

Socio-Economic Factors that Impact the Occurrence of Malaria in Rural Nigerian Households

¹Kelani Omotoso Ajadi, ²Hezekiah D. Olaniran, ¹Folami Munta Alabi and ³David O. Adejumobi

¹Department of Urban and Regional Planning, The Polytechnic Ibadan, Nigeria

²Department of Geography, University of Ibadan, Ibadan, Nigeria

³Department of Urban and Regional Planning,
Ladoke Akintola University of Technology, Ogbomosho, Nigeria

Abstract: The rural areas of Africa are reported to be the worst malaria infested areas. This study attempts a multi-regression analysis of socio-economic factors underlying incidence of malaria in rural areas taking Akinyele Local Government area in Nigeria as a case study. Three hundred and eighty seven (387) respondents are interviewed through the administration of structured questionnaire. Regression indicated a significant correlation between malaria incidence and socio-economic characteristics of respondents $R = 0.211$ at $P < 0.05$. The regression model showed that household size $\beta = 0.114$ at $P < 0.05$, gender $\beta = 0.101$ at $P < 0.05$ and marital status $\beta = 0.102$ at $P > 0.05$. The study suggested intensification of awareness campaign on reproductive health and family planning and effective rural planning are strategies to keep malaria incidence at the barest minimum.

Key words: Multi-Linear Regression • Comprehensive Development Plan • Socio-Economic Factors
• Malaria • Rural Areas

INTRODUCTION

Health is defined in terms of adaptability and is related to the complex systems among habitat (environment), population and cultural behaviour. These three dimensions form a triangular model of human ecology and underlie disease etiology, consequences and prevention [1]. Planning has social and economic aims [2]. Socially, successful planning tends to make people's lives happier because it results in a physical environment that supports good health and allows convenient and safe passage from place to place. Safe passage facilitates social intercourse and visual attractiveness. The economic results of good planning may increase human happiness.

One of the most common diseases in developing countries is malaria, which is a disease transmitted by mosquito in an environment that supported its breeding. *Anopheles* that tends to breed in bodies of permanent fresh-water include the common-causing malaria mosquito (*Anopheles quadrimaculatus*) that can spread malaria to humans. Several cities in Vietnam, Laos and Cambodia are essentially malaria-free, but the disease is present in many

rural regions [3]. By contrast, in Africa malaria is present in both rural and urban areas, though the risk is lower in the larger cities [4].

Sub-Saharan Africa accounted for between 85-90% annual reported malaria cases and death [5, 6]. Despite efforts at reducing transmission and increase treatment, there have been little changes in areas which are at risk of this disease since 1992 [7]. Breman observes that if the prevalence of malaria stays on its present upwards course, the death rate could double in the next 20 years [8].

A large proportion of developing countries' population is rural. Rural population refers to people living in rural areas as defined by national statistical offices. It is calculated as the difference between total population and urban population [9]. For instance in Nigeria, the percentage not classified as urban was 81.9 per cent in 1963, a decrease of 9.2 per cent from the 1953 census data. However in 1985, out of the population estimated at 99.7 million, about 70 per cent comprised rural population [10]. According to World Bank Report, the rural population in Nigeria in 2008 was 77803782.97 (51.6%), 78665326.26 in 2009 and was last reported at

79528437.36 (53%) in 2010 [9]. There is no doubt that rural population constitutes the economically-backward areas of African economy. The sector has not only been backward, but the gap between them and the urban sector has also been widening [11]. In developing countries, one of every five persons has not been able to meet his or her basic needs of life [12].

This situation has persisted in spite of the economic growth in some countries in Africa since attaining political independence. The living conditions of the rural people have remained virtually unaffected by developmental efforts. Low nutritional level of the food items available to the rural population is another characteristic of rural settlement in Africa. Williams estimates the protein intake of the rural people to be between 35 and 60 grammes daily [13]. Generally, Nigeria's per capital daily protein intake is estimated to be 45.4g as against the FAO recommended minimum of 53.8g [14]. But Iyangbe and Orewa estimate shows that the daily per capita protein intakes in both the rural and low-income urban areas in Nigeria were much less than the FAO recommended minimum intake of 44.4g per capita per day [15]. For rural areas, according to them, the daily per capita protein intake was 36.86, which is relatively low [15]. The consequence of this is that frequently some of the people are incapable of maximum production at work (farm) due to attack of various diseases including malaria.

The study aimed at applying multi-linear regression method to analyse the socio-economic factors associated with malaria incidence among individual resident in rural areas. The objective of this paper is to examine whether there is any relationship between malaria incidence and socio-economic characteristics of individual in rural areas of Nigeria. The research hypothesis states that there is significant relationship between socio-economic characteristics of individual and rate of malaria incidence.

