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Full Length Research Paper

The Economic Burden and Catastrophic Expenditure of Presumptive Malaria in Rural Southwest, Nigeria

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ABSTRACT: Malaria is endemic and a major public health problem in Nigeria, having negative effect on economic livelihood of farming households. Malaria treatments at times become catastrophic due to exorbitant out-of-pocket spending. This study examined how catastrophic the financial cost (out-of-pocket spending) of presumptive malaria treatment and prevention among farming households in rural Southwest Nigeria. Data were obtained with the aid of structured questionnaire administered on a randomly selected 395 households. The scenarios used to examine catastrophe were: the percentage of average monthly malaria treatment expenditure as a proportion of monthly income; non-food and total expenditures, using a threshold of 5% in all of the scenarios. Presumptive malaria cost households an average of ₦96,434.94k per year, this include treatment cost of ₦27,642.33, ₦10,434.10 for prevention and ₦58,358.51k as the value of 73.49 workdays lost to the illness. Mean monthly income, non-food and total expenditures and out-of-pocket expenditure on malaria were ₦43053.57, ₦13893.32, ₦48180.30 and ₦2303.53, respectively. The monthly malaria treatment expenditure as a proportion of households' monthly income, non-food and total expenditures were 5.4%, 16.6% and 4.8%, respectively. Thus, households spend 5.4% of their income on presumptive malaria. The disease also accounted for substantial part of households' non-food expenditure. Presumptive malaria resulted in a huge loss in household income in the area. The financial cost associated with the disease is catastrophic and it represents a significant burden on the households. The existence of catastrophic costs will negatively affect the health seeking behaviour of the deprived and rural households.

Keywords: Presumptive malaria, catastrophic expenditure, economic cost, rural Southwest, Nigeria

INTRODUCTION

Malaria is a major public health problem in Nigeria, having negative effect on economic livelihood of farming households. It is one of the widespread communicable diseases, comes as a result of attacks on red blood cells by protozoa parasites belonging to genus *Plasmodium*. The protozoa get introduced into the human body through female anopheles mosquitoes. Human beings are infected majorly by *Plasmodium falciparum*. The early symptoms of malaria are indistinguishable and comparable with the symptoms of other febrile diseases: they include fever, chills, vomiting, headache, fatigue, muscle and joint pain, abdominal discomfort, anorexia, perspiration and lassitude. In malaria-endemic countries, people commonly assume they have malaria when sick and treat themselves accordingly (Whitty, 2008; Juma and Zurovac, 2011).

In Nigeria, malaria is the foremost public health issue that majority of Nigerians complain about, and it remains the primary source of illness and death. WHO (2012) reported that in 2010, the country contributed 32% of the

655,000 global malaria deaths. Children, especially the under-5 years and expectant mothers, are more at risk of contacting malaria or die of the illness in Nigeria. In fact, about 97% of the people in the country are exposed to the illness. The disease is responsible for almost 60% and 30% of all outpatients and hospital admissions, respectively. Federal Ministry of Health, (2007) reported that not less than 70% of all patients in Nigeria hospitals are suffering from malaria attacks. The disease has been declared as the major factor responsible for economic burden of disease in the endemic areas, with the estimated national annual loss to malaria amounting to ₦480billion annually, in the form of treatment costs, prevention efforts, loss of work time, subsidy on anti-malarial drugs and so forth (FMoH, 2012; WHO, 2012).

To worsen the burden of malaria in Nigeria, out-of-pocket (OOP) expenditure is the major source of malaria treatment, it accounts for more than 65% healthcare payments (Soyibo, 2004; Onwujekwe and Uzochukwu, 2005), which in most cases become catastrophic, especially to the poor households (Onoka *et al*., 2011; Onwujekwe and Uzochukwu, 2005). There is a growing concern about economic impact of healthcare expenditure on household who face illness particularly in areas where prepayment mechanisms such as health insurance do not exist and households have to make out-of-pocket expenditure to use health services. Onoka *et al.* (2011) reported that Nigeria's private expenditure accounts for almost 70% of total expenditure on health, of which 90% is out-of-pocket expenditure. This high level of out-of-pocket expenditure implies that healthcare can place a significant financial burden on households. Xu *et al*. (2003) concluded that the level of catastrophic payments increases as the volume of total health expenditure met by out-of-pocket payments increases. The high level of economic burden of malaria coupled with high expenditures and paying mostly through out-of-pocket expenditure may prevent people from seeking and obtaining needed care because they cannot afford to pay the charges levied for diagnosis and treatment (Castillo-Riquelme *et al.,* 2008; Xu *et al.,* 2007).

