### PREVALENCE OF MALARIA PARASITES AMONG PATIENTS ATTENDING GENERAL HOSPITAL WUSE, ABUJA

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### ABSTRACT

Malaria still remains a health challenge in Nigeria and even though a lot of efforts have been made in controlling the rate of infection, several people are still at risk of the parasitic infection. This study determined the prevalence of malaria parasites among patients attending General Hospital Wuse, Abuja. The sample population included 232 out-patients who presented with symptoms of malaria infections at the hospital. Five milliliters (5mls) of blood was collected from the patient into well labeled ethylenediaminetetraacetic acid tubes and malaria parasite was examined using a microscopy. Chi square ( $\chi^2$ ) test was used for data analysis at 0.05 probability level. The overall prevalence of malaria was 45.7%. There was significant difference in the prevalence of malaria between microscopy and RDTs (p < 0.005). Age groups 21 - 30 had the highest prevalence of 29.2%, followed by 17.9% in 41 - 50 age groups. The least prevalence of 4.7% was seen in age groups 51 and above. Patients who sleep under mosquito net (22.6%) had less prevalence compared to 77.3% recorded among patients that did not sleep under mosquito treated net. Prevalence of malaria parasites based on gender recorded in this study is higher in females 71 (66.9%) than males 35 (33.0%). A malaria prevalence rate of 45.7% is considered high and should be a cause for significant concern and urgent efforts of control strategies in the affected Area. Excellence

Key Words: Abuja, Malaria, Parasite, Patients, Wuse.

### **1.0 Introduction**

Malaria still remains one of the most important human diseases throughout the tropical and subtropical regions of the world as there were an estimated 249 million malaria cases in 85 countries, an increase of 5 million cases in the year 2022 compared with 2021 with Nigeria

being among the main countries contributing to the increase of the infection (World Health Organization [WHO], 2023).

It is a leading cause of death and disease in many developing countries, where young children and pregnant women are the groups most affected. Forty-percent (40%) of the world's populations live in malaria-endemic areas (WHO, 2015). Ninety six percent (96%) of deaths due to malaria occur in 29 countries, with four countries accounting for just half of all malaria deaths globally in 2022-Nigeria (31%), the Democratic Republic of Congo (12%), Niger (6%) and the Republic of Tanzania (4%) (WHO, 2022).

Malaria is a disease caused by a single-celled parasite of the genus *Plasmodium* which is spread through the bites of infected mosquitoes. The parasites enter a person's bloodstream and travel to the lever. When the parasites mature, they leave the liver and infect red blood cells. A mosquito becomes infected by feeding on a person who has malaria. If this mosquito bites you in the future, it can transmit malaria parasites to you. Once the parasites enter your body, they travel to your lever- where some types can lie dormant for as long as a year. When the parasites that cause malaria affect red blood cells, people can also catch malaria from exposure to infected blood including; from mother to unborn child, through blood transfusion, and by sharing needles used to inject drugs. This is when people typically develop symptoms. If an uninfected mosquito bites you at this point in the cycle, it will become infected with your malaria parasites and spread them to other people it bites. People who have malaria usually feel sick with high fever and shaking chills (Abdul Rahman *et al*, 2023).

In Nigeria, up to sixty-percent (60%) of out-patients attendance in health facilities and thirty percent (30%) of all hospital admissions are due to malaria (PAN, 2024). The World Health Organization estimated that Nigeria had nearly 67 million cases in 2022 accounting for 27% of the global malaria burden. Also in 2022, Nigeria accounted for 31 percent of the global deaths in children under the age of five (FMoH, 2023).

Epidemiological studies shows that parasitic infections are among the most common infections and one of the biggest health problems of human society worldwide (Cowman *et al.*, 2016).

One of the consequences is unclean environment, stagnant water and breeding site of mosquitoes which leads to increased interaction between *Anopheles* mosquitoes and humans. Such interactions escalate the spread of vectors and the chances of transmission of vector-borne infections (WHO, 2014).

Most people are suffering from malaria infection particularly children and the rate of the infection is on the increase. This rate is mostly unknown due to asymptomatic individuals not until these individuals come down with symptoms of these diseases.

This study is to educate the public and contribute to the body of existing literatures on this field of study particularly in this study area and to also investigate the prevalence of malaria parasites among patients attending General Hospital Wuse Abuja.

