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Short Communication

Identifying Socio-Economic factors Associated with Malaria Infection in Birnin Kebbi, Nigeria

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Abstract

Malaria has long been identified as a major cause of morbidity and mortality, in Nigeria. Data explaining the potential effect of socioeconomic variables on malaria risk, are scantly available in many places. This study was conducted to assess the effect of socioeconomic factors on the occurrence of malaria among study population in Birnin Kebbi, Nigeria. Structured questionnaires were administered to gather relevant baseline information about the study population. Blood samples were collected and tested for malaria using rapid diagnostic test kit (RTD). Persons who cannot read or write had more malaria infections to a significant level than those who were literate (Cannot read or write: 28.0%, vs Can read and write: 18.0%; P = 0.042). There were more cases recorded among farmers (29.5%), than civil servants (16.8%), business and unemployed persons (20.6% each). However, no significant disparity was observed in the distribution among various occupations (P = 0.244). More cases of malaria (24.7%) were encountered among low income earners per month (<N5, 000) than those who earned more per month (>N5, 000), with no significant variation (P = 0.210) in malaria burdens. Illiteracy among study participants has been identified as an important predictor of high malaria burdens in Birnin Kebbi. Public policy measures that can reduce inequalities in health coverage, and promote educational and economic opportunities of the poor may result in the reduction of the burden of malaria in the study area.

Keywords: Malaria, Prevalence, factors, Birnin Kebbi, Nigeria

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Introduction

Although substantial efforts has been made, in controlling malaria, estimated figures of between 300 to 500 million cases of malaria are reported each year (Ramdzan *et al.*, 2020).

Malaria in addition to its debilitating effect as a disease creates a massive socioeconomic burden in several endemic regions of the world (Yadav*et al.*, 2012). The scourge is high and mainly on vulnerable populations living in resource poor areas with limited access to health care (Sachs and Malaney, 2002). Although environmental factors such as climatic conditions, presence of breeding sites such as stagnant water bodies and behavioural factors remain important in the transmission of the disease, other factors linked to malaria transmission such as the influence of socioeconomic factors have not been sufficiently addressed in most endemic areas. Socioeconomic factors including education, employment, income, type of housing (that could allow entry of mosquito vectors) will contribute to the high burden of malaria (Rabha *et al.*, 2011; Yadav *et al.*, 2012). The populations living in malaria laden areas, with other problems such as hunger and poverty, will find it difficult to understand why malaria should be the target of the Government's control efforts and not poverty and hunger. Therefore, in addition to improving our healthcare system, the success in the control of malaria will to a significant extent depend on the knowledge and socioeconomic status of the populations living in places with high malaria densities (Bashar *et al.*, 2012). Given these factors, that influence vulnerability to malaria, the present study was undertaken to identify socioeconomic factors predisposing to malaria in Birnin Kebbi, Northern-western Nigeria.

Materials and Methods

Study area

This study was conducted in Kebbi State in the NorthWestern Nigeria. It is located approximately between latitudes11°0′0′′N to 13° 0′ 0′′N and Longitudes 4° 0′ 0′′ E to 6°0′0′′E. The State was created from the former Sokoto State on August 27th, 1991 with Birnin Kebbi as the state capital. It comprises of 21 Local Government Areas and four emirate councils (Argungu, Gwandu, Yauri and Zuru). It has a total land area of approximately 37,728 sq. km, with a population of 3,256,541 people (NPC, 2006).

Methods

A total of 300 individuals gave blood samples for analysis from six areas in Birnin Kebbi. Fifty (50) samples were collected from each of the sampling stations. Other relevant epidemiological information were obtained by administration of structured questionnaires participants were then tested using the rapid diagnostic test kit for malaria. Blood was obtained from the subjects' left hand thumb. First the thumb is disinfected by cleaning with an alcohol swab and then pricked with a sterile blood lancet.

The finger is then squeezed until blood appeared, from which a drop is taken and placed in the round whole of the test kit to allowed a 10 minutes reaction. The result is observed and read as recommended by World Health Organization (WHO, 2015)

Ethical approval
The study was approved by the Department of Biological Sciences, Kebbi State University of Science and Technology Aleiro.

Reading the Strip test result
If one line appears on the test window ie only the control line appears, the result is negative. If two lines appear (both the test and control line) on the test window it means that the test is positive. But if no line appears on the test window, it means that the result is invalid.

Statistical Analysis
The data obtained were entered into the Statistical Package for Social Sciences, Version 25.0 (SPSS Inc. Chicago, USA) for analysis. Results obtained were presented in simple descriptive statistics. Chi square test was used to compare differences in categorical variables. Values were considered significant at $P<0.05$.

Results

Baseline characteristics of the study population
The population consisted of 300 participants. Of these, 158 were males (52.7%) and 148 females (47.3%). The majority of the population were adults in the age group 21- 30 years. The younger participants (0-10years) constituted only 15% of the total study population.

