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The Prevalence of Malaria amongst Adults in Remote Primary Health Care Facility in South-South Nigeria

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Abstract

Malaria is a serious public health burden with high morbidity and mortality in Nigeria accounting for 60% outpatient visits, 30% childhood mortality, 25% infant mortality and 11% maternal mortality, respectively, in the country. Malaria is endemic in Nigeria with consequent high economic burden. Malaria is one of the leading causes of death in Nigeria. The prevalence of malaria is high in Nigeria resulting from several climatic, bioenvironmental and socio-demographic factors. Malaria prevalence is higher amongst dwellers with high poverty and illiteracy levels. The prevalence of malaria was evaluated retrospectively in this study using clinical records over 12 months in a remote primary healthcare facility in South-South Nigeria. The findings show varied malaria prevalence rates amongst the months, with 3 months below 50% and the remaining 9 months above 50%. The overall period prevalence was 56% (541/966). The high prevalence rate reported in this study reflects the endemicity of malaria in Nigeria and is consistent with other reports that malaria prevalence is higher in the south-south Nigeria than observed with other regions of the country. The study prevalence 56% is twice higher than the average national period prevalence of 23%.

Keywords**:** *malaria prevalence, malaria prevalence determinant factors.*

Introduction

Malaria is a serious epidemiological burden in Nigeria and Africa characterized by high morbidity and mortality rates (Adu-Gyasi et al, 2018; Megnekou et al, 2018). Of the 228 million global malaria cases reported in 2018, Africa accounted for 93% and Nigeria 25%. The world malaria prevalence improved in 2018 by 23 billion cases compared to 251 million cases reported in 2010 (WHO, 2017 & 2019). The prevalence of malaria reflects frequent hospital visits and admission, with varied mortality rates among different population groups.

In Nigeria, malaria accounts for 60% outpatient visits, 30% childhood mortality, 25% infant mortality and 11% maternal mortality, respectively (NMEP). Malaria is not without economic burden as millions of naira ((Nigerian local currency) are involved with malaria management and control in Nigeria. According to the National Malaria Elimination Programme (NMEP), Nigeria loses 132 billion naira to malaria per year from prevention, control, treatment and man-hours loss. Malaria is one of the leading causes of death in Nigeria (Khanam 2017). However, in 2018, Nigeria had the largest reduction in malaria deaths in the world from 153,000 deaths in 2010 to 95000 (WHO, 2019).

The prevalence of malaria in Nigeria has differed in various periods, amongst the geopolitical regions, age groups and rural/urban (Dawaki et al, 2016). In south-south region, period prevalence of malaria was reported at 72.7%, 46.6% and 43.1% at various periods in Rivers state (Amala & Nwibani, 2015; Nzeako, Nduka & Origie, 2013; Wogu & Nduka, 2018) and at 71.4% in Cross River state (Udoh, Ita & Odey, 2013). Though south east recorded 40.5% (Uneke, Ogbu & Nwojiji, 2006) at a time, Enugu state in the same region reported a much higher period prevalence of 85.7% (Ayogu et al, 2016). South-west region has shown much lower period prevalence of 14.7% (Lagos state) and 15% (Ogun state), respectively (Aina, Agomo, Olukosi, Okoh, Iwalokun, Egbuna et al, 2013; Okangba, Ejikwu, Shobowale, Shonekan & Nwadike, 2016). North-west Nigeria reported

60.6% (Dawaki et al, 2016; WHO, 2019) and 32.4% in Kano state and 46.6% in Zamfara state (Garba, Muhammed, Musa et al, 2016). The average national period prevalence of malaria is declining however. In 2010, Nigeria period prevalence of malaria was 42% which reduced tremendously to 27% in 2016 and 23% in 2018 (WHO, 2016, 2018 & 2019).