### 2.0 Materials and Methods

# 2.1 Study Area Integrity, Innovation, Excellence

The study was conducted in General Hospital Wuse II Abuja, Nigeria. Situated in the middle of the country, Abuja has an Area of 1,476km<sup>2</sup> (570 square miles) it is situated on latitude 9°4' North and longitude 7°29' East and about 360 meters (1,180 feet) above the sea level. Abuja is the Federal Capital Territory and eighth most populous city in Nigeria with a population of 1,693,400 people (Ogbuenyi, 2022). It is a planned city built mainly in the 1980s based on a master plan by International Planning Associates (IPA) and declared capital on 12<sup>th</sup> December 1991 (Bolagun & Olayinka, 2001). Wuse is among the six metropolitan district located in the Abuja Municipal Area Council. Its Geographical coordinates is 9° 4' 14" N 7° 28' 3" E. It hosts



major federal government offices and private businesses. It is intertwined with Central Area hosting the Three Arms Zone, Utako, District and Garki District (Oyoyo, 2024; Popoola, 2024).

The sample population includes out-patient presented with symptoms of malaria infections attending General Hospital Wuse Abuja.

### 2.2 Sample size determination

Using the 2022 estimated population data of Abuja, the Federal Capital Territory, Wuse has population of 92,664 people, to calculate the sample size with the precision and absolute error of 0.05 and type 1 error of 0.0025 using the formula by Yamane (1967).

$$n = N/(1 + N (e)^2)$$

Where n signifies the sample size, N signifies the population under study, and e signifies the margin of error. Hence 232 patients were recruited for this study.

### 2.3 Ethical Consideration

The work received ethical permission from the Ethical Review Committee on Human Research, Federal Medical Centre, Keffi, Nigeria (FMC/KF/HREC/0207/23) following a research proposal presentation in the Committee's ethical screening interview. The approval was given on the agreement that all internationally acceptable ethical standards governing conducts of research should be strictly adhered accordingly and all rights and privileges of the volunteering participants be respected.

Permission was obtained from the head of Laboratory General Hospital Wuse and patients were consented on the objective of the study.

### 2.4 Inclusion criteria

The study involved pregnant women, children and adults that attended General Hospital Wuse II Abuja who gave their consent to participate in this study. Patients who did not consent to participating in the study were excluded.

### 2.5 Sam<mark>ple collectio</mark>n

Five milliliters (5mls) of blood was collected from the patient using a well labeled ethylene diamine tetra-acetic acid (EDTA) vacutainer tube. The study was conducted within the period of Six (6) month (June to November 2023).

### 2.6 Microscopic analysis

Microscopic analysis was carried out at the General Hospital Wuse Laboratory. Thin and thick blood films were prepared on the same labeled slides using peripheral blood samples in the field. The slides were fixed in methanol and stained using 10% Giemsa stain solution for ten minutes. Giemsa stock solution was diluted with distilled water of pH 7.2. The stain was washed off gently and slides air-dried before being examined under  $\times 100$  oil immersion lens (Cheesbrough, 2009). For positive slides, number of parasites was counted. Slides were considered negative when no parasite was detected after examining 100 microscopic fields.

### 2.7 Data analysis

Data was analyzed using (SPSS) software version 23.0. Simple frequencies and tables were generated, while categorized variables were compared using Chi-square test. p-value less than 0.05 ( $p \le 0.05$ ) was considered statistically significant.

### 3.0 Results and Discussion

### **3.1** Prevalence of Malaria Parasites among Patients attending General Hospital Wuse II based on Category of Patients

Two hundred and thirty-two (232) patients that include pregnant women, children and adults were recruited for the study. The prevalence of malaria was 45.7%. The percentage of patients who tested positive was below 50% respectively (Table 1). Previous local studies have reported higher values such as 81.9% in study by Oladeinde *et al.*, in Edo State (Oladeinde *et al.*, 2012), 63.3% in a 2015 study in Bayelsa State (Abah & Joe-Cliff, 2016), and 63% in a 2019 study in Ekiti State (Simon-Oke *et al.*, 2019). These studies all used microscopy for parasite detection. Microscopy, although considered as the gold standard for malaria diagnosis, is heavily reliant on the expertise of the microscopist.

