

Malaria and Pre-Eclampsia among Pregnant Women Attending Ante-Natal Clinic in Okigwe Local Government Area.

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Abstract- A total of 1200 pregnant women attending antenatal clinic in Hospitals in Okigwe Local Government Area, were screened for the presence of malaria infection and factors for pre-eclampsia (proteinuria and high blood pressure) using Giemsa stain, dipsticks (Albustix) and sphygmomanometer. The prevalence of malaria infection, proteinuria and high blood pressure among pregnant women attending antenatal clinic in Okigwe Local Government Area (L.G.A) in relation to age group, malaria was highest among 17-21 years (26.1%), followed by the age group of 37-41 (20.6%) and least age group was >42 years (2.7%). The result also showed that the prevalence of malaria was highest at Divine Hospital (17.2%), followed by General Hospital Okigwe (13.9%), and the least was observed at Eve hospital (6.9%), was considered statistically significant. While proteinuria among the pregnant women revealed that the age group of 22-26 years had the highest prevalence rate of 7.5%, followed by 17-21 years (5.5%) and the least was >42 (1.3%). Proteinuria was more prevalent among pregnant women attending Okigwe General Hospital (5.7%), while the least was found at Divine maternity (3.0%). The prevalence of high blood pressure among pregnant women in relation to age group showed that, the age group of 37-41 years had the prevalence rate of 42.8%, followed by 22-26 years (13.9%) and the least prevalent was >42 years (1.3%). General Hospital Okigwe recorded the prevalence rate of 10.4%, and the least was Eve Hospital (5.1%), ($p < 0.05$), age differed significantly in the study population. It is imperative to improve the quality of services in antenatal clinics so as to detect women who are at risk to malaria and complications such as pre-eclampsia.

Index Terms- Malaria, Proteinuria, High blood pressure, Preeclampsia & Pregnancy.

I. INTRODUCTION

P*lasmodium falciparum*, the causative agent of the deadliest form of Malaria (Ekeleme *et al.*, 2014). In tropical countries, malaria and pre-eclampsia are common diseases of pregnancy. They have physiopathologic similarities such as placenta ischemia, and endothelial dysfunction.

When a pregnant woman is affected with malaria parasite, the unborn child is also vulnerable to the disease. Thus, malaria parasite infection in pregnancy is a major cause of low birth

weight, abortion, intrauterine growth retardation, still birth and prenatal mortality.

It has also been reported that a physiologically abnormal state of pregnancy otherwise termed the pre-eclampsia pregnancy, have adverse effects in both function, as well as levels of blood fractions (knopp *et al.*, 2003).

Pre-eclampsia in pregnancy are disorders occurring spontaneously in human females and only during pregnancy. Pre-eclampsia is defined as pregnancy – induced hypertension associated with proteinuria. Pregnancy induced hypertension is defined as hypertension with blood pressure of 140 mmHg systolic or diastolic blood pressure of 90 mmHg diastolic or greater, arising after 20 weeks of gestation in a woman who was normotensive before 20 weeks gestation (Ndao *et al.*, 2009). However, this work is aimed at studying the prevalence of malaria and preeclampsia among pregnant women attending antenatal clinic in Okigwe Local Government Area.

II. MATERIALS AND METHOD

Study Area

This study was carried out at the antenatal clinic in Okigwe Local Government Area, Imo State. The antenatal clinic consist of the following, Divine maternity, Eve maternity and General Hospital Okigwe.

Ethical Clearance

Prior to the commencement of the study, ethical clearance was sought by writing to the Chief medical Director (CMD) of Hospitals in Okigwe Local Government Area explaining the purpose of the study and seek for permission to use the health facility as well as the co-operation of their staff. On receiving approval, officers in charge of the Laboratory section were also consulted having received approval from the CMD.

Distribution of malaria among the pregnant women using CareStart malaria HRP2 and Giemsa Stain.

Whole blood was used for the diagnosis of malaria using parallel Malaria *Plasmodium falciparum* Rapid Test Device (manufactured by GLOBAL DEVICE, USA and INDR Diagnostica, USA). The malaria P.f. Rapid Test Device (Whole Blood) is a qualitative, membrane based immunoassay for the detection of P.f antigen in whole blood.

