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RETROSPECTIVE STUDY OF MALARIA PREVALENCE IN SELECTED HOSPITALS IN ZARIA, NIGERIA

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ABSTRACT

A retrospective study of laboratory records in selected hospitals in Zaria was carried out to determine the trend of malaria prevalence between 2001 and 2005. Data was obtained from the following selected hospitals: St Luke's Anglican Hospital, Wusasa, Salama Infirmary, Saidu Dange railway Hospital and Sick Bay, Ahmadu Bello University, Main campus, Samaru. The selection of the hospitals was based on their geographical location and sizes. The prevalence was consistently high over the years; 2001–44.1%, 2002–59.45%, 2003–59.35%, 2004–58.30% and 2005–64.25%. There was no significant difference ($P>0.05$) between malaria infection in males and females. Infection rates were significantly higher in children than adults ($P<0.05$) in all hospitals sampled except Salama Infirmary. Sick Bay in the main campus, Samaru had the least prevalence consistently over the five years period – 2001-27.0%, 2002-26.3%, 2003-21.8%, 2004-25.9% and 2005-33.2%. No clear seasonal variation over the years was observed. The study clearly showed consistent high prevalence over the five years period. Record keeping was useful as it provided data bur devoid of specific ages of attendees. Specific ages of hospital attendees rather than "children" or "adults" should be recorded and other demographic variables such as occupation and other socio-economic proxies should be included in laboratory record books.

Keywords: Retrospective, Malaria, Prevalence, Hospital, Zaria

INTRODUCTION

Malaria has been a major public health problem throughout human history, particularly in the tropical and subtropical parts of the world (WHO, 2018). Malaria keeps Africa's people poor. It prevents adults from working and children from attending school. Each year, a family spends several month earnings on malaria treatment and prevention. Malaria during pregnancy is also of great concern, since it adversely affects the mother's health and may result in a baby born too small to survive (WHO, 2000).

Malaria is endemic in 107 countries and 3.2 billion people are at risk of being contracted with the disease. It has been estimated that between 300-500 million new clinical cases of malaria occur worldwide annually, leading to 1.5 to 2.7 million deaths, the vast majority being in Africa (WHO, 2011). Anopheles mosquitoes have been incriminated as the major vectors (Okwa *et al*., 2007). Children are more vulnerable because of low immunity. Malaria account for 25% infant mortality and 30% childhood mortality (Annon, 2003) with ninety percent of infections caused by *Plasmodium falciparum* in Nigeria (Awolola, *et al*., 2005).

Nigeria bears up to 25 percent of the regional malaria burden with about 100 million clinical cases annually and 97% of the inhabitants at risk of malaria infection (WHO, 2019). Nigeria is one of the countries where the disease became endemic and therefore experiencing very high number of malaria casualties. It was estimated that 30% of the population lives in areas of high to very high transmission zone, 67% lives in a moderate transmission area and 3% in region of low to very low transmission (Roll Back Malaria, 2012).

More recently, the proportion of outpatient visit to Nigerian hospitals due to malaria increased to 60% (Yahya *et al*., 2014). Beyond morbidity and mortality, malaria presents enormous economic burden in the country. An estimated 132 billion Naira is lost annually in the form of treatment cost, prevention cost and loss of income due to failure to work during illness (Ayanlade *et al*., 2013).

Most studies used in reviewing malaria, particularly those with large data sets, are always based on unconfirmed clinical malaria or fever. Smaller-scale studies, or those based in health facilities and hospitals, and those studies that were part of a larger clinical trial, were based on laboratory confirmed malaria diagnosis (Holtz *et al*., 2000; FMOH, 2009). The objective was to determine five years retrospective trend of malaria prevalence using laboratory records in selected hospitals in Zaria from 2001 to 2005. Since malaria is hyper-

endemic in our environment, the review of laboratory records in hospitals provided information on the trend of the disease in retrospect. Therefore, problems inherent in record keeping could be addressed.

