Economic Implications of Malaria on Households in North-Central Nigeria

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Abstract*: The study analysed the economic implications of malaria on households in North-Central Nigeria. This was with the view to describe the socio-economic characteristics of the households and estimate the factors that influence the adoption of coping strategies by households in the study area when faced with malaria attack. A multistage sampling technique was used to collect data from 600 households affected with malaria in North-Central Nigeria. Descriptive statistics and logistic regression were used for the analysis. The socio-economic characteristics of the respondents such as age showed that majority (56.2%) were still within the active age and the mean age was 46.1 years, majority (74.7%) were male and 90.3% were married and 68.0% of them attended one form of education or the other. The logistic regression model revealed that households' socio-economic characteristics such as household size (-0.018), educational level (0.241), marital status (1.725), age (0.011), and gender (-0.027) influenced the ability of households to cope with malaria illness. The test of hypothesis at 5% level of significance revealed that the socio-economic characteristics of households significantly influenced their adoption of coping strategies when faced with malaria attack. It was recommended that efforts must be intensified by the households in reducing the household size through birth control and improving educational attainment so as to effectively adopt strategies to cope with malaria attack because the disease poses a great challenge to agricultural and economic development of households and the nation at large.*

Keywords: *economic, households, implications, malaria, Nigeria, North-Central.*

I. Introduction

Malaria is a disease which is caused by protozoan parasites of the genus plasmodium and is widespread in tropical and sub-tropical regions of the world, a disproportional share being on the continent of Africa (Hanson, 2004). Malaria parasites are transmitted by the female anopheles mosquito to its victims, who become ill for days and in severe cases, may die of the illness. Malaria does not create only suffering and death but also out of pocket expenditures for patients and their families (Laxminarayan, 2004). When faced with a contingency like malaria illness and medical costs, the costs and sacrifices incurred by the household will depend on the nature, frequency and duration of illness and cost of treatment needed; the various resources available to the household, and the responses the household adopts (Asante and Asenso-Okyere, 2003). An acute malaria illness may impose sudden costs on the household which require sudden resource mobilization while a chronic malaria disease will emerge as a long term disaster with long term cost, response and resource implications (Gallup and Sachs, 2001). When faced with such a situation and money is not readily available, families resort to mobilization of extended entitlements (or claims on support networks) and selling of stores of value (farm produce, belongings and livestock) (Islam and Maistra, 2009). The impact of these adjustment behaviours will be detrimental to the household if the farm produce sold is not surplus but essential for current consumption needs (Sachs, 2005). Some households rely on claims from relatives to pay for health care (Park, 2006). Islam and Maistra (2009) used the term coping strategies to describe strategies employed during health crisis like malaria which is common in Nigeria (North-Central Nigeria in particular). North-Central Nigeria is ranked second in the hierarchy of most affected geographical zones in the country. The highest rate of the disease in the zone is adversely affecting individual farmers, households, communities as well as the overall development of the zone as most of the populace is generally poor and insecure. According to FMOH-NMCP (2006) and WHO/UNICEF (2003), 65 percent of the zone's population is either extremely or moderately poor, and farming which is the key activity accounts for 75 percent of economic activities and employs 85 percent of the working population in rural areas and 26 percent in urban areas is under stress of the disease. This situation is being worsened by the high prevalence rate of the disease in the zone. The study's specific objectives are to describe the socio-economic characteristics of households in the study area and estimate the factors that influence the adoption of coping strategies by households in the study area when faced with malaria attack.

II. Methodology

The study was conducted in North-Central Nigeria. It is one of the six geo-political zones of Nigeria. The zone comprises Benue State, Kogi State, Kwara State, Plateau State, Nasarawa State, Niger State and the

Federal Capital Territory. The zone is known as Middle-Belt of Nigeria and has a population of 20,266,257 and spans an area of 226,411 km^2 (87,419mi^2) (NPC, 2014 estimate). Nigeria is located between latitude 4^{0}N and 14^{0}N of the Equator and longitudes 3^{0}E and 15^{0}E of the Greenwich Meridian. With a landmass of 923,678 square kilometers, Nigeria is the fourth largest country in West Africa after Niger, Mali and Mauritania in terms of landmass. With the population of 177,096,000 (2014 estimated population), Nigeria is the most populous country in Africa. The zone has a mean temperature range of 24^{0}C in October to about 37^{0}C in March while rainfall varies from 12.5mm in some places to 140mm in other places. Alluvial soils are found along the Niger and Benue troughs and their flood plains. Agriculture is the dominant economic activity in terms of employment and linkages with the rest of the economy. Roughly 75 percent of the zone's land is arable, of which about 40 percent is cultivated. Despite two major rivers: the Niger and Benue, agriculture is predominantly rain-fed. Yam, cassava, rice, maize, sorghum and millet constitute the main food crops. The export crops are sesame, groundnuts, soyabeans etc. The zone can boast of a great deal of livestock resources like goats, poultry, sheep, pigs and cattle.