The method described by Etusim *et al.* (2013) was used for the Giemsa Staining of thick blood film. A thick blood film was made on a grease free slide. Giemsa stain was poured on the film and allowed to stay for 30minutes on the staining rack; the stain was then washed with running water. Finally, a drop of oil immersion was dropped on the stain and viewed through the objective lens (x100).

The distribution of proteinuria (albumin) and high blood pressure among the pregnant women using dipsticks (Albustix)

Proteinuria (albumin) was detected in a fresh urine sample before active labor by semiquantitative dipsticks (Albustix; Bayer Corporation, Elkhart, Indiana).

According to routine practices in maternity ward, measures of blood pressure were done using a sphygmomanometer. Blood pressure measures were taken at the time of admission after a 10-minute rest and the value was recorded. Cases were classified into 3 groups according to National High Blood Pressure Education Program guidelines: first, gestational hypertension (systolic blood pressure of 140 mm Hg or diastolic blood pressure of 90 mm Hg and albumin dosage of 2); second, preeclampsia (systolic blood pressure of 140 mm Hg or diastolic blood pressure of 90 mm Hg and albumin dosage of >2, without seizures); and third, eclampsia (when seizures or coma was associated with high systolic blood pressure of over 140 mm Hg or diastolic blood pressure of over 90 mm Hg with proteinuria).

III. RESULTS

A total of one thousand two hundred (1200) pregnant women attending antenatal clinic in Hospitals Okigwe Local Government were screened for the prevalence of malaria, and factors for pre-eclampsia (Proteinuria & high blood pressure). The result revealed that the prevalence of malaria infection among pregnant women attending antenatal clinic in Okigwe Local Government Area (L.G.A). In relation to age group, malaria was highest among 17-21 years (26.1%), followed by the age group of 37-41 (20.6%) and least age group was >42 years (2.7%). The result also showed that the prevalence of malaria was highest in Divine Hospital (17.2%), followed by General Hospital Okigwe (13.9%), and the least was observed at Eve hospital (6.9%) (Table 1).

Table 2 shows the prevalence of proteinuria among pregnant women attending antenatal clinic in Okigwe L.G.A., the result revealed that the age group of 22-26 years had the highest prevalence rate of 7.5%, followed by 17-21 years (5.5%) and the least was >42 (1.3%). Proteinuria was more prevalent among pregnant women attending Okigwe General Hospital (5.7%), while the least was found at Divine maternity (3.0%).

Table 3 shows the prevalence of high blood pressure among pregnant women attending antenatal clinic in Okigwe L.G.A. in relation to age group, 37-41 years had the prevalence rate of 42.8%, followed by 22-26 years (13.9%) and the least prevalent was >42 years (1.3%). General Hospital Okigwe recorded the prevalence rate of 10.4%, and the least was Eve Hospital (5.1%), Fig. 1, 2, 3 shows the distribution of Malaria, Proteinuria, and High Blood Pressure (HBP) among pregnant women attending antenatal clinic in Hospitals in Okigwe L.G.A. The results showed that the age group of 22-26 years had the highest

prevalence rate to HBP (High Blood Pressure) and proteinuria, while the age group of 17-21 years was more prevalent to malaria.