The Study Area: The study focused on Akinyele Local Government area, in Oyo state of Nigeria, which lies between latitude 7° 29' to 7° 40' while its longitude ranges from 3° 45' to 4° 04'. The total land area is about 219.2km². The local government is divided into 12 political wards, namely Ikereku (Ward1), Labode/Oboda/Olanla (Ward 2), Arulogun (Ward 3), Onidundu/Amosun (Ward 4), Moniya (Ward 5), Akinyele (Ward 6), Iwokoto/Amosun(Ward7). Others are Ojoo/Ajibode/Orogun/Owe/Kankon (Ward 8), Ijaye (Ward 9), Alabata (Ward 10), Okegbemi/Mele (Ward 11) and Iroko (Ward 12). The study area, with the population of 21 1359 (2006) experiences a tropical type of

climate and recorded a mean annual temperature of about 32°C. The relative humidity can be as high as 95% area and a total of about 1,250 mm as mean annual rainfall. The area is located in the forest belt of the country, particularly in the tropical rain forest. The forest is not as extensive as it used to be in the area as it is now restricted to some parts, such as *Ijaiye* forests reserve, International Institute of Tropical Agricultural (IITA) forest reserve to mention but a few. Generally, the vegetation in the area is broadly dominated by palm trees and the area may be referred to as a "dry forest belt". The soil of the area were formed from rocks of pre-Cambrian basement complex formation particularly granites, gneisses, quartz-schist, biotite gneisses and schist. They were formed under moist semi-deciduous forest cover and belong to the major soil group called ferruginous tropical soil.

The major occupation of the people is agriculture. This is because the area has a favourable climate and soil condition. However, trading and civil service are now competing with agriculture in the area because the farmers produce and market their surplus agricultural products; most markets in the area are periodic.

MATERIALS AND METHODS

This study relies on both primary and secondary sources of data. The secondary data for this study were obtained from internet sources, library books, theses, dissertations, textbooks, planning journals, magazines, seminar papers, newspapers and other relevant publications.

Reconnaissance survey was followed by the field survey. The questionnaire was administered on members of households. The population of the study comprises all the settlements and the entire buildings/households in the study area. For the purpose of this study, Akinyele local government has been defined as comprising 12 political (electoral) wards, 12,901 buildings and 56 villages (Town Planning Unit, Akinyele Local Government, 2011). The study therefore was divided along the existing political wards that form the strata.

In order to ensure an equal and a fair representation of all the settlements, buildings and respondents in the households, a suitable sample frame was chosen. Three per cent (387) of the entire buildings (12,901) in the local government was selected. The three per cent of the buildings was proportionally selected from each of the wards through systematic sampling method for investigation. Buildings selected are: seven in ward 1,

thirty-one in ward 2, twenty-eight in ward 3, five in ward 4, seventy-eight in ward 5, twenty-two in ward 6, eighteen in ward 7, one hundred and eight in ward 8, twenty-five in ward 9, eighty in ward 10, three in ward 11 and twenty-four in ward 12. From each of these buildings, one member was interviewed and therefore 387 individuals were interviewed on the number of times each had malaria in 2010. The entire sets of questionnaire distributed were retrieved.

The 12 wards and the 3 per cent of the households selected would be representative enough because despite the ethno-linguistic differences among the population within the settlements in the local government, they are not isolated from one another. Rather, there are broad similarities in the customs and cultures of the people in the region and malaria is not linguistic-biased. Systematic and simple random sampling techniques (lucky dip/blind dip method) were applied to select the buildings and households from where individuals were investigated so as to eliminate bias.

The survey was conducted during the periodic market days of the selected villages and in the workplaces of the respondents. This was done to enhance the quality of the information. Other criteria used in the selection of the respondents within the household were that the respondents must have been residing in the village more than a year before the study; and the respondents must be married or above 18 years or must have had a child. The Children and Young Persons Ordinance, No. 41 of 1943 provided that those under the ages of 17 years are children and young persons. A child is defined as any person under the age of 14 years while a young person is any person who has attained the age of 14 years but is less than 17 years (in the southern states) or 18 years (in the northern states) [16].

The data collected were subjected to descriptive analysis and multiple regression analysis. Frequencies and percentages were used to describe the demographic and socio-economic characteristics of the households and the number of times each had malaria episode in 2010.

Multiple Linear Regressions Analysis: Ordinary Least Squares (OLS) multiple regression analysis method was applied to analyse the data collected and to determine the relationship between the incidence of malaria and the socio-economic factors within individual respondents in the rural areas of Akinyele Local Government. The study therefore did not include the etymological study of the disease and the vector.

