Malaria, Abundance and Preventive Practices in Lafia North Development Area, Nasarawa State, Nigeria

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Abstract
The role of anopheles mosquitoes in malaria transmission was investigated in Lafia North Development Area of Nasarawa State, Nigeria. The study was conducted with records from the three primary health clinics to determine 5 years trend of malaria. Two hundred and fifty questionnaires were administered for information on the use of preventive measures on household two hundred mosquitoes were collected from Shabu, B.A.D and Kwandere using human landing catch and hand net mosquitoes were identified morphologically, species distribution differed significantly at (X2 = 367 df = 5 P<0.05) based on the three study areas. There was significant difference in the use of preventive measures (untreated mosquito nets, inseciticdes, mosquito coil, window nets and repellents) by participants in the three locations (X2 = 1.369, df = 4, P= 0.000. P = 0.05). There was no significant difference between tribes in relation to phobia from using ITNs (X2 = 1.721, df = 4, P = 0.650 (P<0.05). As malaria does not seem to be decreasing despite preventive measures being used, malaria still remains a serious health challenge in Lafia North Development Area. Stakeholders must ensure and sustain more aggressive strategies to fight malaria.

Keywords*: Primary health clinic, mosquitoes, malaria and prevention*

Introduction

According to (WHO, 2013) malaria continues to be of great public health concern to many countries in the world over. (WHO2013), there were 97 countries and territories with ongoing malaria transmission and 7 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endermic. Worldwide, an estimated 3.4 billion people are at risk of malaria WHO estimated that 207 million cases of malaria occurred globally in 2012 (uncertainty range 135-287 million) and 67, 000 deaths (uncertainty range 473,000 – 789,000).

Areas where *Plasmodium falciparum* is the most dominant causative agents of the disease, the effect of malaria, on the resident population has been very huge especially in Nigeria (Abdullahi *et al.,* 2003, Oguche *et al*, 2004, Pitmang, *et al.*, 2005). The serious impact of *falciparum* malaria has continued mainly because of the increasing wave of drugs resistant malaria (Olliaro and Taylor, 2004). Different species of anopheles mosquitoes are involved in malaria transmission in several parts of the world (Zhou, *et al*, 2004, Antonio Nkondjio *et al*, 2005).

Reybum *et al* (2005), malaria is known to be very complex and highly delibilitating disease. It varies widely in epidemiology and clinical manifestation occur possibly because of some

factors such as the predominant specie of parasite causing the disease in an area. The susceptibility of isolates to anti-malaria drugs used in the area, the level of acquired of immunity of the exposed human population, the efficiency of malaria transmission by the mosquito vector and specific environmental conditions that promote the disease transmission by the mosquito vector and specific environmental conditions that promote the disease transmission occur in tropical and subtropical regions; largely in sub-sahara Africa, central and south America, the Caribbean Islands, the middle-East and parts of Europe (WHO, 2013). Vector control is a major component of the global malaria control strategic (GMCS) and still remains the most generally effective measure to prevent malaria transmission (WHO, 2013). However, successful application of vector control measures in a given location requires the understanding of the economics of anopheles species responsible for malaria transmission, including correct and precise identification of the target species and its distribution (WHO, 2003).

Even though various control measures are beginning to result in reducing the trend in occurrence in some countries including Nigeria, these overall number of malaria cases is still on the increase as a result of several factors such as poor and ineffective diagnosis (Bell *et al*., 2006; Breman *et al.*, 2004). Research evidence over the years has shown that effective diagnosis can reduce both morbidity and mortality from malaria (Kiszewski and Teklehaimanot, 2004). Recently, need arises to reinforce practical malaria diagnostic globally for effective control and management of malaria. This study investigated the recent trend of malaria as against the use of control and preventive practices and the abundance of the vector species in Lafia North development Area of Nasarawa State, Nigeria.