IV. DISCUSSIONS AND CONCLUSION

Malaria and pre-eclampsia occur frequently in women in tropics and are leading causes of maternal and perinatal morbidities, mortality and fetal growth restriction (Adam *et al.*, 2011). Few data exist concerning the interaction between malaria and pre-eclampsia in Nigeria. However, this research work was done to study the prevalence of malaria and pre-eclampsia among pregnant women attending antenatal clinic in Okigwe Local Government Area, Imo State, Nigeria. In this study, a total of 1200 patients were examined for malaria; proteinuria and high blood pressure which are factors of pre-eclampsia. The result revealed that 457(38.1) were positive to malaria, 154(12.8) were positive proteinuria and 265(22.1) were positive to high blood pressure. This study is consistent with the work of Adam *et al.* (2011) who studied malaria and pre-eclampsia in an area with unstable malaria transmission in Central Sudan and found out that twenty-eight (19.6%) vs. 16 (11.2%); $P = 0.04$ of the cases vs. controls, had placental malaria infections. Five (2%), 1 (2%) and 22 (28.0%) vs. 1, 2 and 13 of the placentae showed acute, chronic and past infection on histopathology examination in the two groups respectively, while 115 (80.4%) vs. 127 (88.8%) of them showed no infection, $P = 0.04$. In multivariate analysis, while there were no associations between age, parity, educational level, lack of antenatal care, blood groups and body mass index and pre-eclampsia; family history of hypertension and placental malaria (OR = 2.3, 95% CI = 1.0-5.2; $P = 0.04$) were significantly associated with pre-eclampsia. Adam *et al.* (2011) concluded that Placental malaria was associated with pre-eclampsia. Wong and Cox (2014) in study of proteomics analysis of preeclampsia, a systematic review of maternal and fetal compartments showed that 12 studies comparing samples from preeclamptic and normotensive pregnancies using mass spectrometry based techniques were selected and 401 proteins with significantly altered expression in preeclampsia were observed across all studies. Inter-study comparison identified 52 proteins as significant in two or more studies. These 52 proteins were enriched for 22 pathways, including several previously implicated in preeclampsia such as hemostasis, immune response, and lipid metabolism which is a focus of this analysis. Significantly, the proteins complement component 4 and apolipoprotein E were observed with aberrant expression at week 12 before the clinical diagnosis of preeclampsia indicating promising roles as clinical biomarkers. Wong and Cox (2014) now concluded that Preeclampsia is a relatively common hypertensive disorder of pregnancy that remains a high cause of maternal and fetal death due to the lack of early detection and treatment options.

Malaria during pregnancy poses a substantial risk to the mother, her fetus and the neonate. Although pre-eclampsia and maternal malaria would be expected frequently to occur concurrently in malarious areas, their interaction on the health of the mother and her baby has been studied as stated by Adam *et al.* (2011). In sub-Saharan Africa, the rates of both preeclampsia and malaria increase during the cooler rainy season (Bergstrom

et al., 1992); however, in non-malarious areas, preeclampsia may also increase during colder months (Magnu and Eskild, 2001). Preeclampsia increased the odds of malaria in Senegal (Sartelet *et al.*, 1996); however, it was not associated with peripheral parasitemia as stated by Dorman *et al.* (2002) or with placental infection by histology in Kenya (Ndao *et al.*, 2009). A strong association was found between active malarial infection (identified by peripheral parasitemia) and bilateral notching of the uterine artery Doppler waveforms in late pregnancy (32–35 weeks' gestation) as observed in women with preeclampsia (Shulman *et al.*, 2001; Ndao *et al.*, 2009). In The Gambia, a 5.4-fold increase in maternal deaths due to eclampsia during the malarial season was observed.

The prevalence of malaria infection among pregnant women attending antenatal clinic, in Okigwe Local Government Area in relation to age group revealed that the age group of 17-21 years had the highest prevalence rate of 26.1%, followed by the age group of 37-41 years which was 20.6% and the least was the age group of >42 years which recorded 2.7%, $P < 0.05$, was considered statistically significant. The malaria infection among the pregnant women was more prevalent within the active child-bearing age. This study is consistent with the work of Adam *et al.* (2011) who studied malaria and pre-eclampsia in an area with unstable malaria transmission in Central Sudan and found out that twenty-eight (19.6%) vs. 16 (11.2%); $P = 0.04$ of the cases vs. controls, had placental malaria infections. Malaria during pregnancy is a major health problem in Sudan, where pregnant Sudanese women are more susceptible to malaria, and it is associated with maternal anaemia and poor maternal and perinatal outcomes as stated by Adam *et al.* (2011)