The population for this study consisted of all households affected with malaria in North-Central Nigeria. Purposive sampling technique was used to select three States namely: Benue, Kogi and Nasarawa States due to their level of malaria prevalence, proximity and accessibility, and high intensity of farming activities. Simple random sampling and stratified random sampling techniques were used in selecting a sample size of 600 respondents from the three States: Benue State having 270 respondents, Kogi Sate and Nasarawa State with 210 and 120 respondents respectively.

Data for this study were collected from both primary and secondary sources. The primary data for the study were generated from the households affected with malaria in Benue State, Kogi State and Nasarawa State using a well structured questionnaire. The questionnaire was administered with the assistance of community health workers and extension workers in the various communities of the States. The secondary data were collected from National Health Insurance Scheme, the Federal Ministry of Health, the State Ministry of Health (Benue, Kogi and Nasarawa States), National Bureau of Statistics (NBS), and published data from the World Bank and Roll Back Malaria (RBM).

The data collected for this study was analysed using both descriptive and inferential statistics. The descriptive statistics such as mean, frequency and percentages was employed to analyse the socio-economic characteristics of households in the study area and logistic regression analysis was used to estimate the factors that influence the adoption of coping strategies by households in the study area when faced with malaria attack.

Logistic Regression Model

The analysis employed logistic regression model to determine household socio-economic and demographic factors that influence the coping/treatment seeking behaviour of households. The logistic regression is expressed as:

$L_n[P_i/1-P_i] = \beta_k X_k + U_i$

Where P is the value of the dependent variable between 0 and 1.
The probability that the dependent variable takes the value P is given by:

$P = 1/1 + e^{-(a + bX + U)}$

$P_i/i-P_i$ is coping/treatment seeking behaviour of households
X_k = A set of household socio-economic and demographic characteristics
βk = Parameters
Ui = A random disturbance term.
From the specified model, the model for estimation in this study is explicitly stated as:
CSI = f(MS, SH, AH, LE, HS)
Where CSI = Coping strategy index
MS = Marital status
SH = Sex of household head
AH = Age of household head
LE = Level of education of household head
HS = Household size.
Thus the specific form of the model becomes:
$CSI = \beta_0 + \beta_1 MS + \beta_2 SH + \beta_3 AH + \beta_4 LE + \beta_5 HS + U_2$
On a priori grounds, $\beta_1 > 0$, β_2, β_3, $\beta_5 < 0$, $\beta_4 > 0$.

III.   Results And Discussion

Socio-economic characteristics of the respondents

Table 1 showed the socio-economic characteristics of respondents of the study area. Majority (74.7%) of the respondents for household questionnaire were male in the three states: Benue State (78.5%), Kogi State (61.5%) and Nasarawa State (84.0%). The result agrees with findings by Anonguku et al. (2010) that males are usually household heads and actively involved in agricultural and economic activities. Hence, they would be willing to pay higher amounts for malaria control/eradication.

Apparently 11 percent of the respondents were aged below 30 years, 45.4 percent were between 30-50 years and 43.8 percent were above 50 years. The average age of respondents was 46.2 years in Benue State compared to 45.4 years and 46.8 years for Kogi and Nasarawa States respectively. Overall the average age for the combined sample was 46.1 years. The result shows that majority of the respondents (55.4%) were within the productive age category of 20-50 years; implying that they can actively and effectively use their energies on agricultural and economic activities. This result agrees with the submission of Anonguku et al. (2010) and Ladele (2005) that people in this age bracket have a lot of energy that could be properly directed towards meaningful agricultural and economic activities. Thus, they would be willing to pay higher amounts for malaria control/eradication if they understand the implication of the disease on production, distribution and consumption in their households.

Table 1: Socio-Economic Characteristics Of Respondents In The Study Area (In Percentage)