MATERIALS AND METHODS

Study Area

The study was conducted in four selected hospitals in Zaria (11°03'N, 07°42'E), Kaduna State, a region that has a tropical Savanna climate with distinct wet (May to October) and dry (November to April) seasons. The mean annual rainfall is 1050 mm based on annual rainfall record of 2012 (NIMET, 2012). The selected hospitals were:

(i) St Luke's Aglican Hospital, Wusasa
(ii) Saidu Dange Railway Hospital, G.R.A.
(iii) Salama Infirmary, Kwangila Area
(iv) Sick Bay, A. B. U. Main Campus, Samaru

The selection of the hospitals was based on their geographical locations within the town as well as their big sizes.

Data Collection

A retrospective study of malaria prevalence was conducted in the selected hospitals using laboratory records kept over a period of five years, from 2001 to 2005. The study considered persons that visited those hospitals with symptoms of malaria, and did laboratory investigation for malaria parasite based on recommendation. The recorded results of the laboratory investigation were obtained for the said five years period. The records were compiled on monthly bases for each year, which comprised of the number of persons examined for malaria those that were negative.

The demographic variables obtained from the records were sex and age. In all the selected hospitals, age was recorded as child or adult. Persons whose ages ranged from 0-13 years were regarded as children while those whose ages were 14 years and above were adults.

Statistical Analysis

Data collected was subjected to statistical analysis. T-test was used to determine the significance difference in prevalence between sexes and age groups. Graphs were used to show monthly prevalence among the selected hospitals for each year.

RESULTS

The results obtained in three of the four hospitals under study are summarized in table 1 below. Records obtained from the fourth hospital – St Luke's Anglican Hospital did not contain sex and age, therefore, only the total prevalence was presented in the table. The prevalence of malaria infection in the population was generally high in both males and females. However, there was no significant association (P>0.05) of prevalence with sex of individuals in the population.

Table 1: Prevalence of Sex-related Malaria in the selected Hospitals by Years

SEX / YEARS	MALE			FEMALE			TOTAL		
1	SALAMA INFIRMARY			KWANGILA			ZARIA		
	NE	NP	%P	NE	NP	%P	NE	NP	%P
2001	-	-	-	-	-	-	-	-	-
2002	116	70	60.3	93	77	82.7	209	147	70.3
2003	136	83	61.0	134	63	47.0	270	146	54.0
2004	120	69	57.5	117	77	65.8	237	146	61.6
2005	-	-	-	-	-	-	-	-	-
2	SAIDU DANGE			RAILWAY HOSPITAL			ZARIA		
	NE	NP	%P	NE	NP	%P	NE	NP	%P
2001	103	71	68.9	120	93	77.5	223	164	73.5
2002	81	71	87.6	93	79	84.9	174	150	86.2
2003	58	51	87.9	60	49	81.6	118	100	84.7
2004	30	26	86.6	37	28	75.6	67	54	80.5
2005	30	22	73.3	39	34	87.1	69	56	81.1
3	SICK – BAY ABU MAIN			CAMPUS SAMARU			ZARIA		
	NE	NP	%P	NE	NP	%P	NE	NP	%P
2001	416	109	26.2	424	118	27.8	840	277	27.0
2002	457	117	25.6	398	108	27.1	855	225	26.3
2003	324	97	29.9	399	61	15.2	723	158	21.8
2004	487	107	21.9	490	147	30.0	977	254	25.9

2005	357	95	26.6	349	140	40.1	706	235	33.2
4	ST LUKE'S ANGLICAN			HOSPITAL, WUSASA			ZARIA		
	NE	NP	%P	NE	NP	%P	NE	NP	%P
2001	-	-	-	-	-	-	184	65	35.3
2002	-	-	-	-	-	-	779	480	61.6
2003	-	-	-	-	-	-	1327	758	57.5
2004	-	-	-	-	-	-	701	600	85.5
2005	-	-	-	-	-	-	506	406	80.2

KEY: NE-Number Examined, NP=Number Positive, %P= Percentage Positive
No significant difference (P>0.05)

There was higher prevalence in the younger age group (children) than in the older age group (adults) as shown in Table 2.When the hospitals were subjected to T-test singly, there was no significant difference between children and adults in Salama Infirmary (P>0.05) only. There was however, significant difference between the age groups in both Saidu Dange Railway Hospital and Sick Bay. In all, there was significant difference between children and adults when the three hospitals were treated together (P<0.05). No records from St Luke's Anglican Hospital was available, so, it was left out.