The prevalence of proteinuria among pregnant women attending antenatal clinic in Okigwe L.G.A. revealed that the age group of 22-26 years had the highest prevalence rate of 7.5%, and the least was the age group of >42 (1.3%). The study is in line with Amin *et al.* (2014) who evaluated the efficacy of spot dipstick analysis and urinary protein-creatinine ratio (UPCR) in hypertensive disease of pregnancy for predicting 24-hour proteinuria. The results showed that seventy-eight patients (76.5%) had significant proteinuria of more than 300 mg/24 h. During pregnancy, the presence of proteinuria along with hypertension (the preeclampsia syndrome) increases the risk of numerous complications in the affected women, the most common being HELLP syndrome and eclampsia. The adverse outcomes associated are premature birth, low birth weight baby, intrauterine growth restriction, stillbirth and death of the newborn. The significance of proteinuria (i.e. proteinuria without hypertension or any other abnormality) is not known with certainty, but it is expected to be associated with increased risk of adverse outcomes. Women with isolated proteinuria may develop hypertension later and progress to preeclampsia or eclampsia (Hollegaard *et al.*, 2013).

The prevalence of high blood pressure among the pregnant women increased significantly within the age group of 22-26 years and 37-41 years had decreased significantly with the age group of >42 years. Ndao *et al.* (2009) conducted a case-control study to explore the relation between malaria and hypertension at Guediawaye, a hypoendemic malarial setting in Senegal. Cases were pregnant women admitted to the delivery unit for hypertension. Controls were pregnant women admitted for

normal delivery, without any history of hypertension or proteinuria during the present pregnancy. Malarial infection was determined by placental tissue examination. From January to December 2002, 77 cases of gestational hypertension, 113 cases of preeclampsia, 59 cases of eclampsia, and 241 controls were enrolled. Placental malarial infection (PMI) was present in 14 cases (6.3%) and in 15 controls (6.2%). The prevalence of PMI was 4.6% for eclampsia, 4.0% for preeclampsia, and 11.6% for gestational hypertension. In multivariate analysis, PMI appeared to be an independent risk factor for gestational hypertension (adjusted odds ratio $\frac{1}{4}$ 2.7, 95% confidence interval: 1.0, 7.6). Ndao *et al.* (2009) found an association between PMI and nonproteinuric hypertension in women living in a malaria-hypoendemic area. However, Muehlenbachs *et al.* (2006) in a study titled hypertension and maternal-fetal conflict during placental malaria concluded that hypertension occurs in young first-time mothers with chronic malaria, and their elevated soluble vascular endothelial growth factor receptor 1 (sVEGFR1) levels suggest they are suffering from preeclampsia.

V. CONCLUSION

Conclusively, it was noted from the research work that malaria infection was high among the pregnant women attending ante-natal clinic in Okigwe L.G.A and this suggest that malaria during pregnancy may be an independent factor for pre-eclampsia. Proteinuria and high blood pressure are the major cause of pre-eclampsia. It is imperative to improve the quality of services in antenatal clinic so as to detect pregnant women who are at risk to malaria and complications such as pre-eclampsia.

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TABLE 1: THE PREVALENCE OF MALARIA INFECTION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN OKIGWE L.G.A

AGE GROUP (YEARS)	NO OF PATIENTS EXAMINED	NO OF PATIENTS INFECTED WITH MALARIA AT DIVINE MATERNITY	NO OF PATIENT INFECTED WITH MALARIA AT EVE HOSPITAL	NO OF PATIENTS INFECTED WITH MALARIA AT GENERAL HOSPITAL OKIGWE	TOTAL
17 – 21	268	70 (7.0%)	22 (8.2%)	38 (14.1%)	48.5
22 – 26	345	55 (6.3%)	29 (8.4%)	58 (16.8%)	41.1
27 – 31	209	29 (6.6%)	13 (6.2%)	25 (11.9%)	32.0
32 – 36	185	21 (6.4%)	10 (5.4%)	21 (11.3%)	28.1
37 – 41	121	25 (33.3%)	7 (5.7%)	16 (13.2%)	33.7
42 >	72	7 (5.5%)	2 (2.7%)	9 (12.5%)	25.0
TOTAL	1200	207 (17.2%)	83 (6.9%)	167(13.9%)	457 (38.0)

P <0.05, WAS CONSIDERED STATISTICALLY SIGNIFICANT.