Table 1: Pi	revalence	of Malaria	Parasites	among	Patients	attending	General	Hospital
Wuse II bas	sed on Ca	tegory of Pa	tients					

Category of Patients	No. Examined	No. Positive (%)
Pregnant Women	59	22 (37.3)
Children	55	25 (45.5)
Adult	118	59 (50.0)
Total	232	106 (45.7)

 $\chi^2 = 39.178$ , Degree of freedom = 2, p = <0.001

**Key:**  $\chi^2 = chi square$ , No. = Number, % = Percentage, RDT = Rapid Diagnostic Test Kits.

A Tanzanian study compared the results of routine microscopy for malaria diagnosis to expert microscopy and reported 53.1% of slides positive by health facility routine microscopy but only 2.1% positive by expert microscopy (Lubell et al., 2017). This difference is quite significant. However, the findings in this study is higher than the 83 (23.3%) prevalence of malaria as reported by Nwaneli et al., 2020 in a hospital-based study in a developing community in South-East Nigeria, also, a Nigerian study described a rigorous methodology involving confirmation by three independent microscopists who had all received a thorough training prior to their study, reported a prevalence of 16.9% in children under 5 years (Oyibo et al., 2023). This study revealed that 22 (37.3%) out of 59 pregnant patients were found with malaria infection, this is higher than the findings of Oyerogba et al., 2023 who worked on the prevalence of malaria parasitemia among pregnant women at booking in Nigeria and found 26 (8.70%) out of 300 pregnant women to be positive of the infection. Percentage of malaria prevalence in children in this study is 10 (18.2%) out of 55 which is slightly lower than the 18.9% reported by Taye and Alexander, (2022) in a cross-sectional analysis in Akure, Nigeria. According to the world health organization, malaria burden disproportionately affects population groups and the burden of malaria are more prevalent among children and pregnant women because infants, and pregnant women are at risk of clinical episodes from their low reduced or no protective immune mechanism to malaria infection (WHO, 2019; Artavanis-Tsakonas et al., 2003; Doolan et al., 2009).

## **3.2** Prevalence of Malaria Parasites among Patients attending General Hospital Wuse II based on Gender of patients

Table 2 shows that the prevalence of malaria parasites among patients based on gender having 35 (33.7%) prevalence among 80 male samples examined for malaria parasites while 71 (66.9%) prevalence was recorded out of 152 female patients. The result show significant



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difference in the prevalence malaria parasites among patients base on gender ( $\chi^2 = 18.558$ , Degree of freedom = 1,  $p = \langle 0.001 \rangle$  as prevalence in female (66.9%) is higher than male (33.0%). It was higher among the females than the males. This is in line with the findings of Amadi et al., (2018), Ocheje and Mustapha (2016), Chijoke-Nwauche and Sam-Ozini (2017), Egbom and Nzeako (2017) and Okonko et al., (2017) but in contrast with the findings of Abah and Temple (2015), Wokem et al., (2020), and Taye and Alexander, (2024) who recorded a higher prevalence among the males. Higher prevalence among the females in this study could be attributed to greater exposure of women in their immediate environment due to their routine household activities at dusk and dawn, especially in the rural settings where they have to prepare meals and carry out their domestic chores outside their houses It could also be attributed to immune suppression due to pregnancy (Belete and Roro, 2016).

Table 2: Preval	lence of	Malaria	<b>Parasites</b>	among	<b>Patients</b>	attending	General	Hospital
Wuse II based o	n Gende	er						

Category of Patients	No. Examined	No. Positive (%)
Male	80	35 (33.0)
Female	152	71 (66.9)
Total	232	106 (45.6)

 $\chi^2 = 18.558$ , Degree of freedom = 1, P = <0.001; **Key:**  $\chi^2$  = chi square, No. = Number, % = Percentage

### 3.3 Prevalence of Malaria Parasite Among Patient attending General Hospital Wuse II based on Age groups.

The result based on age group showed that the age group 21 - 30 had the highest prevalence of 29.2%, followed by 17.9 % in 41 - 50 age groups. The least prevalence of 4.7% was seen in 50 above age groups (Table 3).