Table 2: Prevalence of Malaria among Hospitals by Age groups and Years

AGE GROUP/ YEARS	**CHILDREN**			**ADULTS**		
1	SALAMA INFIRMARY			KWANGILA, ZARIA		
	NE	NP	%P	NE	NP	%P
2001	-	-	-	-	-	-
2002	-	-	-	-	-	-
2003	57	27	47.3	213	119	55.8
2004	37	18	48.6	200	128	64.0
2005	-	-	-	-	-	-
2	SAIDU DANGE R/WAY			HOSPITAL, ZARIA		
	NE	NP	%P	NE	NP	%P
2001	48	45	93.7	175	119	68.0
2002	24	23	95.8	150	127	84.6
2003	22	21	95.4	96	79	82.0
2004	12	10	83.3	55	44	80.0
2005	20	19	95.0	49	37	75.5
3	SICK-BAY ABU MAIN			CAMPUS, SAMARU, ZARIA		
	NE	NP	%P	NE	NP	%P
2001	11	7	63.3	829	220	26.5
2002	9	8	88.8	846	217	25.6
2003	6	5	83.3	717	153	21.3
2004	7	5	71.4	970	249	25.6
2005	13	10	76.9	693	225	32.4

KEY: NE-Number Examined, NP=Number Positive, %P= Percentage Positive
Significant Difference (P<0.05)

The average prevalence of the four hospitals by years is presented in Table 3. The least was observed in 2001- 44.15% and the highest prevalence was in 2005- 64.25%.

Table 3: Average prevalence of the four Hospitals by years

YEARS	PREVALENCE (%)
2001	44.15
2002	59.45
2003	59.35
2004	58.30
2005	64.25

The prevalence in relation to months of study is presented in Figures 1-5 each, representing prevalence of one year from 2001 to 2005 respectively. Figure 1 indicates highest peak of prevalence between March and July in Saidu Dange Railway Hospital and Sick Bay, A. B. U. main campus. Sick Bay consistently recorded the least prevalence within the year, with the highest peak of 48.2% between August and October.

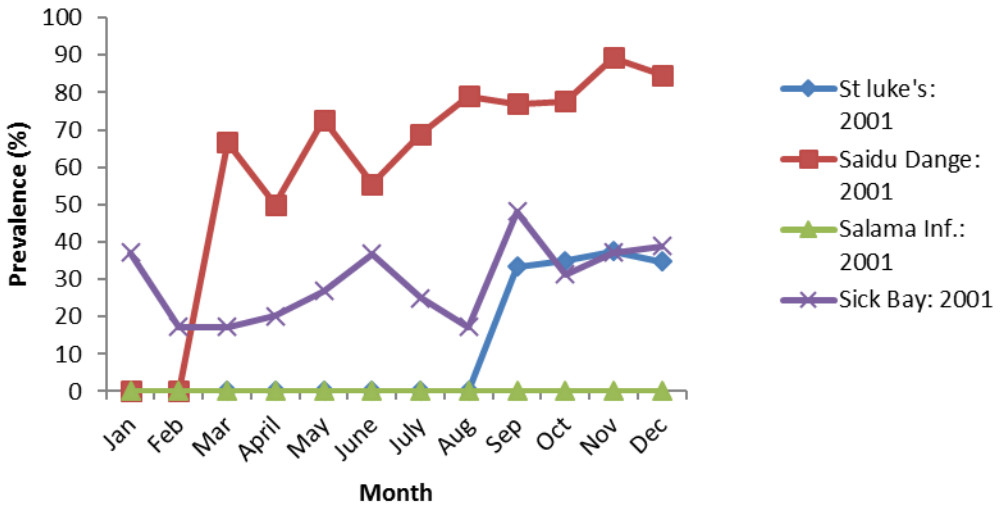

Figure 1: Prevalence of the four hospitals against months in 2001

❖ **Records for 2001 in Salama Infirmary were not available**

The figures 2-5 generally indicated highest peaks between March and June, and between July and October. Although no clear seasonal variation was observed. Sick Bay in the main campus, Samaru had the least prevalence consistently over the years.