RESULTS AND DISCUSSION

The social and economic characteristics included the age distribution, gender status, marital status, household size, religion affiliation, educational status, level of income and occupational characteristics, among others, of the respondents.

The data showed that 4.1% of the respondents are below 18 years, 0.5% of the respondents are above 57 years. From a total percentage of adults (respondents above 18) that accounted for 95.9%, more than 94% are within the working ages of between 18 and 57. It should be noted that 4.1% of the respondents are below 18 years but are married with children. This implies that the population of the study area constitutes a target population in their prime age. The result indicated that females accounted for 57.6% of the total respondents, while males were 42.4%. The higher percentage of the female respondents is attributed to the non availability of the male heads of households during the time of survey because their major occupation, which is farming, demands that they leave home very early and come back very late at night.

The result of the survey shows that over 66 % of the respondents are married while 18.9% of them are singles and over 10 % are 'Never Married. It should be noted that over 10 % that are 'Never Married' does not mean that they are children below 18 years of age, but single families. It could be concluded that 66% of the respondents that are married indicates a growing population, hence the need for proper management of health infrastructural facilities to meet up with anticipated population and rural growth challenges.

It should be noted from the survey that, of the total number of household size of one in each count, only 3.3%, 3.9%, 1.8% and 7.7% had malaria episodes once, twice, three times and six times respectively in 2010. Of significance is that every member (100%) of household sizes of six and eight had malaria episodes eight and 12 times respectively in 2010.

Respondents who claimed that they were with no child, wife or husband account for 3.6% and those with between 2 and 3 members account for 12.9% while 39.0% of the respondents have been claimed between 4 and 5 members. Some 44.4% of the respondents have six or more members. It could be inferred that not all respondents interviewed were with children but over 18 years old. The result of the survey revealed that only 11.4% of the respondents are with no formal education. It could be

inferred from the survey that majority of the respondents are educated; respondents with no education or otherwise only account for 13.0%. Some 87.0% have up to primary formal education. It means that “Roll Back Malaria” Campaign would be successful if the educated ones in the local government are involved.

Survey showed that only 10.1% of the respondents earned more than ₦920, 000.00 (N165.00=\$1) per annum. More than 89% of the respondents earned less than N8, 000.00 (N165.00=\$1) per month. This has implication on the level of expenditure on malaria preventive measures by the individual respondents. The variation in income could be due to the variation in occupation and status. Survey revealed that the large proportion of the population is incapable of affording a good shelter, feeding, healthcare and clothing, which are basic needs. Resultant effects of these presumably are negative on the environment and human quality with implication on poor health and poor sanitation which is a characteristic of unplanned environment due to low purchasing power.

Over three-quarters (37.2%) of the respondents interviewed were civil servants who were traced to their places of work from their respective homes 24.5% were traders. It should be noted that because the majority of the women in the rural areas do sell the family farm produce by themselves, they prefer calling themselves traders rather than farmers. The female counterpart did not only assist in land cultivation but also helped in marketing the farm products. All the respondents (13.4%) who are farmers are male respondents but all other respondents (86.6%) combined farming as part-time occupation with their major occupation.

Of the 387 respondents interviewed, only 2.3% claimed not “to have ever” had any episode of malaria. By the time the respondents that claimed “to have or/and not to have ever” had any episode of malaria was cross tabulated with the wards, the data shows that the respondents in all the wards have had malaria episodes except in wards 5, 7, 8 and 12 where 6.4%, 5.6%, 1.4% and 4.2% respectively where respondents claimed they

Table 1: Cross Tabulation of Malaria Episodes in Relation with Electoral Ward by the Respondents

		Political wards * Have you ever had malaria ? Crosstabulation			
		Have you ever had malaria		Total	
		Yes	No		
Political wards	Ward 1	Count	7	0	7
		% within Political wards	100.0%	.0%	100.0%
	Ward 2	Count	31	0	31
		% within Political wards	100.0%	.0%	100.0%
	Ward 3	Count	28	0	28
		% within Political wards	100.0%	.0%	100.0%
	Ward 4	Count	5	0	5
		% within Political wards	100.0%	.0%	100.0%
	Ward 5	Count	73	5	78
		% within Political wards	93.6%	6.4%	100.0%
	Ward 6	Count	22	0	22
		% within Political wards	100.0%	.0%	100.0%
	Ward 7	Count	17	1	18
		% within Political wards	94.4%	5.6%	100.0%
	Ward 8	Count	136	2	138
		% within Political wards	98.6%	1.4%	100.0%
	Ward 9	Count	25	0	25
		% within Political wards	100.0%	.0%	100.0%
	Ward 10	Count	8	0	8
		% within Political wards	100.0%	.0%	100.0%
	Ward 11	Count	3	0	3
		% within Political wards	95.8%	4.2%	100.0%
	Ward 12	Count	23	1	24
		% within Political wards	95.8%	4.2%	100.0%
Total		Count	378	9	387
		% within Political wards	97.7%	2.3%	100.0%