Variable	n = 270 Benue State	n = 210 Kogi State	n = 120 Nasarawa State	Combined Sample
Gender				
Male	78.5	61.5	84.0	74.7
Female	21.5	38.5	16.0	25.3
Marital status				
Single	5.0	2.5	2.0	3.2
Married	87.0	91.0	93.0	90.3
Widow	7.5	5.5	4.5	5.8
Others	0.5	1.0	0.5	0.7
Age				
15 – 19	1.0	1.0	0.5	0.8
20 – 24	3.5	5.5	2.0	3.7
25 – 29	6.5	6.0	6.5	6.3
30 – 34	11.0	13.5	10.5	11.7
35 – 39	10.0	9.5	10.5	10.0
40 – 44	13.0	13.5	13.0	13.2
45 – 49	10.5	10.0	11.0	10.5
50 – 54	11.0	7.0	12.5	10.2
55 – 59	12.5	11.0	13.5	12.3
60 and above	21.0	23.0	20.0	21.3
Average	46.2 years	45.4 years	46.8 years	46.1 years
Education				
No education	24.5	34.5	37.0	32.0
Primary/Adult	29.0	28.0	28.5	28.5
Secondary	33.0	24.5	22.0	26.5
Higher/Tertiary	13.5	13.0	12.5	13.0
Average	7.7 years	6.6 years	6.2 years	6.8 years
Access to electricity	54.5	69.5	50.0	58.0
Average	0.544	0.695	0.500	0.579
Household asset				
Radio	80.0	77.5	80.5	79.3
Television	47.5	64.5	42.5	51.5
Refrigerator	24.0	32.0	20.0	25.3
Bicycle	45.0	38.5	47.0	43.5
Motorcycle	45.5	44.5	45.5	45.2
Car	18.0	19.5	15.5	17.7
Land ownership	78.0	67.0	73.5	72.8
Source of drinking water				
Piped into residence	6.0	11.0	7.0	8.0
Piped into yard	3.5	5.0	3.0	3.8
Public piped	7.5	15.0	9.0	10.5
Well with pump	23.0	8.5	20.5	17.3
Well without pump	32.5	46.5	36.0	38.3
Cart pusher	3.5	1.0	2.5	2.3
Tanker truck	20.0	12.0	19.0	17.0
Rain water	2.0	0.5	1.5	1.3
Other	2.0	0.5	1.5	1.3
Toilet type				
Flush toilet	24.5	15.0	12.5	17.7

Pit	55.0	68.5	72.5	65.3
Bush	15.0	11.5	10.5	12.3
Other	5.5	4.0	4.5	4.7
Main type of flooring in the house				
Dirt, sand, dung	14.0	23.5	39.5	25.7
Wood or plank	2.5	1.0	0.5	1.3
Cement	77.0	69.5	54.5	67.0
Parquet or polished wood	0.0	0.5	0.5	0.3
Tiles	1.5	2.0	2.5	2.0
Other	5.0	3.5	2.5	3.7
Household Size				
1 – 5	21.0	24.0	20.5	21.8
6 – 10	34.0	41.5	37.0	37.5
11 – 15	23.0	19.0	23.5	21.8
16 – 20	17.5	9.5	10.5	12.5
21 and above	4.5	6.0	8.5	6.3
Average	10.5	9.6	10.5	10.2

Source: Field Survey (2013).

Ninety-three percent of respondents in Nasarawa State were married compared to 91.0 percent and 87.0 percent in Kogi and Benue States respectively. Overall, 90.3% of the respondents were married. Jimoh et al. (2007) pointed out that married couples are more willing to pay higher amounts to control malaria than single persons because pregnant women and children are at the greatest of risk and such households have more of these than households with single persons.

In terms of education, 37 percent in Nasarawa State had no education compared to 34.5 percent in Kogi State and 24.5 percent in Benue State. Overall, 32% of the respondents were not educated while 68% were educated. High literacy rate in the study area by implication means that the educated people would understand the advantages of malaria control better than the uneducated ones and would be willing to pay higher amounts to control malaria than the illiterates. This finding is in consonance to that of Asante and Asenso-Okyere (2003) and Jimoh et al. (2007). The average number of years spent in school for respondents in Benue State was 7.7 years compared to 6.6 years and 6.2 years for Kogi and Nasarawa States respectively. Overall the average number of years spent in school for the combined sample was 6.8 years. According to Asante and Asenso-Okyere (2003) as the years of schooling increase it is expected that people will understand the advantages of malaria control better than others (illiterates).

Approximately 70 percent of households had access to electricity in Kogi State while the corresponding figures in Nasarawa and Benue States were 50 percent and 54.5 percent respectively. The average number of households having access to electricity in Benue State was 0.544 while Kogi and Nasarawa States had 0.695 and 0.500 respectively. Overall the average number of households having access to electricity for the combined sample was 0.579. Overall, 58.0% of the respondents had access to electricity for the combined sample. In Benue State 80.0% of the respondents had radio compared to 77.5% and 80.5% for Kogi and Nasarawa States respectively. Overall, about 79.3% households had radio for the combined sample. Surveyed households in Kogi State possessed more televisions (64.5%), cars (19.5%) and refrigerators (32.0%) compared to households in Nasarawa and Benue States.