Table 3: l	Prevalence	of Malaria	Parasite Among	Patient atten	ding Gen <mark>e</mark>	eral Hospita	l Wuse
II based	on Age gro	ups.		$\sim$			

Age group	No. Examined	No. Positive (%)
0-5	22	10 (9.4)
6 – 10	19	11 (10.3)
11 – 20	24	15 (14.1)
21 – 30	ntegritty, Inne	ovati <sup>31 (29.2)</sup> xcel
31 - 40	35	15 (14.1)
41 - 50	38	19 (17.9)
51 and above	10	5 (4.7)
Total	232	106 (45.6)
2 26 200 D		0.001

 $\chi^2$  = 36.399, Degree of freedom = 6, P = <0.001 **Key:**  $\chi^2$  = chi square, No. = Number, % = Percentage

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There is significant difference in the prevalence of malaria based on age groups ( $\chi^2 = 36.399$ , Degree of freedom = 6, p = <0.001). However this agrees with the findings of Dicko, *et al.*, (2003) who opined that people with older age were susceptible to malaria because of reduced immunity. Antibody levels have been noted to increase with age and exposure to malaria parasite in hyper endemic areas. It was also noted that most cases of severe clinical malaria occurred among children while constant exposure confers some levels of partial immunity in terms of clinical symptoms and parasitaemia burden (WHO, 2018).

### 3.4 Prevalence of Malaria Parasite Based on the Factors that Influence Infections

Table 4 shows the prevalence of malaria parasite based on the influencing factors which include level of education and use of Insecticide Treated Nets (ITNs) showed that there was a significant difference in the prevalence of malaria ( $\chi^2 = 15.233$ , Degree of freedom = 3, p = 0.002) as patients who are not educated had the highest prevalence of 64 (60.3%).

Risk <mark>factor</mark> s	No. tested	Microscopy No. positive (%)	χ <sup>2</sup> P-value
Level of Education			
Educated	122	42 (39.6)	
Non Educated	110	64 (60.3)	-
Total	232	106 (45.6)	
Use of ITNS	8		
Yes	75	24 (22.6)	38.288 <0.050
No	157	82 (77.3)	
Total	232	106 (45.6)	7
<b>Kow</b> $u^2$ - chi square N	Io – Numbor 0	- Dorcontago	

Table 4: Prevalence of Malaria Parasite Based on the Factors that Influence Infections

**Key:**  $\chi^2 = chi square$ , No. = Number, % = Percentage

Patients who sleep under mosquito net (22.6%) had less prevalence compared to 77.3% recorded among patients that did not sleep under mosquito net. The result showed that patients who used Long Lasting Nets (LLINs) or Insecticide Treated Nets (ITNs) had low level of malaria infection compared with those that do not use the net due to personal reasons. This agrees with Simon-Oke *et al.*, (2018) who reported that the majority of respondents having malaria infection in five major communities in Ikenne LGA, Ogun State, Nigeria were not sleeping under LLINs. Public enlightenment on the proper use of ITNs should be further encouraged in the study area, Dada-Adegbola, et al., (2018) stated that ITNs have been shown to be effective in malaria control and Jemimah, et al., (2019) observed low malaria prevalence among those that use ITNs. Also, the patients might have been exposed to the vector (mosquito) from the environment probably, before sleeping under the nets as well as noncompliance to the use of ITNs by majority of the people living in the study area because more than half of the people in a community must use ITNs for it to be effective (Olawumi et al., 2015). The use of ITNs has effect on the malaria prevalence however, knowledge of mosquito as a vector of malaria could play a significant role in the transmission of malaria in the study area. Free or subsidized insecticide treated bed nets (ITN) should be made available to mothers so that the infection of malaria could be controlled in children and Government agencies and health facilities should implement free medical treatment for under five children. Also, blood donors must be disqualified if found infected with malaria parasiteamia after screening.

### 4.0 Conclusion

This study determined the prevalence of malaria parasites among patients attending general hospital Wuse, Abuja. The findings revealed a prevalence of 45.7%, among both young and older age patients thus indicating that malaria is still endemic in the study area. Females had higher prevalence than the males and statistically, there was a significant difference (p<0.05). This could be attributed to greater exposure of women in their immediate environment due to their routine household activities. Age groups 21 - 30 had the highest prevalence of 29.2%, followed by 17.9 % in 41 - 50 age groups, and the least prevalence of 4.7% was seen in 50 above age groups. There is significant difference in the prevalence of malaria based on age groups (p<0.05). The prevalence of malaria parasite based on the influencing factors such as the level of education of patients and use of Insecticide Treated Nets (ITNs) showed that there was a significant difference in the prevalence of malaria (p<0.05) as patients who are not educated had the highest prevalence of 64 (60.3%). Patients who sleep under mosquito net (22.6%) had less prevalence compared to 77.3% recorded among patients who do not sleep under mosquito net. A malaria prevalence rate of 45.7% is considered high and should be a cause for significant concern and urgent efforts of control strategies in the affected area.

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### **Conflict of Interest**

The authors declare no competing interest.

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