Source: Authors’ Field Survey, June/July, 2011

Table 2: Cross Tabulation of the Political Wards with Number of Times of Individual Malaria Episode in 2010

Pölitical wards * How many times did you have malaria in 2010 ? Crosstabulation			How many times did you have malaria in 2010 ?									Total
			1	2	3	4	5	6	7	8.00	12.00	
Political words	Ward 1	Count	1	6	0	0	0	0	0	0	0	7
		% within Pölitical wards	14.3%	85.7%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	Ward 2	Count	6	13	4	4	3	1	0	0	0	31
		% within Pölitical wards	19.4%	41.9%	12.9%	12.9%	9.7%	3.2%	.0%	.0%	.0%	100.0%
	Ward 3	Count	5	9	5	3	1	1	3	1	0	28
		% within Pölitical wards	17.9%	32.1%	17.9%	10.7%	3.6%	3.6%	10.7%	3.6%	.0%	100.0%
	Ward 4	Count	0	2	3	0	0	0	0	0	0	5
		% within Pölitical wards	.0%	40.0%	60.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	Ward 5	Count	16	32	11	8	7	4	0	0	0	78
		% within Pölitical wards	20.5%	41.0%	14.1%	10.3%	9.0%	5.1%	.0%	.0%	.0%	100.0%
Wars 6	Count	5	13	4	0	0	0	0	0	0	0	22
		% within Pölitical wards	22.7%	59.1%	18.2%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
Ward 12	Ward 7	Count	1	11	4	2	0	0	0	0	0	18
		% within Pölitical wards	5.6%	61.1%	22.2%	11.1%	.0%	.0%	.0%	.0%	.0%	100.0%
	Ward 8	Count	26	66	20	8	6	3	1	0	0	138
		% within Pölitical wards	18.8%	47.8%	14.5%	5.8%	5.8%	4.3%	2.2%	.7%	.0%	100.0%
	Ward 9	Count	8	11	1	2	2	1	0	0	0	25
		% within Pölitical wards	32.0%	44.0%	4.0%	8.0%	8.0%	4.0%	.0%	.0%	.0%	100.0%
	Ward 10	Count	2	6	0	0	0	0	0	0	0	8
		% within Pölitical wards	25.0%	75.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	Ward 11	Count	1	1	1	0	0	0	0	0	0	3
		% within Pölitical wards	33.3%	33.3%	33.3%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	Ward 12	Count	9	8	2	3	1	0	0	0	1	24
		% within Pölitical wards	37.5%	33.3%	8.3%	12.5%	4.2%	.0%	.0%	.0%	4.2%	100.0%
Total	Count	80	178	55	30	22	13	6	2	1	387	
	% within Pölitical wards	20.7%	46.0%	14.2%	7.8%	5.7%	3.4%	1.6%	.5%	.3%	100.0%	

Source: Field Survey, June/July, 2011

“rarely have” episode of malaria. A cross tabulation of malaria episode within electoral wards also showed that there was a slight or no spatial variation in the occurrence of malaria incidence among the wards within the study area (Table 1).

Result showed that 46.0% of the respondents had malaria episode twice in 2010 which is the highest and the lowest (0.3%) are those who had it 12 times. Result in Table 2 shows that with the exception of wards 1 and 10 where 85.7% and 75% of the respondents respectively have had malaria episode just twice in 2010, every other respondent had malaria episode more than twice in 2010. The highest number of times of malaria episode is 12 and this accounted for 4.2% of the respondents. This showed that malaria has become endemic in the study area and requires urgent attention. In Ward 1, as shown in Table 2, 14.3% and 87.7% of the total respondents had malaria episodes once and twice respectively in 2010.

In wards 3 and 8, although only 10.7% and 2.2% respectively had episodes of malaria 7 times in 2010, these percentages accounted for 50% of total occurrences of

malaria episodes in those counts in each of the wards in 2010 (Table 3). Again in the same wards 3 and 8, the 3.6% and 0.7% of the total respondents that had malaria episodes 8 times also represents 50% of the total occurrences in that count in each of the wards in 2010 (Table 3). Of significance is ward 12 where only 4.2 % of the respondents that had malaria episode in 2010 represent 100% of the total occurrence in the count (Table 3). The result in Table 3 revealed that the occurrence of malaria is not regional or ward-specific.

