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# Malaria in Kebbi state: A study of a demonstrable presence of malaria parasite among the residents of some communities around selected health facilities in kebbi state

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**Abstract:** Malaria infection is a major public health emergency that requires prime- concern due to its high cause of morbidity and mortality. This study investigated the recurrence of malaria infection in patients attending selected Kebbi State health facilities, Kebbi state Nigeria. Random sampling techniques were used. A total of 1200 samples were collected; thick films stained with Field stain A&B) and thin films (stained with3% Giemsa) were examined microscopically. Out of this samples 530 (44.16%) were infected, with total parasite density of 2107518/ul. plasmodium falciparon was the only species found. The highest infection 61 (61%) was Sir Yahaya Memorial Hospital (SYMH) Birnin kebbi with statewide infection 61 (5.08%) and parasite density 248616/ul followed by Kebbi Medical Center along Kalgo road Birnin kebbi, 59 (59%)with statewide infection of 59 (4.92%)and parasite density 203540/ul and the least was General Hospital Jega 24 (24%) with state wide infection of 24 (2%) and parasite density, 137696/ul ($p<0.05$). Kebbi South had the highest infection rate, 215 (53.75%) with statewide infection of 215 (17.92%) and parasite density, 802100/ul whereas the least was recorded in Kebbi East134 (33.5%) with parasite density 685600/ul and statewide infection of 134 (11.16%). Consistent statewide investigation and sustained awareness should be carried out to track progress and identify areas of data driven intervention needs for smart decision to combat malaria.

**Keywords:** Malaria parasite, Kebbi state, health facilities.

**Introduction:** Malaria is a major public health problem and cause of suffering and premature death in tropical and sub-tropical countries (Nwaorgu and Orajaka 2011). It is caused by parasite Plasmodium transmitted through the bite of an infected female Anopheles mosquito (WHO 2018) Globally, there were 229 million, 244 million and 249 million cases in 2019, 2021 and 2022, respectively (Kassam et al 2021; WHO 2023).

Despite being preventable and curable, Nigerian accounted for 25% of global malaria cases followed by Democratic Republic of Congo with 11% in 2017 (WHO 2018). And Kebbi state hold first position in malaria infection in the whole federation of Nigeria. The most vulnerable groups are children who accounted for 61% (266,000) global malaria deaths. Other vulnerable groups are pregnant women, travelers, people living with HIV/AIDs (WHO 2018). There are five Plasmodium species (Plasmodium falciparum, P. ovale, P. vivax, P. malariae and P. knowlesi) known to cause malaria in humans. The most deadly and prevalent on African continent is the P. falciparum. Symptoms of malaria include fever, chills, headache, fatigue, confusion, seizures, and difficulty in breathing black blood urine and jaundice {WHO 2018, 2023}.

Although malaria programmes were disrupted by COVID 19 pandemic, it was estimated that 174 million and 184 million cases were averted in 2020 and 2021, respectively. Deaths averted were 886,000 in 2020 and 948,000 in 2021(World Malaria Report, 2023). The pursuit for malaria free world encouraged this research to be carried out long time ago.

Malaria can be prevented by sleeping under Long Lasting Insecticidal Nets (LLINs), windows and doors screening, indoor spray of insecticide, wearing protective clothing and use of chemoprophylaxis. Elimination of vector breeding sites such as collections of water around human habitat can also help break transmission (WHO2018).

Malaria vaccines RTS/SAS01and RS21/Matrix-M are recommended for prevention in young children. The best treatment for P. falciparum malaria is artemisinin-based combination therapy (WHO 2018, 2023).

There have been report of high malaria prevalence in Kebbi State 78.2% (Yusuf Kanya et al 2022). 43.1% (Rupashree Singh et al. J Vector Borne 2014)and 56.28% ( Iboyi Nathaniel Onuche

Admiralty university of Nigeria 2017). This study was necessitated by the need for more investigation on malaria infection (with parasite density inclusive) to provide information, which will influence policy development for data driven interventions in effort to control/elimination malaria in Kebbi state in particular and Nigeria in general.

## METHOD

Study areas

Kebbi State is located in Northwestern part of Nigeria with coordinates 12.4376*N and 4.2078*E. It is bounded by Sokoto state to the east and North, Zamfara state to the east, Niger state to the South, Benin Republic to the South West and Niger Republic to the West. It is made up of 21 Local Government Areas and three land administration zones, 35 districts and 4 Emirates Councils. Figure 1 shows study location in Kebbi State. It has a land mass of 37,6999km2 with projected population of 6,001,610 2023. Kebbi state has a total annual rainfall of 787.53 and 112.21mm and an annual mean temperature of

65°F to 104°F.e.