TABLE 2: THE PREVALENCE OF PROTEINURIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN OKIGWE L.G.A

AGE GROUP (YEARS)	NO OF PATIENTS EXAMINED	NO OF PATIENTS INFECTED WITH PROTEINURIA AT DIVINE MATERNITY	NO OF PATIENT INFECTED WITH PROTEINURIA AT EVE HOSPITAL	NO OF PATIENT INFECTED WITH PROTEINURIA GENERAL HOSPITAL OKIGWE	TOTAL
17- 21	268	11 (4.1%)	12 (4.4%)	15 (5.5%)	14.1
22 – 26	354	9 (2.6%)	15 (4.3%)	26 (7.5%)	14.4
27 – 31	209	7 (3.3%)	9 (4.3%)	11 (5.2%)	12.9
32 – 36	185	5 (2.7%)	7 (3.7%)	9 (4.8%)	11.3
37 – 41	121	3 (2.4%)	4 (3.3%)	6 (4.9%)	10.7
42 >	72	2 (2.7%)	1 (1.3 %)	2 (2.7%)	6.9
TOTAL	1200	37 (3.0%)	48 (4.0%)	69 (5.75)	154 (12.8)

P < 0.05, WAS CONSIDERED STATISTICALLY SIGNIFICANT.

TABLE 3: THE PREVALENCE OF HIGH BLOOD PRESSURE AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN OKIGWE L.G.A

AGE GROUP (YEARS)	NO OF PATIENTS EXAMINED	NO OF PATIENTS WITH HIGH BLOOD PRESSURE AT DIVINE	NO OF PATIENT WITH HIGH BLOOD PRESSURE AT EVE	NO OF PATIENT WITH HIGH BLOOD PRESSURE AT GENERAL HOSPITAL OKIGWE	TOTAL
17 – 21	268	19 (7.0%)	15 (5.5%)	30 (11.1%)	64 (23.9)
22 – 26	345	22 (6.3%)	21 (6.0%)	48 (13.9%)	26.4
27 – 31	209	14 (6.6%)	11 (5.2%)	21 (10.0%)	22.0
32 – 36	185	12 (6.4%)	9 (4.8%)	15 (8.1%)	19.4
37 – 41	121	7 (5.7%)	5 (4.1%)	9 (7.4%)	17.4
>42	72	4 (5.5%)	1 (1.3%)	2 (2.7%)	9.7
TOTAL	1200	78 (6.5%)	62 (5.1%)	125 (10.4%)	265 (22.1)