Catastrophic expenditure due to presumptive malaria treatment in this case, refers to households spending more than a stated percentage threshold of their income (or non-food expenditure) on malaria treatment. According to Feder *et al.* (1987), deciding what share of income constitutes catastrophe is a question of values. Some defined it as expenses that threaten a person's existing standard of living; others as expenses that threaten some 'reasonable' standard of living. In either case, share of income may vary with people's circumstances and with their incomes (Feder *et al.* 1987). Several thresholds have been proposed: Ranson, (2002), Pradhan and Prescott, (2002), Wagstaff and van Doorslaer, (2003) and O'Donnell *et al.* (2005) used a threshold of 10% of income. Xu *et al.* (2003) used a threshold of 40% of 'capacity to pay', which was defined as income after subsistence needs are met, in practice as income minus food expenditure. Castillo-Riquelme *et al.* (2008) used a threshold of 10% of household income and 40% of non-food expenditure. However, it could be argued that any expenditure, to some very poor households in Nigeria, especially those already living below poverty line, is catastrophic. At this level of poverty, households may not have money to spend on other household needs aside from food. Ichoku, (2005) postulated that in the presence of the high incidence of poverty in Nigeria, with more than 50% of the people living below the poverty line, most health expenditures are catastrophic and the threshold for assuming catastrophe could be less than 2%.

The extent to which malaria expenditures are catastrophic in many sub-Saharan African (SSA) countries, such as Nigeria, particularly to the poor and the rural farming households, is unknown. It is possible that people who do seek care suffer financial catastrophe and impoverishment as a result of meeting the costs (Xu *et al.* 2007). Enormous bills mean catastrophe to anyone, but small bills can still be catastrophic to people with limited means (Feder *et al.* 1987). According to Xu *et al.* (2007), a relatively small payment can result in a large financial catastrophe to poor households, forcing them to reduce other basic expenses such as food, shelter or their children's education. Similarly, large healthcare payments can lead to financial catastrophe and bankruptcy even for the rich.

Many of the previous studies have examined the level of households' expenditures and cost of treating malaria both in Nigeria and elsewhere (Onwujekwe *et al.* 2000; Chima *et al*. 2003; Onwujekwe and Uzochukwu 2005; Worrall *et al.* 2005), there is relatively few information as to the extent the treatment of malaria leads rural farming households to incur catastrophic expenditures in South west, Nigeria. Although, Onwujekwe *et al.* (2010) examined how malaria treatment expenditures catastrophic affect different socio-economic and geographic groups in southeast Nigeria. This study however, examined the economic cost of presumptive malaria and also investigated the extent the malaria treatment expenditures are catastrophic to the people living in rural South West, Nigeria. Holtz *et al* (2002) and Breman *et al* (2004) argued that poor and rural households have higher risk factors and greater malaria burden.

The out-of-pocket expenditure portion of the economic cost of malaria (i.e 'financial cost of malaria treatment' and prevention in the case of this study) was isolated and examined for possible catastrophe. The out-of-pocket expenditure on malaria can be defined as the direct costs incurred by the households as a result of seeking treatment for their malaria. It included cost of self-treatment, medical costs and non-medical costs. Cost of self-treatment comprised the cost of medicines purchased from pharmacies, and other drug sellers

without prescription from a doctor or medical staff at a health facility. Medical costs included consultation, laboratory and prescription fees incurred at a health facility. Nonmedical cost included cost of transportation to and from the facility where care was sought and other nonmedical costs incurred as a result of seeking health care for the treatment of malaria. Although, several authors have defined a threshold of 10% of household income as catastrophe (Ranson 2002; Pradhan and Prescott, 2002; Wagstaff and Van Doorslaer, 2003), this study adopted a threshold of 5% in line with Onwujekwe *et al. (*2010). Hopefully, the results of this study will be useful for policy makers to develop initiatives to reduce the burden of payment for malaria treatment to poor households, especially in the rural areas, and additionally, develop better financing arrangements.