**fig1. Map of Kebbi State showing the sampling area with an insert of map of Nigeria showing Kebbi state.**

**Source: ESRI Open Street Map.**

### Study design

Random sampling technique was used. Twelve (12) secondary health facilities (100 samples from each) were randomly selected. Kebbi State was stratified into 3 geographical zones; Kebbi Central, Kebbi North and Kebbi South for administrative conveniences. Kebbi Central consists of Sir Yahaya Memorial Hospital (SYMH) Birnin Kebbi, Kebbi Medical Center, Birnin kebbi, General Hospital Zauro, General Hospitals Jega, General Hospital Aleiro, General Hospital Bunza, General Hospital Mayama. sKebbi Nortrh Consist of General Hospital Argungu, General Hospital Kamba, General Hospital Dakingari. Kebbi South consists of General Hospital Zuru ( mata Bamaiyi memorial hospital), General Hospital Yawuri and General Hospital Danko- Wasagu.

Sample size was determined using Yamane's formula:

n = N/I+N (e)2

where n= sample size, N= population size, e= level of precision (Glenn 2003). The total number of samples collected was 1200.

### Sample collection

From each consented subject, 5ml of venous blood was collected with the assistance of licensed Medical Laboratory Scientist in the health facilities visited for laboratory investigation.

### Inclusion criteria

Only subject that are permanent residents of the study area were included.

### Exclusion criteria

Subject that are on malaria treatment and visitors (e.g travellers) who report to the health facilities and thereafter will leave the study area were excluded.

### Ethical Clearance

Approval to conduct the research at the selected health facilities was obtained from Kebbi state Ministry of Health as well as Selected health facilities Management Team.

### Laboratory Procedure

From each subject, 5ml of venous blood was collected. Thick and thin blood films were prepared. Thick films were stained with Field stains A and B whereas thin films were stained with Field stains A and B whereas thin films were stained with 3% Giemsa. Both films were observed by oil immersion microscopy. Thick films were observed for species differentiation. Results obtained were kept confidential in record books. Parasite count x 8000/Set range of white blood cells (WBC) = parasite density/u/ (WHO 2016).

**Data Analysis**

Analysis of variance, descriptive statistics and charts were for comparison of malaria parasite among subjects from different locations in the study area.

**RESULTS**

Out of 1200 samples examined in Kebbi State, 530 (44.16%) were infected with total parasite density 2107518/ul. Plasmodium falciparum was the only species found. Parasite by location within Kebbi State showed that subject who reported to Sir Yahaya Memorial Hospital Birnin kebbi Hospital had the highest infection 61(61%) with parasite density 248616/ul and statewide infection of 61(5.08%) followed by subjects who reported to General Hospital Yawuri in Kebbi South with infection 59 (59%), 203540/ul parasite density and statewide infection of 59 (4.92%). The least infection was recorded among subjects who reported to General Hospital Mayama with 24 (24%), parasite density 137696/ul and statewide infection of 24 (2%). The difference in prevalence rate and parasite density between the study locations were statistically significant ($p<0.05$, Table 1).

Infection rate in the 3 geographical zones (Kebbi Central, Kebbi North, Kebbi South) Showed highest infection recorded in Kebbi Central 53.75with statewide infection of 17.92% and parasite density of 802100/ul followed by Kebbi South South with 45.25% infection, statewide infection, 15.08% and parasite

density of 619818/ul. The least infection (33.5%) was 11.16% and parasite density of 685600/ul ($p<0.05$, recoded in Kebbi North swith statewide infection,

***Table 2 and figure 2).***

| S/N | Location No. | No. infected Infected (%) | Statewide% | P.D./ul | p-Valve |
|---|---|---|---|---|---|
| SYMH Birnin kebbi | 100 | 38(38) | 3.16 | 227672 | |
| KMC Birnin kebbi | 100 | 28(28) | 2.3 | 126408 | |
| GH Zauro | 100 | 44(44) | 3.67 | 193824 | |
| GH Aleiro | 100 | 24(24) | 2.00 | 137696 | |
| GH Jega | 100 | 47(47) | 3.92 | 1645584 | |
| GH Mayama | 100 | 54(54) | 4.5 | 203331 | |
| GH Bunza | 100 | 37(37) | 3.08 | 85647 | |
| GH Dakingari | 100 | 43(43) | 3.58 | 166256 | |
| | 100 | 61(61) | 5.08 | 248616 | |

| | | | | |
|---|---|---|---|---|
| GH Yawuri | | | | |
| 100 | 59(59) | 4.92 | 203540 | |
| GH Zuru | | | | |
| 100 | 39(39) | 3.25 | 131280 | |
| GH Danko wasagu | | | | |
| 100 | 56(56) | 4.67 | 218664 | |
| **Total** | 1200 | 53(44.16) | 44.16 2107518 | 0.000 |

