with the occurrence of the disease in pregnant women (Agomo *et al.*, 2013).

The number of the children gotten which is (parity) is associated with the occurrence of malaria, according to

statistical analysis in this study, the pregnant women with two number of children recorded the highest number of the malaria incidence, followed by the pregnant women with three children and the women with eight children has the least frequency of malaria infection. This finding is justified by the fact that women that has successive birth are expected to have come down with the different forms of malaria disease caused by the variety of strains of malarial parasites, causing the women to have developed immunity against the parasites, and the level of parasite reduces with successive birth (Beeson *et al.*, 2000).

The result reveals that use of LLITNs has association with malaria occurrence. When comparing women that uses LLITNs frequently with those that does not uses LLITNs frequently, it was found that women that does not uses LLITNs frequently were affected more than those women who uses LLITNs frequently. This result is in agreement with a research conducted in Otukpo area of Nigeria which also indicated that there is increase in malaria occurrence with a decrease in the use of LLITNs (jumbo *et al.*, 2010). WHO (2010) also reported that the use of LLITNs reduces malaria occurrence and malaria death in pregnant women. The use of LLITNs by pregnant women reported in this study was found to less from the target set by all African head of state in a crusade to roll back malaria which was held in Abuja 2000 (Marchant *et al.*, 2002).

It was observed in this study that over 40% of pregnant women practice the use of intermittent preventive treatment (IPT) in other to curb the number of malaria episodes, while over 50% of pregnant women that participated in this

study does not practice the use of intermittent preventive measures, and those that does not use IPT has the highest malaria parasite, than those that use the IPT. This IPT should be provided mostly for Primigravid, multigravid, Secondigravid and pregnant women as they record more malaria parasite in their blood, and this is in accordance with the finding of Kabore (2001).

The area that the pregnant women resides was also considered, to know if it has relationship with the occurrence of malaria, where the pregnant women residing in the urban area has a little more than 50% malaria parasites, that also has close to 50% malaria parasites, compared to the rural dwellers, this proved that malaria is evenly spread across the area of this study, and this might be as a result of them not properly using LLITN, and keeping other necessary things that drastically support the breeds of the mosquito growth, and once there is contact, that is, a bite of mosquito on the body of pregnant women, and where *Plasmodium* is introduced into their blood, they are most likely to be infected, because their immune system are normally compromised with the pregnancy. This however does not conform with the finding of Egwunyenga *et al.* (2001), who reported that the highest malaria parasites were recorded among those living in mud houses.

Occupation has association with the occurrence of the malaria, where the farming recorded the highest number of malaria parasites, which could be as a result of farmers not capable of subjecting themselves to the use of some preventive measures or as a result of some of the villagers captured in this research resides

close to the water such as Kpastuwa, Tsafa, and even Ndafu where they are frequently exposed to some factors that promotes the breeding of mosquitoes.

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