Table1 summarizes the economic characteristic of the participants. Twenty point three percent (20.3%), were subsistent farmers, while137 (45.7%) were predominantly civil servants. Of the total population, 227(75.7%) had an average monthly income above five thousand naira (>#5, 000). Majority (66.7%) slept under mosquito net, 122(40.7%) do not use insecticides (either they could not afford or on health grounds), 94(31.7%) had stagnant water bodies around houses, 199(66.3%) had no nets on doors or windows, while 101 (33.7%) kept domestic animals at home.

Distribution of malaria with respect to socio-economic factors
The overall prevalence is 20.7%. There were more cases recorded among farmers (29.5%), than civil servants (16.8%), business and unemployed persons (20.6%). However, no significant discrepancy was observed in the distribution among various occupations (P=0.244).

More cases of malaria (24.7%) were encountered among less income earners per month (<N5, 000) than those who earned more per month (>N5, 000), but presence of malaria in both cases showed no significant variation (P = 0.210).

Persons who cannot read or write had more infections to a significant level (28.0%, P = 0.42) than those who were literate (18.0%).

Table1: Baseline characteristics of study population

Factor	Category	Total number	Percentage
Occupation	Farmers	61	20.3
	Civil servants	137	45.7
	Business	68	22.7
	Unemployed	34	11.3
Average monthly income	< 5,000	73	24.3
	>5,000	227	75.7
Use of nets (ITNs)	Yes	200	66.7
	No	100	33.3
Use of insecticides	Yes	178	59.3
	No	122	40.7
Presence of stagnant water	Yes	94	31.3
	No	206	68.7
Nets on Doors/Windows	Yes	101	33.7
	No	199	66.3
Presence of domestic animals	Yes	101	33.7
	No	199	66.3

ITN: Insecticide Treated Mosquito Net

Table 2: Distribution of malaria stratified according to socioeconomic factors of study population

Factor	Number examined	Number infected	%	P-value
Occupation				
Farmers	61	18	29.5	0.244
Civil servants	137	23	16.8	
Business	68	14	20.6	
Unemployed	34	7	20.6	
Average monthly income				
<5000	73	18	24.7	0.210
>5000	227	44	19.4	
Education				
Can read and write	222	40	18	0.042
Cannot read or write	78	22	28	

Discussion

A vast majority of studies on malaria in Nigeria have focused more on hospital patients, school children, under-fives and pregnant women. However, community based studies that provide data on the influence of social, economic as well as demographic factors on malaria are essential in developing useful guidelines and recommendation for disease prevention/control in endemic areas (Bashar *et al.*, 2012).

The result obtained here are comparable to those published in related studies in Nigeria (Oladepo *et al.*, 2010; Benjamin *et al.*, 2017). The prevalence of malaria with respect to occupation, showed no significant occurrence of cases in any particular trade. However, more cases of malaria infection (29.5%) were recorded among farmers than it was among other occupations where prevalence ranged between 16 – 20.6%. This is probably so, because agricultural practices such as irrigation, the use of ponds for fish farming and storage of water in tanks for livestock provide suitable breeding grounds for mosquitoes (Oladepo *et al.*, 2010). It's also possible that programmes targeting farmers as high risk groups for intervention are scanty. Therefore farmers' knowledge of malaria transmission, signs and symptoms are low. Consequently, infections are relatively high among them.

In this study, although distribution of infection between low and high income classes, showed no significant difference (P = 0.210), prevalence was higher (24.7%) among low

income earners than their counterparts (19.4%). Similar studies have indicated that income levels determine the capacity for individuals to buy or access preventive measures such as insecticide treated nets (ITNs) and indoor residual sprays (Degarege *et al.*, 2019). A study in Sudan has reported improved use of malaria prevention strategies such as ITNs and house spraying with an increase in household wealth (Onwujekwe *et al*., 2006).

It has been opined that possession of good income affect individuals' capability to afford available goods and health services to contain malaria. For example, poor people may not have sufficient money to pay for transportation, consultation with health care givers and payment for drugs when they are ill (Schellenberg *et al*., 2003). The effect of such limitation is that, though relevant services may be available, people may not access them due to poverty.

Our analysis also showed that educational status of residents positively correlated with the presence of malaria infection. We found that occurrence of malaria cases were significantly higher among those who were not literate (28.0%, P=0.042) than those who can read and write (18.0%). Education is linked to productivity, capital or earning potential and socialization of individuals. Also, education increases knowledge, skills and ability to access information that promotes health (Mmbando *et al*., 2009). This could then lead to better acceptance and practice of health measures.

Conclusion

In conclusion, illiteracy among study participants has been identified as an important predictor of high malaria burdens in Birnin Kebbi. Public policy measures that can reduce inequalities in health coverage, and promote educational and economic opportunities for the poor, may prove to be important in reducing the burden of malaria in the study area.

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