S/No=Serial number, %=Percentage, P.D. =Parasite density,ul=Microlitre, GH=General hospital ZH=Zonal hospital,LGA=Local government Area

**Table 2**: Malaria parasites among selected persons of Kebbi State by zones

| S/N zone | No. examined | No. infected(%) | Statewide | P-Valve |
|---|---|---|---|---|
| 1 Kebbi central | 400 | 134(33.5) | 11.16 | 0.000 |
| 2 Kebbi South | 400 | 181(45.25) | 15.08 | |
| 3 kebbi west | 400 | 215(35.75) | 17.92 | |
| Total | 1200 | 530(44.16) | 44.16 | |

S/No=Serial number,%=percentage

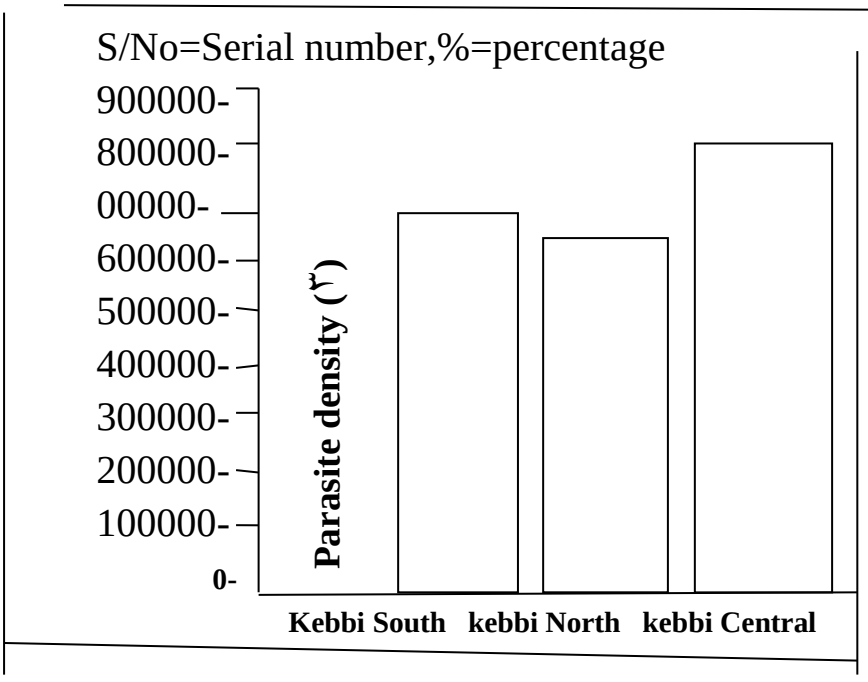


**Figure 2.** Parasite densities (ul) among residents of the three zones of Kebbi State

**DISCUSSION**

In this study, the overall prevalence of malaria in Kebbi State, which was 44.16%, is relatively high. However, it is lower than 56.3%and 78.1% reported by Yusuf kanya et al (2022)

, Rajendra Bahadur Singh1,

et al (2014), respectively, an indication that the infection is decreasing within the state. This finding concurs with the overall infection rate reported in the neighboring Sokoto state (AJOL et al 2022). The high infection rate in

Kebbi State could be a reflection of a long wet season in some areas like Yawuri, Aleiro Argungu, Suru, Bunza and Birnin kebbi With abundant smaller rivers and the practices of farming and fishing in the rural communities, which provide favorable mosquitoes breeding sites and consequent transmission of malaria parasite.

In relation to location, the results from SYMH with 61%infection, parasite density, 203540/ul and Statewide infection of 5.08% differs from the 82.7% infection and state level infection of 10.17% reported in Primary Health Care Centre (PHC) Gwadangwaji Birninkebbi LGA reported by IHP (2022). The second highest infection of 59% was observed in subjects who reported to KMC Birnin kebbi with statewide infection of 4.92% and parasite density, 203540/ul. This is at variance with 61.96% reported for Kebbi Central by Yusuf kanya et al (2022), 53.3% in the neighbouring Aleiro by Rupashree sing et al (2017) and 35.5% in Mayama (Achigili okau et al 2017). Anopheles mosquitoes could find it easy to thrive in Yawuri due to the reported ambient temperature (29 0C) and humidity (89%) in addition to consistent early rainfall, consequently transmit malaria to the citizens who mostly practice farming and fishing as their major economic engagements.