Well water was the main source of drinking water in all the three states: Benue State (55.5%), Nasarawa State (56.5%) and Kogi State (55.0%). Overall the combined sample of 55.6% used well water for drinking. However, 31 percent of households in Kogi State had access to piped water compared to 12.0 percent in Benue State and 19.0 percent in Nasarawa State. The overall combined sample of about 22.3% had access to pipe borne water. More people buy water in Benue State (23.5%) than in Nasarawa State (21.5%) and Kogi State (13.0%). With regards to agricultural land 78.0 percent of households in Benue State had access to agricultural land compared to 67.0 percent in Kogi State and 73.5 percent in Nasarawa State. Overall 72.8% of the respondents had access to agricultural land. According to Jimoh et al. (2007), households that have substantial assets (financial and physical) would be willing to pay higher for malaria control than those households with small assets. Also, those using public health facilities, where the cost is relatively cheaper and who sometimes enjoy some subsidies, should be willing to pay relatively less for malaria control.

In terms of toilet types used by households, 16 percent of households in Kogi State had flush toilet and 68.5 percent had pit latrines. The corresponding figures for Nasarawa State were 12.5 percent and 72.5 percent respectively while Benue State had 24.5 percent flush toilet and 55.0 percent pit latrines. This shows that Benue State is more educated in terms of sewage disposal than both Nasarawa and Kogi States. The main flooring in 69.5 percent of households in Kogi State were made up of cement compared to 54.5 percent in Nasarawa State. Benue State had the highest percentage of 77.0 percent. The location of giant cement factories in Benue and Kogi States could have influenced the use of cement in making floors in Benue and Kogi States.

The average household size for Benue State was 10.5 while Kogi and Nasarawa States had 9.6 and 10.5 respectively. Overall, 10.2 was the average household size for the combined sample. This is higher than the

recommended national average of 6 persons per household. According to Jiang and Braun (2005), an increase in household size would increase the coping strategy index, implying that increase in household size in general increases the food insecurity of the household. Russell (2004) agrees that large household size could constitute a serious hindrance in the face of sickness, feeding, educational funding and other activities that compete for the meagre resources of the household.

Estimation of the factors that influence the adoption of coping strategies by households when faced with malaria attack

Logistic regression was employed to estimate the factors (socio-economic characteristics) that influence the adoption of coping strategies by households when faced with malaria shocks. Table 16 showed a high chi-square of 167.224 which was statistically different from zero at 5% level of significance and a high log likelihood value of 973.710 implying that the model performed well.

The marital status of the household head positively influenced the adoption of the coping strategy of the households when faced with malaria shock, and was statistically significant at 5%. This implies that a married household head had a 1.73% likelihood of employing a set of coping strategies to smooth consumption when faced with malaria health shock. The sex of the household head was negatively associated with the coping strategy contrary to the a priori expectation, though it was not statistically significant.

The age of the household head was positively related with the coping strategies and was statistically different from zero at 5% level of significance. This implies that elderly household heads had about 0.01% likelihood of employing the coping strategies such as selling household assets, borrowing from money lenders and friends to smooth their consumption when faced with malaria shock.

Table 2: Results Of Logistic Regression Model

Variables	Coefficient	Standard error	Significance
Marital status	1.725	0.166	0.021 **
Sex	-0.027	0.175	0.063
Age	0.011	0.013	0.042 **
Level of education	0.241	0.087	0.022 **
Household size	-0.018	0.065	0.047 **
Constant	-3.674	0.647	0.003

Chi-square   = 167.224
Log likelihood = 973.710
Cox of Snell R^2 = 0.540
Nagel Kerke R^2 = 0.680
** 5% level of significance
Source: Field Survey (2013).

The level of education of the household head had a positive relationship with the coping strategies such as reducing the consumption of other goods and was statistically significant at 5% level of significance. This implies that when the household head acquires high level of education, there is about 0.24% likelihood for such a household head to adopt coping strategies such as reducing the consumption of other goods and working for extra hours to smooth consumption when faced with malaria shock.

The household size was negatively associated with the coping strategy of the household head. This implies that as the household size increases, the ability to cope with health demands of the household affected with malaria decreases. This was statistically different from zero at 5% level of significance, implying that an increase in size of the household by one percent will reduce the likelihood of the household coping with health demands by 0.018%.

IV.   Conclusion And Recommendation

The result of this study revealed that majority (56.2%) of the respondents were still within the active age and the mean age of the respondents was 46.1 years, majority (74.7%) were male and 90.3% were married and 68.0% of them attended one form of education or the other. The logistic regression model revealed that households' socio-economic characteristics such as household size (-0.018), educational level (0.241), marital status (1.725), age (0.011), and gender (-0.027) influenced the ability of households to cope with malaria illness. The test of hypothesis at 5% level of significance revealed that the socio-economic characteristics of households significantly influenced their adoption of coping strategies when faced with malaria attack. It was recommended that efforts must be intensified by the households in reducing the household size through birth control and improving educational attainment so as to effectively adopt strategies to cope with malaria attack because the disease poses a great challenge to agricultural and economic development of households and the nation at large.

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