To unravel socio-economic factors accounting for incidence of malaria, the hypothesis, which stated that “there is significant relationship between malaria incidence and the socio-economic characteristics among individual respondents”, was tested using regression method with the Statistical Package for Social Science (SPSS). The dependent variables are the number of times the respondents have malaria episode in 2010. The independent variables are household size, education status, gender, religion, age, marital status, level of income per annum and occupation. The result is presented in Tables 4-7.

Table 3: Cross Tabulation of Number of Times of Individual Malaria Episode with the Political Wards in 2010

		How many times did you have malaria in 2010 ? *Political wards Crosstabulation													
		Political wards													
		Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8	Ward 9	Ward 10	Ward 11	Ward 12	Total	
How many times dif you have malaria in 2010?	1	Count	1	6	5	0	16	5	1	26	8	2	1	9	80
		% within How many Times did you have malaria in 2010 ?	1.3%	7.5%	6.3%	.0%	20.0%	6.3%	1.3%	32.5%	10.0%	2.5%	1.3%	11.3%	100.0%
	2	Count	6	13	9	2	32	13	11	66	11	6	1	8	178
	% within How many Times did you have malaria in 2010 ?	3.4%	7.3%	5.1%	1.1%	18.0%	7.3%	6.2%	37.1%	6.2%	3.4%	.6%	4.5%	100.0%	
	3	Count	0	4	5	3	11	4	4	20	1	0	1	2	55
	% within How many Times did you have malaria in 2010 ?	.0%	7.3%	9.1%	5.5%	20.0%	7.3%	7.3%	36.4%	1.8%	.0%	1.8%	3.6%	100.0%	
	4	Count	0	4	3	0	8	0	2	8	2	0	0	3	30
	% within How many Times did you have malaria in 2010 ?	.0%	13.3%	10.0%	.0%	26.7%	.0%	6.7%	26.7%	6.7%	.0%	.0%	10.0%	100.0%	
	5	Count	0	3	1	0	7	0	0	8	2	0	0	1	22
	% within How many Times did you have malaria in 2010 ?	.0%	13.6%	4.5%	.0%	31.8%	.0%	.0%	36.4%	9.1%	.0%	.0%	4.5%	100.0%	
	6	Count	0	1	1	0	4	0	0	6	1	0	0	0	13
	% within How many Times did you have malaria in 2010 ?	.0%	7.7%	7.7%	.0%	30.8%	.0%	.0%	46.2%	7.7%	.0%	.0%	.0%	100.0%	
	7	Count	0	0	3	0	0	0	0	3	0	0	0	0	6
	% within How many Times did you have malaria in 2010 ?	.0%	.0%	50.0%	.0%	.0%	.0%	.0%	50.0%	.0%	.0%	.0%	.0%	100.0%	
	8.00	Count	0	0	1	0	0	0	0	1	0	0	0	0	2
	% within How many Times did you have malaria in 2010 ?	.0%	.0%	50.0%	.0%	.0%	.0%	.0%	50.0%	.0%	.0%	.0%	.0%	100.0%	
	12.00	Count	0	0	0	0	0	0	0	0	0	0	1	1	
	% within How many Times did you have malaria in 2010 ?	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%	100.0%	
Total		Count	7	31	28	5	78	22	18	138	25	8	3	24	387
		% within How many Times did you have malaria in 2010 ?	1.8%	8.0%	7.2%	1.3%	20.2%	5.7%	4.7%	35.7%	6.5%	2.1%	.8%	6.2%	100.0%

Source: Authors' Field Survey, June/July, 2011

Regression result gives a correlation coefficient (R) of 0.211 which shows positive correlation between dependent variable (Number of times individuals had malaria in 2010) and independent variables (age, Gender, Marital status, Level of income per annum, Occupation, Educational status, Religion and Household size). The coefficient of determination (R^2) is 0.044, when multiplied by 100 equals to 4.4% ($0.044 \times 100\%$), which implies that about 4% of the incidence of malaria in individual life can be explained by socio-economic factors such as age of the respondents, gender, marital status, level of income per annum, occupation, educational status, religion and household size. The implication of this is that there are other factors accounting for the incidence of malaria in the study area in particular and other rural areas of

developing countries in general. The result in Table 7 shows that the calculated F-value is 2.192 and this is related to the P-value of 0.027, which shows that the model is statistically significant. Therefore, our hypothesis which states that there is significant relationship between malaria incidence and the socio-economic relationship among individual respondents is true and therefore accepted.