Several factors have been reported responsible for malaria prevalence in Nigeria ranging from bioenvironmental factors through educational status of the citizens to medical conditions and physiological states (Bassey & Izah, 2017; Garba, Ameh, Whong and Aminu-Mukhtarl, 2016; Seiyaboh et al, 2016; Ukaegbu et al, 2014). The common bioenvironmental factors are bushy and water-collecting environments that promote the breeding of the malaria parasite *(Plasmodium)* vector *Anopheles mosquitoes*. Level of education has been correlated with malaria vector control protocols adherence, with those having advanced education known for better adherence rates. Medical conditions like diabetes mellitus, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDs), cancers and other chronic conditions that reduce immunity are a risk to contracting malaria. Understanding the risk groups and factors for malaria prevalence is fundamental to the management of the disease.

Symptoms associated with malaria are not specific to the disease. Chief among the symptoms is fever with different patterns depending on the *Plasmodium* species; *falciparum, ovale, vivax, malariae and knowlesi* as the common five human-infesting species (Wongsrichanalai, Barcus, Muth, Sutamihardja & Wernsdorfer, 2007). Other non-specific malaria symptoms are weakness, malaise, headaches, joint pains, muscle pains, poor appetite, haematuria (blood in urine), vomiting, diarrhea, abdominal pain (Khanam, 2017). The burden of febrile disease in Nigeria and Africa is high, which necessitates diagnostic work ups of any febrile presentation at health facilities of any categories (Abdullah et al, 2017; Crump & Kirk, 2015). Parasitological testing is essential in malaria management.

Plasmodium falciparum remains the predominant species in Africa (including Nigeria) and it is the species that causes cerebral and fatal malaria in most cases (Griffin et al, 2010). *P. falciparum* accounts for most complicated and fatal cases of malaria in Nigeria as also reported across other African countries. Female *Anopheles mosquito* species (*Anopheles gambiae*) is the vector that bears the malaria parasite Plasmodium spp., which promotes the transmission of malaria (Ayogu, Ukwe, & Nna, 2016). However, *Plasmodium vivax* is the most predominant species outside Africa.

Malaria can be catastrophic in certain vulnerable individuals because of reduced, poor or impaired immunity. Malaria has poor outcomes in neonates, infants, under five (U-5) children, pregnant women, and persons having haemoglobinopathies, chronic diseases and/or on chemotherapy (Ayogu et al, 2016; WHO, 2019).

Prompt and appropriate management of malaria following parasitological testing cannot be overemphasized, to avoid complications and resistance (Ayogu et al, 2016). Also, parasitological testing will help to determine the burden of malaria in the country and enable for planning and implementation of interventions to eradicate malaria from the country. Malaria is routinely diagnosed with microscopy and rapid diagnostic tests in health facilities. Microscopy is the gold standard and it requires expertise for reliable detection of malaria parasites (*Plasmodium spp*.).

Malaria elimination from the country is actually a daunting goal because of the unique and complex sociocultural composition of the population and poor political commitment of the country (Aribodor, Ugwuanyi & Aribodor, 2016). The prevailing poverty condition and poor literacy level in the country underline the difficulty in reducing malaria prevalence, if not eliminating the febrile illness/disease (World Bank, 2019).

Given the burden of malaria in Nigeria, the study aimed at evaluating the period prevalence of malaria in a remote Primary Health Care facility in South-South Nigeria, using microcopy. This will result in proper channeling of scarce resources at the peak period of transmission in order to eradicate or reduce drastically the transmission of malaria.

Materials and Methods

This retrospective study evaluated positive malaria cases as documented in the study clinic's records over 12 months from September

2017 to August 2018. The study site is a 'remote Primary Health Care (PHC) facility' in South-South Nigeria (a rainforest zone with high malaria transmission), using Giemsa-stained microscopy as the malaria diagnostic test method. The clinic sees adult population with a handful of females, males being the predominant gender in the study site.

The clinic laboratory is operated in good conditions with constant power supply and by two professional scientists who read microscopic slides according to international standard practice and the local protocol.