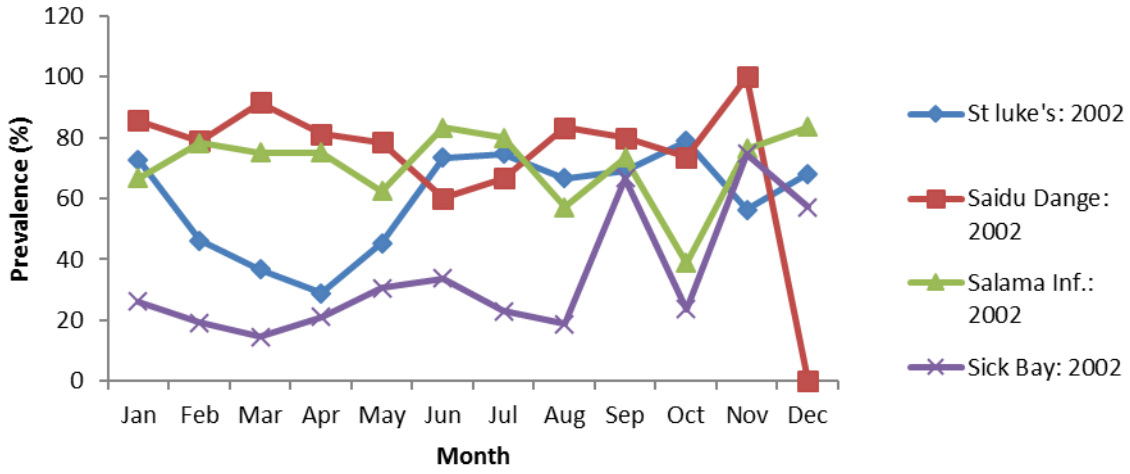

Figure 2: Prevalence of the four hospitals against months in 2002

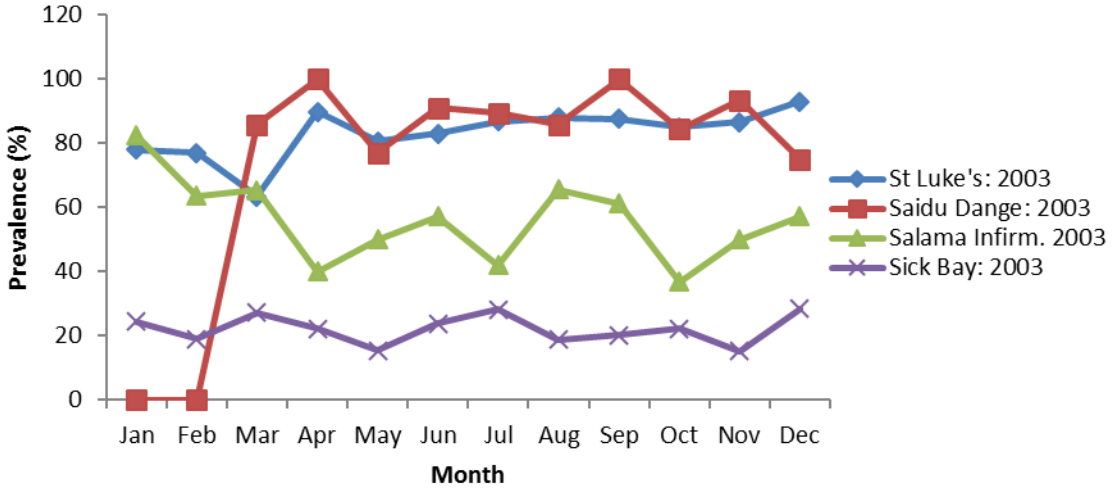

Figure 3: Prevalence of the four hospitals against months in 2003

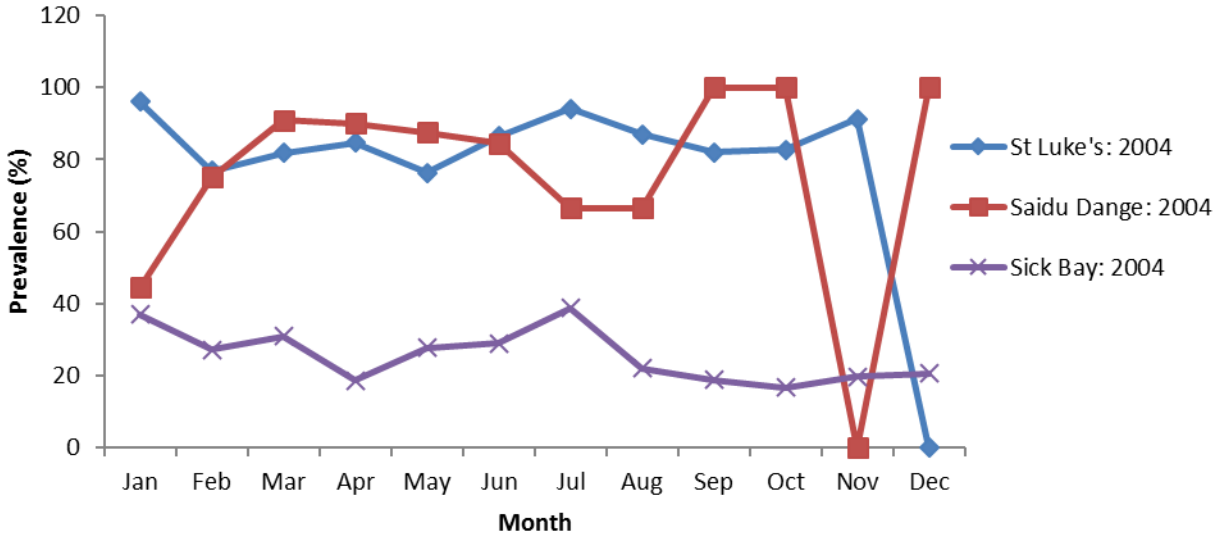

Figure 4: Prevalence of the four hospitals against months in 2004

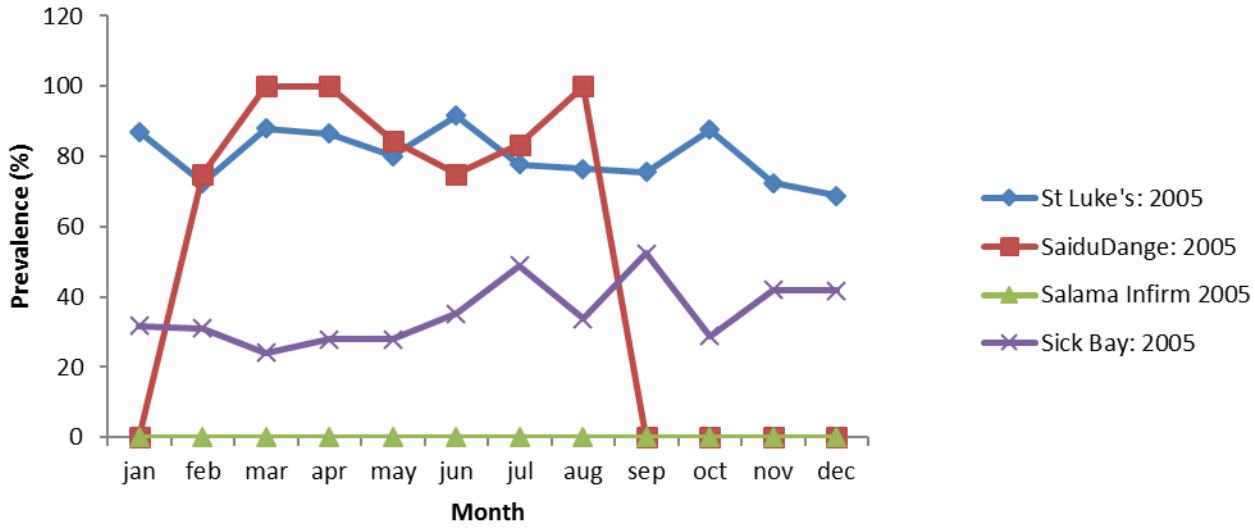

Figure 5: Prevalence of the four hospitals against months in 2005

Figure 6 represents the average monthly prevalence of the four hospitals over the five years. There was no clear seasonal variation as shown by the graphs but the average prevalence approximately ranges between 35% and 75% from 2001 to 2005. The prevalence was therefore, consistently high within this range over the five years.