However, enquiry should be made to investigate other factors that account for cases of malaria incidence. Such factors may include sanitation culture and proximity factors such as individual proximity to malaria infested areas, open waters, bushy areas and so on. Other factors may include health habits of individual and perception towards malaria. Some rural dwellers care less about

Table 4: Variable entered/Removed^b

Model	Variable Entered	Variable Removed	Method
1	House hold size, Education status, Gender, Religion, Age, Marital Status, Level of Income per Annum, Occupation		Enter

All requested variables entered.

Dependent variable: How many times did you have malaria in 2010?

Source: Authors' Field Survey, June/July, 2011.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.211a	.044	.024	1.48684

Predictor: Constant), Household size, Educational Status, Gender, Religion, Age, Marital Status, Level of Income per annum, Occupation

Source: Authors' Field Survey, June/July, 2011

Table 6: ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Significant
1 Regression	38.764	8	4.846	2.192	.027 ^a
Residual	835.644	378	2.211		
Total	874.408	386			

Predictor: Constant), Household size, Educational Status, Gender, Religion, Age, Marital

Status, Level of Income per annum, Occupation

Dependent variable: How many times did you have malaria in 2010?

Source: Authors' Field Survey, June/July, 2011

malaria because of the believe that “how much blood can mosquito suck” or “mosquitoes have no mothers or parents that take care of them, therefore they should be allowed to suck”.

Looking critically at Table 7, the result raises some salient issues. In the first instance, the result shows that among socio-economic variables influencing incidence of malaria in individual respondents, household size is the most significant. $\beta = 0.114$ at $P = 0.036$. A household had been observed by Ohwofasa to be the total number of persons living together as a family unit sharing basic facilities such as shelter, kitchen and so on [17]. Simpson sees a family as a basic social group united through bonds of kinship or marriage, present in all societies. The nuclear family-two adults and their children-is the main unit in some societies. In others, it is a subordinate part of an extended family, which also consists of grandparents and other relatives. A third family unit is the single-parent family, in which children live with an unmarried, divorced, or widowed mother or father. In many rural household

societies, polygamy is common and this usually swells the size of household. Large household predisposes people to poverty and inadequate provision in term of health and nutrition [18].

Corbett has shown that people who grow up in persistently poor households experience more difficulties throughout their lives than those raised in households that are above the poverty level [19]. It is admitted by Ettliling, Humphreys and, Gallup and Sachs that poverty is both cause and effect of malaria disease and that malaria is not just a disease commonly associated with poverty but also a cause of poverty [20-22].

Therefore, it could be admitted that the larger the household, the more likely increase in incidence of malaria in the life of individual members of household. Effort should therefore be directed at increasing awareness campaign on family reproductive health and planning to sensitize rural residents on the need to reduce family size for proper health care. It is believed that if socio-economic status of households is improved, it would be easy to acquire mosquito nets and other protective measures that would improve people’s health and protect them from mosquitoes’ bites. Malaria and poverty are intimately connected and improving socio-economic conditions of the rural poor of the developing countries would enable them to afford protective measures or decent environment.

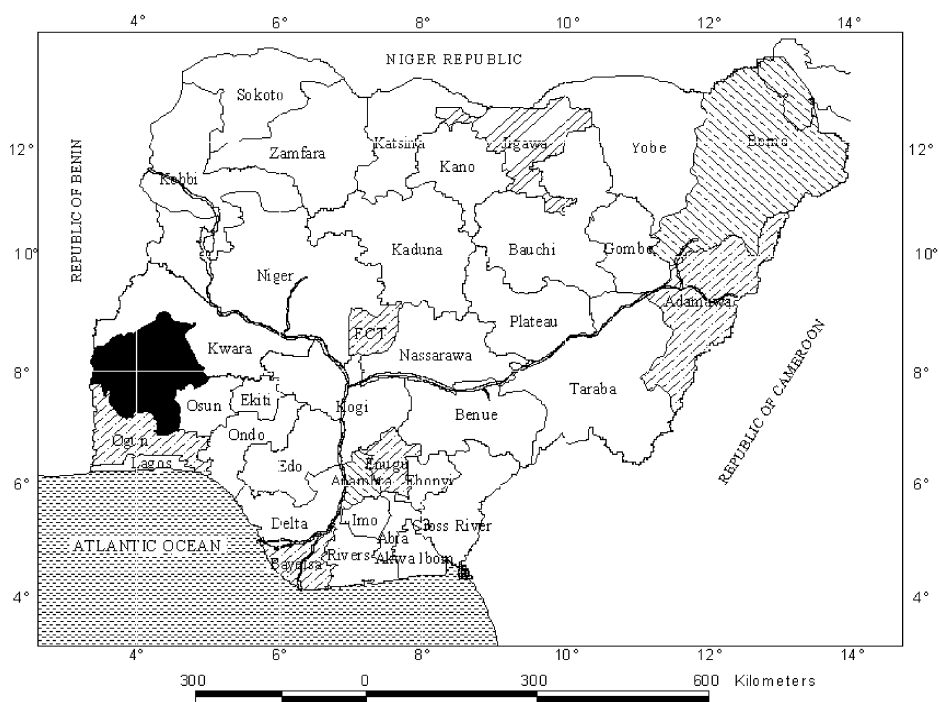
Secondly, gender is found to contribute significantly to our model $\beta = 0.101$ at 0.049. Gender is seen as sex, physical and behavioural difference that distinguishes individual organisms according to their functions in the reproductive process [23]. Gender is significant in the sense that malaria is a significant indirect cause of death among most pregnant women since malaria causes maternal anaemia in pregnancy, low weight and premature delivery [24]. Debeaudrap and Krefis *et al.* also note that malaria is a major public health problem especially in children and those children (particularly female children) from households classified as poor have significantly higher chance to get malaria [25, 26]. Available evidence according to Ohwofasa also suggests that given equal exposure, adult men and women are equally vulnerable to malaria infection, except for pregnant women who are at greater risk of severe malaria in most endemic areas [17]. Moreover, due to health-seeking behaviours, there may be variations in malaria incidence among females and males in different localities. Although marital status contributes to incidence of malaria as reported by our model $\beta = 0.102$, however the contribution is not significant as P value is found to be greater than 0.05.