Materials and Method

Study Area

This research was carried out in Lafia North Development Area of Nasarawa State, Nigeria. Lafia north is located at the North western part of the state on latitude 8^{o}31^{o}N and longitude 7o, 31^{o}E its location on the regional road confer on its good linkage with Makurdi (Capital of Benue State). The mean monthly temperature in this area ranges between 30^{o}C in March and 25^{o}C in December. The mean annual rainfall is about 1270 – 1540mm received over seven to eight months (April to October) of rainy season, with four months of dry season. The main socio-economic activities of the people are farming trading and some are in public services.

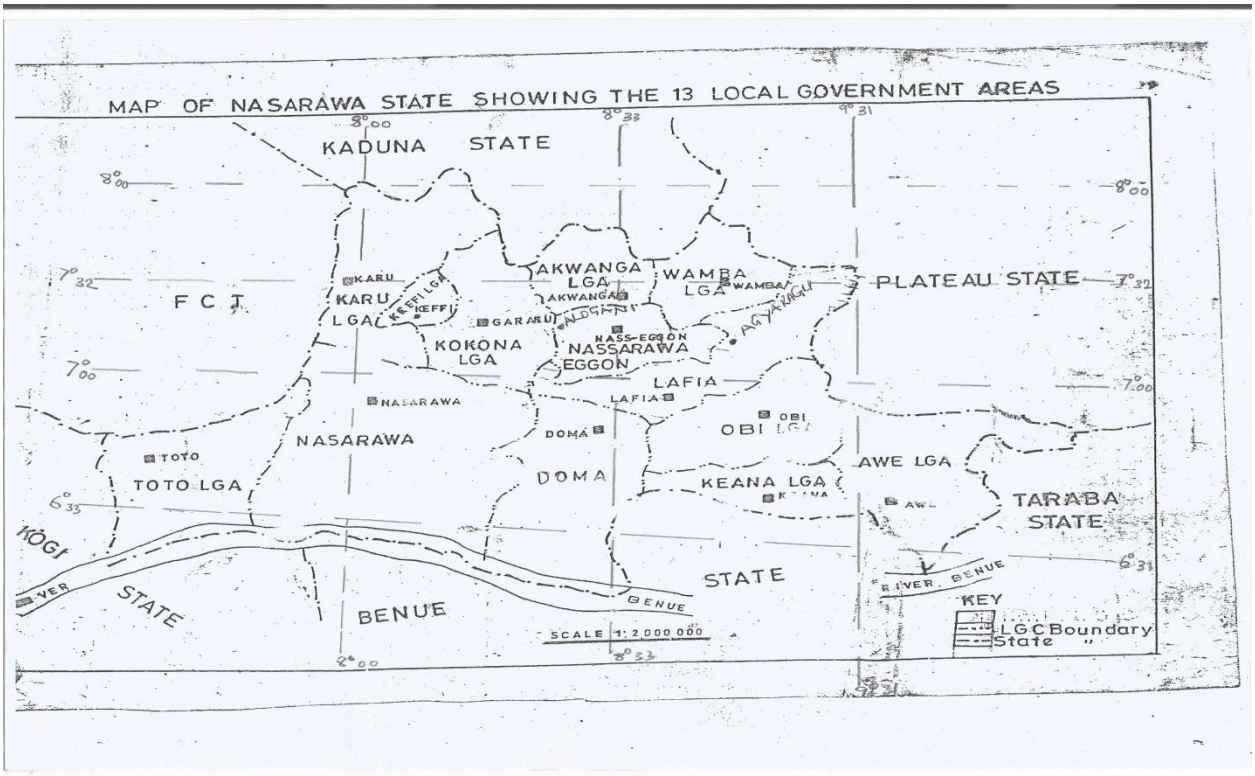

Figure 1: Map of Nasarawa State Showing the study area

Ethical Clearance

The protocol for this study was approved by the three primary health centres in the areas used. The approval was on the agreement that participant's anonymity must be maintained good laboratory practices/quality control ensured and every findings would be treated with utmost confidentiality and for the purpose of this research only. Participant were fully informed on their right to withdraw without any constraints.