P <0.05, WAS CONSIDERED STATISTICALLY SIGNIFICANT. **BP ≥140/90MMHG** WAS CONSIDERED HIGH BLOOD PRESSURE

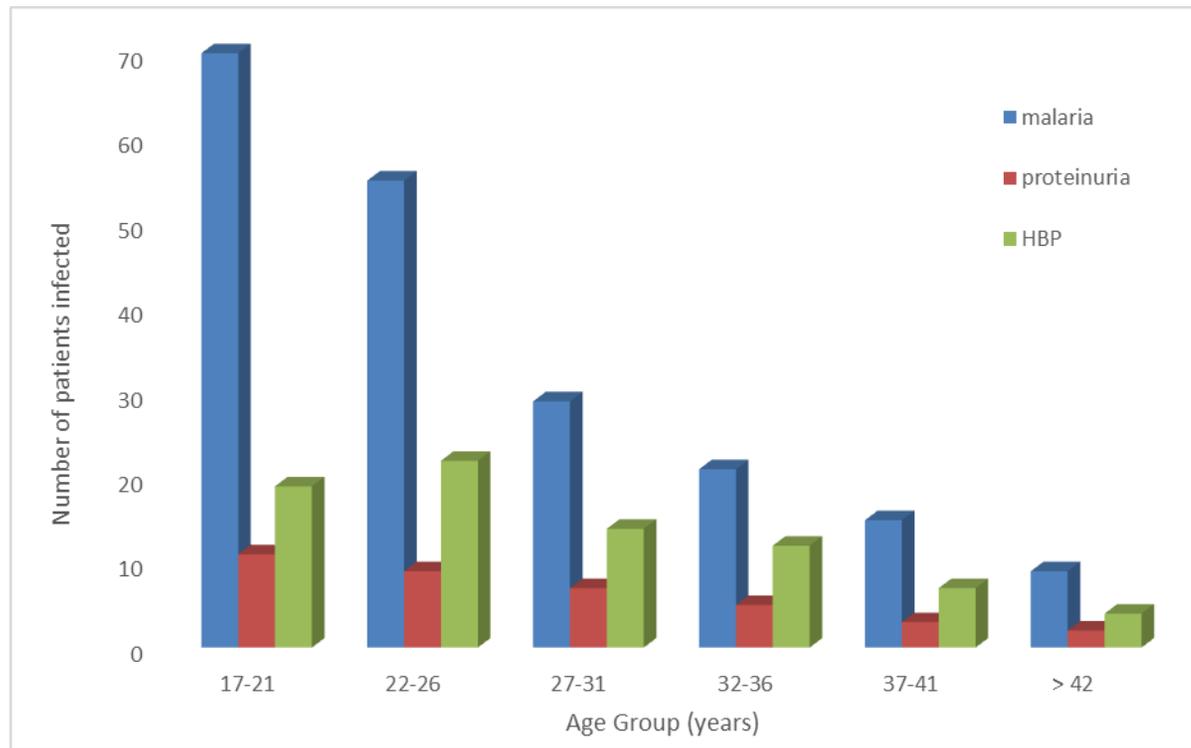


FIG. 1: DISTRIBUTION OF MALARIA, PROTEINURIA, AND HIGH BLOOD PRESSURE AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT DIVINE HOSPITAL IN OKIGWE L.G.A.