Table 7: Regression Coefficientsa

Model	Un-standardized Coefficients		Standardized Coefficient		
	B	Std. error	Beta	T	Sig.
1 (Constant)	1.612	.584		2.762	.006
Age	-.021	.074	-.018	-.284	.777
Gender	.308	.156	.101	1.977	.049
Marital status	.181	.107	.102	1.686	.093
Level of income per annum	-.094	.070	-.080	-1.327	.185
Occupation	-.011	.066	-.011	-.165	.869
Educational status	-.043	.100	-.031	-.435	.664
Religion	-.016	.128	-.007	-.128	.898
Household size	.109	.052	.114	2.108	.036

Dependent variable: How many times did you have malaria in 2010?

Source: Authors' Field Survey, June/July, 2011



Source: Ministry of Lands and Survey, Ibadan, Oyo State (2011)



Fig. 1: Oyo State within national context

CONCLUSION

Evidence from reviewed literature showed that the continued existence of malaria in an area would require a combination of high human population density (especially high family size), high mosquito population density (especially in areas of poor sanitation) and high rates of transmission from humans to mosquitoes and from mosquitoes to humans (resulting from high family size and poor sanitation). This study has attempted to show that if these are lowered sufficiently, the rate of malaria

incidence will drastically reduce among individuals. Also malaria parasite will sooner or later disappear. Data gathered and analysed from the study showed that majority of people in the study area are poor, with high family size and poor environmental sanitation.

Government must provide adequate fund to carry out awareness campaign on family planning and family reproductive health. Also, sound comprehensive development plan and detailed layouts for all the rural areas would go a long way to enhance good living and healthy environment among rural residents. The result of

this study would go a long way at helping decision makers at reducing uncertainties. Malaria incidence could be reduced to the barest minimum if efforts are in the right direction.