Study Design

Previous study conducted in the three major primary health clinics namely, Shabu, primary health clinics, Kwandere primary health clinic and B.A.D primary health clinic in order to determine 5 – years trend of malaria by using records of malaria diagnosis from 2012-2017. Vectors studies and use of questionnaires among participants was carried out between June, 2016 and May, 2017. The three study areas in the communities was surveyed and questionnaires were issued to participants in both areas. Mosquitoes were collected in participants homes using human landing catch (human bait) and hand net (moving around swiftly to collect mosquitoes) in order to assess their numbers.

Sampling Technique

Houses were randomly selected and mosquitoes were collected using human landing catch vectors were identified morphologically. Two hundred and fifty questionnaires were distributed to 250 households (83 questionnaires each for the study area).

Statistical Analysis

Simple statistical analysis and Pearson's chi-squared test was used to determine the association with p-value of 0.05.

Results

In table 1, a total of 1,200 female anophelines were collected. Overall, *An. gambiaesis* was the most abundant, 356 (29.66%). This was followed by An. Funestus 213 (17.75%); An. Moucheti nigeriensis, 189 (15.75%); An. Arabiensis 183(15.25%); An. Melas 147 (12.25) and the least are others with 112 (9.33%) secondary vectors. Specie distribution differed significantly (X^2 = 367 7df = 5. P<0.05).

Patient/individual in Shabu use more insecticides (17.5%), repellant (50.0%) and had better window nets in Kwandere (16.27%) than those of Shabu and B.A.D respectively (Table 3) B.A.D individuals had higher percentages of participants. Using other preventive measures such as untreated mosquito nets (23.40%) and mosquito coils (50.0%). There was significant difference (X^2 = 1.369, df = 4, p=0.000, P<0.05) shown in the use of the other preventive measures by individuals across the various locations.

Phobia of using (ITNs) was indicated by all the individuals and there was no significant difference between tribes in relation to phobia of using ITNs (Table 4) (X2 = 1.721) df = 4, P =0.650 (P<0.05).

Table 1: Species composition and abundance of mosquitoes (Anophelines) collected indoors in Lafia North Development Area in the season (June – October, 2017).

Species	n(%)
Anophelines arabiensis	183(15.25)
Anophelines melas	147(12.25)
Anophelines gambiensis	356(29.66)
Anophelines funestus	213(17.75)
Anophelines moucheti	189 (15.75)
Others	112 (9.33)
Total	1,200

Table 2: Use of insecticide treated net (ITN) in various locations

Location	Respondents	Numbers of non ITN users (%)	Numbers of ITN users (%)
Shabu	84	40(47.61)	44(52.38)
Kwandere	83	43(51.80)	40(48.19)
B.A.D	83	36(43.37)	47(56.62)
Total	250	119	131

X^2 = 6.081 df = 1 (P<0.05)

Table 3: Types of other preventive measures used in the study location

Location	Untreated mosquito nets (%)	Insecticides (%)	Mosquito coils (%)	Window nets (%)	Repellants
Kwandere	9(22.5)	4(9.30)	20(46.51)	7(16.27)	3(6.97)
B.A.D	11(23.40)	6(16.66)	18(50)	1(2.77)	0(0.00)
Shabu	8(18.18)	7(17.5)	19(52.77)	4(10)	2(5)
Total	28	17	57	12	5

X^2 = 1.369 df = 4 (P<0.05)

Table 4: Phobia of using ITN among the various tribes in Lafia North Development Area

Tribes	Responses		
	Total	Yes (%)	No (%)
Eggon	110	13 (11.81)	97 (88.18)
Gwandara	90	18 (20)	72 (80)
Rindre	30	9(30)	21(70)
Others	20	3(66.66)	17 (85)
Total	250	43	207

$X^2 = 1.721$ df = 4 ($P<0.05$)