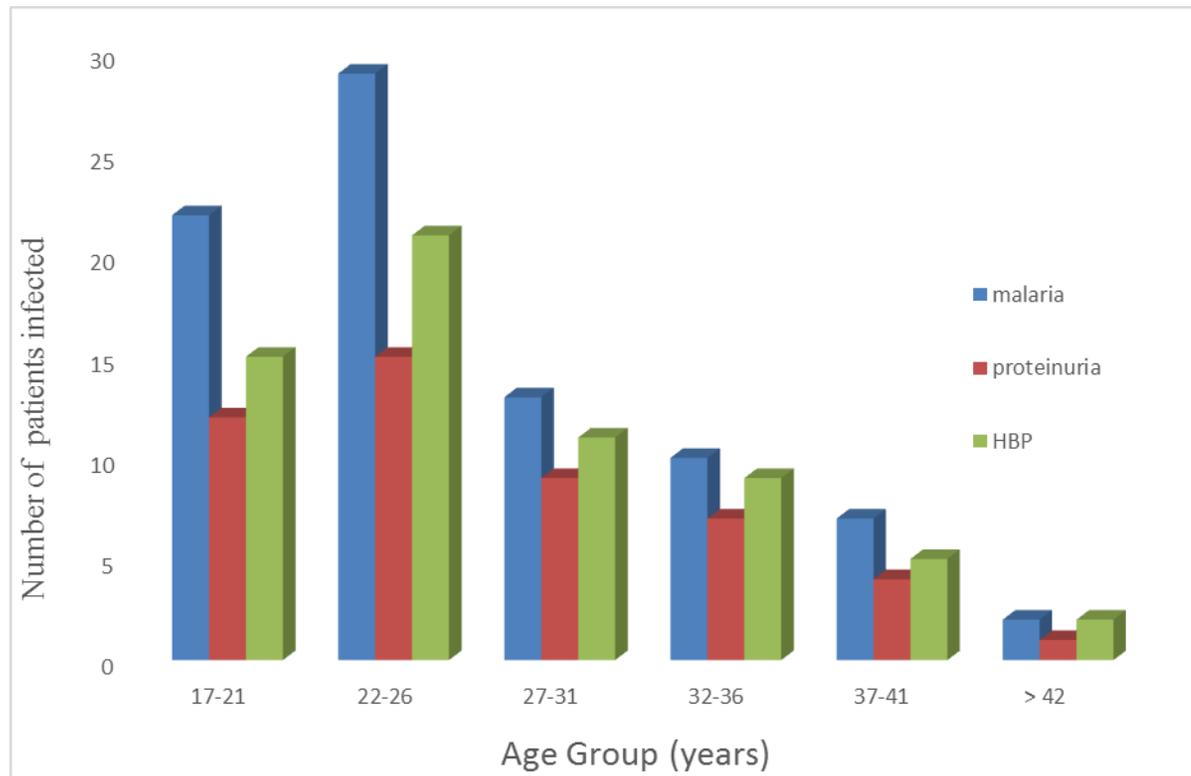


FIG. 2: DISTRIBUTION OF MALARIA, PROTEINURIA, AND HIGH BLOOD PRESSURE AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT EVE HOSPITAL IN OKIGWE L.G.A.

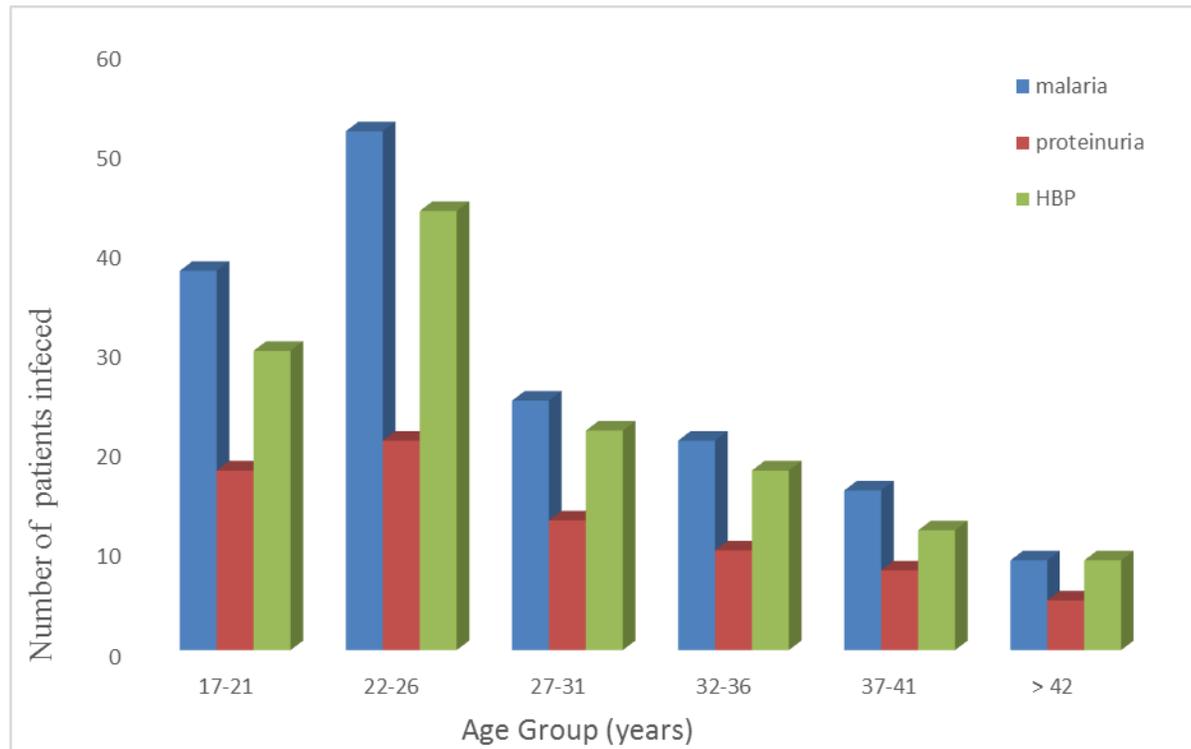


FIG.3: DISTRIBUTION OF MALARIA, PROTEINURIA AND HIGH BLOOD PRESSURE AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT OKIGWE GENERAL HOSPITAL IN OKIGWE L.G.A.

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