REFERENCES

1. Meade, M.S., J.W. Florin and W.M. Gesler, 1988. Medical Geography, The Guilford Press. New York London.
2. Keeble Lewis, 1969. Principle and Practice of Town and Country Planning, The Estates Gazette Limited.
3. Trung, H., W. Van Bortel, T. Sochantha, K. Keokenchanh, N. Quang, L. Cong and M. Coosemans, 2004. 'Malaria Transmission and Major Malaria Vectors in Different Geographical Areas of Southeast Asia'. Trop. Med. Int. Health, 9(2): e473.
4. Keiser, J., J. Utzinger, M. Caldas De Castro, T. Smith, M. Tanner and B. Singer, 2004. Urbanization in sub-Saharan Africa and Implication for Malaria Control. Am. J. Trop. Med. Hyg., 71(2Suppl): 11827. http://www.ajtmh.org/cgi/content/full/71/2_suppl/118. Retrieved 26-08-10.
5. Layne, S.P., 2007. Principles of Infectious Disease Epidemiology (PDF) EPI 220, UCLA Department of Epidemiology, Archived from the original 2006-12-20. <http://www.ph.ucla.edu/epi/layne/epidemiology> Retrieved 2010-12-15.
6. WHO, 2008. World Malaria Report 2005.
7. Hay, S., C. Guerra, A. Tatem, A. Noor and R. Snow, 2004. The global distribution and population at risk of malaria: past, present and future. Lancet Infect Dis., 4(96): 327-36.
8. Breman, J., 2001. The Ears of the Hippopotamus: Manifestations, Determinants and Estimates of the Malaria Burden, Am. J. Trop. Med. Hvg., 64(1-2): 1-11, http://www.ajtmh.org/cgi/content/abstract/64/1_suppl/1. Retrieved 11-11-10.
9. World Bank Report, 2012. Rural population in Nigeria. World Bank Report. www.tradingeconomics.com/Nigeria/rural-population-wb-data.html.
10. NEST, 1992. The Challenge to Sustainable Development in Nigeria, Tade Akin Aina and Ademola T. Salau, (eds), in NEST Publication, Ibadan.
11. Olatunbosun, Dupe, 1975. Nigeria Neglected Rural Majority. NISER. Oxford University Press, Ibadan.
12. Lupine, J.R. and V. Menza, 2004. Assessing Prospects for Improving Food Security and Nutrition. FNA/ANA, 25: 5-9. Cited in C.O. Iyangbe and S.I. Orewa, 2009. Determinants of Daily Protein Intake among Rural and Low-Income Urban Households in Nigeria. American-Eurasian J. Scientific Res., 4(4): 290. IDOSI Publication, 2009.
13. Williams, S.K.T., 1978. Rural Development in Nigeria, University of Ife Press.
14. FAO, 1992. The State Of Food Security in the World Progress Report on World Food Hunger: Rome. Cited in C.O. Iyangbe and S.I. Orewa, 2009. Determinants of Daily Protein Intake among Rural and Low-Income Urban Households in Nigeria. American-Eurasian J. Scientific Res., 4(4): 290. IDOSI Publication, 2009.
15. Iyangbe, C.O. and S.I. Orewa, 2009. Determinants of Daily Protein Intake among Rural and Low-Income Urban Households in Nigeria. American-Eurasian J. Scientific Res., 4(4): 300. IDOSI Publication, 2009.
16. Asein, J.O., 2005. Introduction to Nigerian Legal System (2nd ed.), Ababa Press Ltd, pp: 165-227.
17. Ohwofasa, E.I., 2010. The incidence and periodicity of malaria in residential zones of Warri metropolis. Being a dissertation submitted to the Department of Geography, Faculty of the Social Sciences, University of Ibadan, for the award of M.Sc. Geography.
18. Simpson, Ida Harper, 2008. 'Family'. Microsoft® Encarta® 2009 [DVD]. Redmond, WA: Microsoft Corporation.
19. Corbett, Thomas J., 2008. Poverty. Microsoft® Encarta® 2009 [DVD]. Redmond, WA: Microsoft Corporation.
20. Ettlign, M., D.A. McFarland, L.J. Schultz and L. Chitsulo, 1994. Economic Impact of Malaria in Malawian Households, Trop. Med. Parasitol., 45(1): 74-9.
21. Humphreys, M., 2001. Malaria: Poverty, Race and Public Health in the United State. Johns Hopkins University Press, pp: 256.
22. Gallup, J.L. and J.L. Sachs, 2001. The economic burden of malaria, The American J. Tropical Medicine and Hygiene. 64(1): 85. www.ajtmh.org/content/64/1_suppl/85.full.pdf+html. Retrieved 16-09-10
23. Redmond, WA., 2008. Sex." Microsoft® Encarta® 2009 [DVD]. Microsoft Corporation.

24. Ter Kuile, F.O., 2004. The Burden of Co-Infection with HIV-1 and Malaria in Pregnant Women in Sub-Saharan Africa. *American J. Tropical Medicine and Hygiene*, 71(Suppl. 2): 41-54.
25. Debeaudrap P., C. Nabasumba, F. Grandesso, E. Turyakira, B. Schramm, Y. Boum Ii and J.F. Etard, 2011. *Malaria, Malaria J.*, 18: 10(1): 132. www.ncbi.nlm.nih.gov/pubmed/21711110 Retrieved 11-11-10
26. Krefis, C.A., N.G. Schward, B. Nkrumah, S. Acquah, W. Loag, N. Sarpong, Y. Adu-Sarkodie, U. Ranft and J. May, 2010. Principal Component Analysis of Socioeconomic Factors and Their Association with Malaria in Children from the Ashanti Region, Ghana, *Malaria J.* 9: 201. [http:// www.malariajournal.com/content/9/1/202](http://www.malariajournal.com/content/9/1/202) Retrieved 26-09-10.