Discussions

Due to previous study conducted in the last few years in Lafia North Development Area, there was a fluctuating trend in malaria cases within the last five years (2012-2017) in the study-area. This indicates that both positive and negative cases were observed in the study-area but this varied within the years of the study with no significant differences in the prevalence of infection. However, the decrease of malaria cases may be due to the advent of Roll-Back malaria schemes in Nigeria. The advent reasons could be increased attention to malaria control and preventive activities by different responsible bodies, increased awareness of the community on use of ITNs, increment of budget for malaria control and prevention activities (personal communication) participants may have recanted in the use of control and preventive strategies in 2010 (49.51%) and 2011(51.37%) because positive cases were on the rise. Thus, this figure is relatively high as it show a serious threat to the actualization of the cardinal goal of "Roll-Back Malaria" initiative which is to at least reduce malaria burden on the continent by the year 2009 (United Nations (UN) Africa, 2001-2010). Based on this, there is need to direct the malaria control plan to the most vulnerable population like poorer communities as found in Lafia North Development Area as well as create valid quality assurance to monitor progress of control measures. More so, from previous and present data obtained on health centres of this development area, malaria still remains a serious public health problem despite the intensified control measures set in place to roll back the disease. This trend however agrees with reports by (Abebe *et al*, 2012) on fluctuating trend of malaria in Ethiopia within the last decade (2002-2011) with the minimum of 5,486 (94.87%) in 2002. The distribution of species indicates that all members of An. Gambiae Moucheti nigeriansis and An. Funestus have sympathetic distribution (Gillies *et al*., 1987). Anno, 2003 concluded that An. Gambiaesis is omni present in Nigeria because of its indiscriminate breeding habit such as domestic water containers, animal drinking places and any other breeding place created by man it has been described as highly endophilic, anthropophagous wet season vector (Gillies *et al*., 1987). It had the highest sporozotes rates and was most abundant compared to other vectors in the study area.

An Arabiansis has been known as savannah vector, in isolated populations, deforested areas and predominant in the dry season (Reybum *et al.*, 2005) mentioned that wherever An. Arabiansis occurs in the rainforest. It is associated with a history of extensive land clearance. Despite the higher usage of insecticide treated nets (ITNs) recorded in B.A.D, prevalence of malaria in this rural area was higher than in the Shabu. Based on observation and investigations made in B.A.D, there are few or no drainage systems, plus, observation of general sanitation there is poor, these factors supports breeding of malaria vectors. This may also explain why the use of other preventive measures was higher among Kwandere inhabitants (to prevent mosquitobites). However, a higher percentage (56.62) of insecticides treated nets used by individuals in B.A.D conflicts with a research carried out by Jombo *et al*. (2011) in Otukpo

Local Government Area in which only 23.3% ITN were used. The reverse is the case in Kwandere (suburban) settings where there is low usage of insecticide treated nets (ITNs), this could be because they have a lower rate of Mosquitoes a result of constant observation of general sanitation and availability of presence of good drainage system, good window netting and electricity to power fans and other devices.

Also, the present research shows that phobia of using insecticides treated nets (ITNs) was shown among the different tribes. Some respondent explained during an interactive season that the chemicals on the nets irritated their eyes, body and causes more heat due to the averagely hot weather in Lafia North. The importance of the use of ITNs cannot be over-emphasized. However, it has been observed that there is an influence of the people culture which is affecting its proper usage. The finding correspond with those of Jombo *et al* (2011) in Otukpo. Some community individuals use donor ITNs to barricade and demarcations on their farms.

Conclusion/Recommendations

Malaria still remains a serious health challenges in Lafia North Development Area despite the intensified control measures set in place to roll back the disease. It is recommended that the present malaria control program in the community should be reviewed with the aim of addressing the community back to the global anti-malaria strategies control measures, stakeholders must be persuaded to accept and sustain more aggressive measures; such as the use of ITNs to fight malaria, sanitation should be observed always.

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