Every case of suspected malaria in the clinic is investigated using either Giemsa-stained microscopy or rapid diagnostic test, but the study considered cases tested with microcopy. The population studied was 966 cases tested for malaria by Giemsa-stained microscopy as extracted from the clinic's records over the 12-month period.

For statistical analysis, the author used the formula below to calculate the 'period prevalence' of malaria over a 12-month period.

$$\text{Prevalence} = \frac{\text{Positive Malaria cases}}{\text{Total population at risk over the 12-month period,}} \times 10^n$$

where $10^n = 100$

The numerator is the positive cases of malaria and the denominator is the total population tested or studied for malaria in the specified period.

Results

The results displayed in the respective table 1 and figure 1 show the respective monthly malaria prevalence rates per 100% from September 2017 to August 2018 (12-month period).

From both table 1 and figure 1, three months in 2018 (February, July and August) had below 50% malaria prevalence rates. The remaining 9 months recorded prevalence rates of malaria above 50%. The lowest malaria prevalence rate was 45% (August, 2018) and the highest was 71% (June, 2018).

However, the overall 'period malaria prevalence' with respect to the total microscopy positive cases and the total number tested is 56%.

Discussion

This study has shown different monthly prevalence rates of malaria. Three months have respective malaria prevalence rates below 50% and the rest 9 months have above 50%. But the study overall period prevalence of malaria is 56% (i.e. the no of positive cases over total cases times 100). This implies that for every 100 Nigerians 56 persons have malaria in the study area which depends on several factors as discussed in the introduction (Bassey et al, 2017). This study finding at 56% is twice higher than the national average malaria prevalence (23%) reported in 2018 (WHO, 2019). Malaria prevalence is not stable neither consistent all year round, across regions and among age groups. The study results imply that malaria prevalence is dynamic as it varies in different periods (Nigeria Malaria Fact Sheet, 2011). The understanding of the determinant factors of malaria prevalence is helpful in instituting malaria elimination programmes and control protocols.

Several studies have reported varied malaria prevalence rates in different geopolitical regions and socio-demographic strata (Dawaki et al, 2016). The study overall period prevalence of malaria at 56% is much higher than 14.7% in Lagos state (Okangba et al, 2016) and 15% in Ogun state in south-west Nigeria (Aina et al, 2013). Also, the index prevalence is higher than 32.4% in Kano state in north-west Nigeria (WHO, 2019), 40.5% in south-east Nigeria (Uneke et al, 2006), 40.8% and 43.1% in Rivers state in south-south Nigeria (Amala et al, 2015; Wogu et al, 2018) and 46.6% in Zamfara state in north-west Nigeria (Garba et al, 2016). However, the study prevalence (56%) is lower than 60.6% in Kano state in north-west Nigeria (Dawaki et al, 2016), 71.4% Cross River state in south-south Nigeria where the index study was conducted (Udoh et al, 2013), 72.7% in Rivers state in south-south Nigeria (Nzeako et al, 2013) and 85.7% in Enugu state in south-east Nigeria (Ayogu et al, 2016). The authors' finding shows that the prevalence of malaria is more in the south-south and south east than in the north and west.

Garba et al (2016) reported different malaria prevalence in different seasons among blood donors. Malaria prevalence amongst the group was 9.2% in wet (rainy, April to October) and 4.9% dry (November to March) seasons,

respectively. The study site is one of the rainforest zones of Nigeria and rainy season would have contributed to the high malaria prevalence observed in this study. Though socio-demographic characteristics such as lifestyles, poverty, age and gender, level of education and environmental control status of the population were not considered in the study they could have contributed as well. Climatic impact notwithstanding, other factors like high income and level education can blunt this effect on malaria prevalence. Malaria burden is highest in rural settings where level of poverty and illiteracy is high (Bassey et al, 2017).