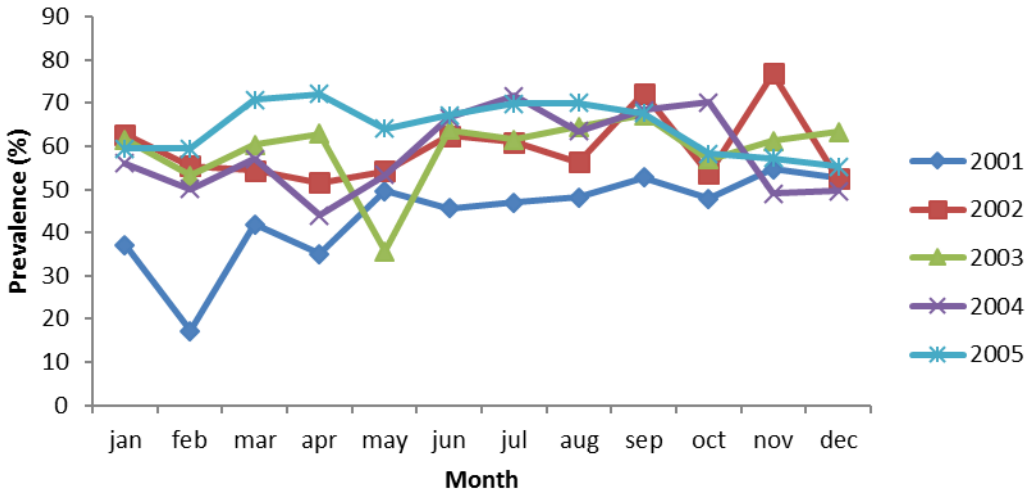

Figure 6: Average monthly prevalence of the four hospitals by years

DISCUSSION

The prevalence of malaria was expected to be high, and so were the results. The non-significant association between prevalence and sex of individuals in the population can be explained within the context of both sexes having equal exposure and similar susceptibility to malaria infection. This observation is similar to those of Chineke *et al*. (2016) who stated that there was no significant difference in the prevalence of malaria infection male and female populations and drew the same conclusions.

The prevalence of malaria in the study population was age related. The higher prevalence in the younger population (0-13 years) than in the older population (14 and above years) might be due to younger individuals in the population not having a high level of immunity to confer protection against malaria infection. Udoh *et al.* (2016) reasoned that differences between persons in acquiring infection are related to differences in their ability to acquire immunity, rather than differences in exposure. In high transmission areas, children under five years are one of the most vulnerable groups affected by malaria due to partial immunity (WHO, 2018). Malhortra *et al*. (2009) suggested that children who are exposed to Plasmodium falciparum malaria before birth become tolerant to the malaria parasites or their soluble products; this tolerance which persists to childhood weakens the ability of immune system to attract and destroy parasites and this increases the susceptibility of the children to malaria infection.

The non-significant result recorded from Salama Infirmary may be due to incompleteness of the data; therefore, reasonable conclusions cannot be drawn from that. The effect of malaria in the children may lead to low educational attainment, thus putting their future at jeopardy, whereas effect in the active group lead to reduced productivity. Although, Opreh (2015) opined that the effect of malaria in children may be due to low immunity of their system.

The high consistency of prevalence over the years might be due to unawareness of modern methods of control of the disease, lack of taking preventive measures or non-challant attitudes over such measures. Poor drainage system, marshy environment and poor sanitary conditions could also be the reasons why St Luke's Anglican Hospital, Wusasa, Saidu Dange Railway Hospital, GRA and Salama Infirmary, Kwangila recorded higher prevalence. Yakudima and Adamu (2017) reported similar results of high prevalence in Kano, attributing it to poor hygienic and lack of awareness of the disease.