The least infection, 24% with statewide infection of 2% and parasite density of 137696/ul was recorded for subjects who reported to General Hospital Kangiwa in Kangiwa LGA.This concurs with the 24% infection reported for Silami Community of Sokoto West, Nigeria (AJOL et al 2021), but higher than the 12.4% prevalence reported for Gulma community in Kebbi State (Rupashree sing 2017). It also differs from the 22.5% reported by Enoch ET AL (2020) in Doubeli PHC, Adamawa State, Northern Eastern Nigeria.

Infection by zones showed that Kebbi Central had the highest infection rate (53%) with statewide infection and total parasite density of 17.92% and of 802100/ul, respectively. This findings concurs with earlier reports of Gboeloh et al (2022)

## CONCLUSION

Malaria remains a public health concern in Nigerian communities. Considering the high rate of malaria infection in Kebbi State, more interventions are needed in areas of research, awareness and prevention. Data generated from this research can guide interest groups and governmental organizations in carrying out targeted intervention programmes.

### Conflicts of interest

The authors declare that there is no conflict of interest

## REFERENCES

USAID/PMI/Vector Link/OEA,2022).

Feasibility Survey on Laelrval Source Management/Mapping and Remote Sensing of Anopheles Mosquito Breeding Sites in Argungu, Bunza and Kalgo LGAs, Kebbi state, Nigeria.

USAID -PMI- Vector Link Project, Abuja, Nigeria (2018-22) Insecticide Resistance Monitoring, Surveillance and Larval Source Management (LSM) Activities in Kebbi state, Nigeria.

USAID President's Malaria Initiative FY (2020) Nigeria Operational Plan.

World Health Organization (2003) " Global defense against the infectious disease threat".

Enock, N., Pukuma,S.M., Augustine I.M., Gundriri L.B., Zamdayu, N.M and

Daniel, J.L 2020Prevalence and associated risk of malaria infection among pregnant women attending antenatal clinic in Yola North, Adamawa State, Nigeria zoologist 18:19-25.http://dx.doi.org/10.4314/tzool.v18il4.

WHO's Strategies and Actions in Malaria Control Programme (Source: 2010)

World Health Organization (2019) Fact Sheet of Malaria. World Malaria Report (2019)

Glenn, D.I. 2003. Determining sample size. Programme evaluation development, Florida PEOD-6 pp 4. https://www.citypopulation.de.en./nigeria/admin/NGA033 rivers/. Accessed 24 March, 2024.

Kassam, N.A., Kaaya, R.D., Damian, D.J., Schmiegelow, C., Karishe, R.A.,

Alifrangis, M. and Wang, C.W.2021.Ten years of monitoring malaria trend and factors associated with malaria test positive rates in lower Moshi. Malar J. 20 (1). https://doi.org/10.1186/s12936-021-03730-1.

Nwaorgu, O.C and Orajaka, B.N 2011: Prevalence of Malaria among Children

1-10 years old in communities of Awka, Anambra State, South-East, Nigeria. Afr. Res. Rev. 5(22): 264-265.

Yuen, C and Liu Q (2012) . Magnetic field enriched surface enhanced resonance diagnosis. J Biomed Opt, 17: 017005

Yusuf Kanya Danladi, Achigili okau Attah, Falke Z. Assessment of Gender and Age - Related Prevalence of Malaria in Birnin Kebbi, Kebbi State, Nigeria

January 2022.

Rupashree Singh et al. J Vector Borne Dis. 2014

High prevalence of asymptomatic malaria in apparently healthy schoolchildren in Aliero, Kebbi state, Nigeria Iboyi Nathaniel Onuche.

Retrospective Study of Plasmodium Parasites Infection in Ngaski Local Government of Kebbi State, North-West, Nigeria August 2017

U. B. Abdullahi *, J. O. Zainab, J. K. Rai, M. Gwani, A. G. Gado. Effect of Some Atmospheric Variables on Malaria Prevalence in

Kebbi State Nigeria International Journal of Environment and Bioenergy, 2013, 8(1):12-21

WHO2016. Malaria parasite counting. Malaria Microscopy Standard Operating Procedure – MM