Limitation

Though socio-demographic characteristics such as lifestyles, poverty, age and gender, level of education, environmental control and status of the population were not considered in the study they could have contributed as well. Other factors like high income and level education can blunt this effect on malaria prevalence. Malaria burden is highest in rural settings where level of poverty and illiteracy is high**.**

Conclusion

In the index study, the high malaria prevalence reported is a reflection of malaria endemicity in Nigeria. A lot of funds – indigenous and foreign – have been plunged into several malaria control programmes and one would expect much reduction in the prevalence of malaria. The malaria elimination programmes in the country would require intensive commitment from all involved stakeholders (governments, private organizations, health institutions and the citizens in order to reduce malaria prevalence.

Table and Figure

Table 1. Malaria Prevalence (N = 966)

Month/Year	Suspected cases	Microscopy Positive (Plasmodium falciparum)	Microscopy Negative	Prevalence rate per 100%
Sept. 2017	68	38	30	56%
Oct. 2017	86	51	35	59%
Nov. 2017	95	54	41	57%
Dec. 2017	60	37	23	62%
Jan. 2018	75	47	28	63%
Feb. 2018	92	42	50	46%
Mar. 2018	102	65	37	64%
Apr. 2018	84	51	33	61%
May 2018	91	55	36	60%
Jun. 2018	14	10	4	71%
Jul. 2018	124	57	67	46%
Aug. 2018	75	34	41	45%
Total	**966**	**541**	**425**	
Prevalence = positive cases / Total Suspected cases X 100 = 541/966 X 100 = 56%				

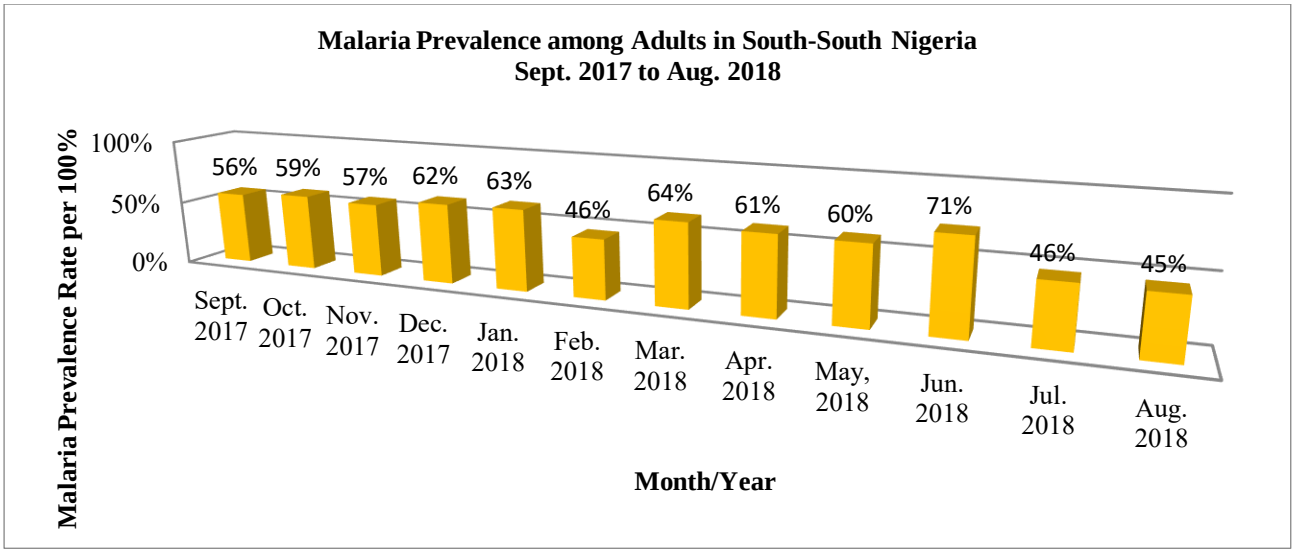

Figure 1. Bar Chart Presentation

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