The low prevalence recorded in Sick Bay, Samaru, might probably be due to the environmental cleanliness which started in the main campus in 2001. Since then, there have been good drainages which promote flow of water, thereby preventing the breeding of mosquitoes which are vectors to the disease. It might also be that individuals in this environment are more enlightened on health education.

CONCLUSION AND RECOMMENDATIONS

The study clearly showed consistent high prevalence over the five years period. Record keeping was useful as it provided data but devoid of specific ages of attendees.

Specific ages rather than children or adults should be used. Demographic variables such as occupation, tribe and other socio-economic proxies should be included in the laboratory record books. An environment such as that of A. B. U. main campus where cleanliness has been established is highly recommended for other communities.

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REFERENCES

Awolola T. S. Oyewole I. O. Koekemoer LL. Coetzee M (2005) Identification of Three Members of the An Funestus Group and Their Role in Two Ecological Zones of Nigeria. *TransAfrica Regional Society of Tropical Medicine Hygiene*, **99**(7):25-531.

Ayanlade, A., Adeoye, N. O. and Babatimehin, O. (2013). Intra-annual climate variability and malaria transmission in Nigeria. *Bulletin of Geography, Socio-economic series*, **21**: 7-19.

Chineke, H. N, Egenti, B. N, Egwuatu, C. C, Okeke C. N, Adogu P. O. U, Ilika, A. L. (2016). Prevalence and trend of malaria disease among under fives in a primary health center of Anambra State, Nigeria: A three-year Retrospective Study (2012-2014). *Journal of Dental and Medical Sciences*, **15**(6):113-119.

Federal Ministry of Health (2009). Federal Republic of Nigeria training manual for management of malaria in Nigeria participant manual, Federal Ministry of Health National malaria and vector control division Abuja – Nigeria.

Holtz, T. H., Marum,L. K., Mkandala,, C., Chizani, N., Roberts, J. M., Macheso, A., Parise, M. E. and Kachur, S. P. (2002). Insecticide treated bednet use, anaemia and malaria parasitaemia in Blantyre district, Malawi, *Tropical Medicine and International Health*, **7**:220-230.

Malhortra, I., Dent, A., Mungai, P., Wamachi, A. and Ouma, J. H. (2009). Can Parental malaria Exposure Produce an Immune Tolerant Phenotype? A Prospective Birth Cohort Study in Kenya. *PloS Medicine*, **6**(7):100-116.

NIMET. (2012). Rainfall data for Kaduna, Nigeria., Nigerian Meteorological Agency, Nogueira, S. B. (1987). "Cupim do cerne", Coptotermes testaceus (Isoptera: Rhinotermitidae), umapraga séria de eucaliptos nos cerrados. *Brasilian Florestal*,**61**: 27-29.

Okwa O. O., Rasheed A., Adeyemi A., Omoyemi M, Fayemi A, and Ogunwomoju A, (2007). *Anopheles* Species Abundance, Composition and Vectoral Competence in Six Areas of Lagos Nigeria. *Journal of Cell and Animal Biology*, **1**(2): 19-23.

Opreh O. P., (2008). The Pattern of Malaria Infection in Under Five in Ille-Ife, Nigeria *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **102**(9):868-874.

Roll Back Malaria Progress and Impact Series (2012). Focus on Nigeria.

World Health Organization (2000). African Summit on Roll Back Malaria (RBM). Abuja, Nigeria.

World Health Organization (2018.) World Malaria Report.

World Health Organization. (2019) World Malaria Report.

WHO (2011). Expert Committee on Malaria: World Malaria Report. Geneva.

Udoh S. B, Hamidu, I. M., and Saleh, A. H. (2016). Seasonal prevalence of malaria parasites infection in Maiduguri, Borno State, North East, Nigeria. *Scholarly Journal of Biological Science*, **5**(1):52-55.

Yahya, A., Tyav, Y.B. and Nura, M.S. (2014). Seroprevalence of paediatric malaria infections in two hospitals in Kano State, Nigeria. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, **14**(1): 252-264.

Yakudima, I. I. and Adamu, Y. M. (2017). Retrospective study of seasonal trends of reported Malaria cases in Kano State, Nigeria. *Bayero Journal of Pure and Applied Sciences*, **10** (2): 262-271.