Objectives of the study

The broad objective of the study is to examine the Economic Burden and Catastrophic Expenditure of Presumptive Malaria in Rural Southwest, Nigeria. Specific objectives are to

(i) Examine the economic cost of presumptive malaria among the farming households in rural south west, Nigeria.
(ii) Find out if the out-of-pocket expenditure on presumptive malaria treatment and prevention is catastrophic or not.

MATERIALS AND METHODS

The study was carried out in rural Southwest Nigeria. The zone is made up of six states: Ekiti, Lagos, Ogun, Ondo, Osun and Oyo with a total population of 27, 581,992 (NPC, 2006). Although malaria is endemic throughout Nigeria (Yusuf *et al*., 2010), the choice of South west Nigeria is based on the fact that, in the zone, the climate is hot and humid which favours the proliferation of the mosquito vectors (Babalola *et al*., 2009). Also, Nigeria Demographic and Health Survey, (2013) indicated that South west is the zone with the lowest number of households with at least one Insecticide Treated Nets (ITNs). Hence, the least in access to malaria preventive measures when compared with the remaining five geo-political zones. A four-stage sampling technique was used. The first stage was the random selection of Oyo and Osun states from the six states in South west Nigeria. In the second stage, four (4) and three (3) rural Local Government Areas (LGAs) from Oyo and Osun states, respectively were randomly selected based on probability proportionate to size of rural LGAs in each of the states. The third stage was the random selection of five villages from each of the LGAs, making a total of 35 villages in all. In the fourth stage, a simple random selection of 10 percent of the food crop farming households in each of the thirty-five (35) villages were carried out. Out of the four hundred and twenty (420) questionnaires administered on the respondents, twenty-five (25) were discarded for incomplete information and inconsistency. Thus, data from 395 questionnaire were analyzed and results presented. This study focused on "perceived" or “self-reported’’ malaria. That is, what people perceived to be "malaria" and presumptively diagnosed as "malaria" and not with the prevalence of malaria as measured by the presence of parasites in the blood that are not manifested in illness symptoms. Structured questionnaire were used to obtain primary data used for the study. Efforts were made to ensure that people reported malaria episodes based on symptoms as close as possible to accepted clinical symptoms. The following symptoms were taken as indicative of malaria: fever, headache, chills/shivering, abdominal pain, diarrhea, nausea (vomiting), altered taste, loss of appetite (anorexia), general body weakness, muscular pain, joints pain and convulsion, especially in children (Tangpukdee *et al*., 2009). Appropriate symptoms baselines were set to conclude that the symptoms described justified concluding that the illness is malaria.

The data collected include socio-economic and demographic characteristics; farming activities such as farm size cultivated, food and cash crops planted, inputs used, farm outputs and income realized. Malaria related information sought include the number of presumptive malaria cases per household in 2014, number of days of incapacitation per episode of malaria by the sicks and the caregivers, age and sex of the sicks and the caregivers. Also sought was the amount expended on treatment of each of the malaria cases recorded by the households, as well as the households’ monthly expenditure on malaria preventive measures. All of the expenditures were then converted to monthly estimates. Household monthly food expenditures and the monetized value of home produced and consumed food was also collected.

Statistical tools used in data analyses are descriptive analysis and Cost-of-Illness (COI) approach**.** The descriptive statistics were used to profile the socio-economic characteristics of the households, malaria preventive cost and workdays lost to malaria. The Sauerborn index type of the COI approach was used to estimate the economic cost of presumptive malaria. The scenarios used to examine catastrophe were: the percentage of average monthly malaria treatment expenditure as a proportion of average monthly household income; non-food expenditure; and monthly total expenditure. This approach has been widely used to assess the productivity losses from illness or injury as measured by income forgone due to morbidity, disability and mortality. The COI approach draws on the human capital theory. It is the sum of the costs of medical treatment (the ‘direct’ costs) and the value of productive

time lost due to illness (the 'indirect' costs). This study adopted the COI approach developed by Sauerborn *et al.* (1994) which was adopted by Akinbode *et al.* (2011) and Ayinde *et al.* (2015) for its simplicity. According to Sauerborn *et al*. (1994):
Financial costs of malaria illness:

$$F = \sum_{i=0}^{n} (F_{di} + F_{fi} + F_{tri} + F_{li}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Time costs of malaria illness:

$$T = \sum_{i=0}^{n} [(T_{si} * a_{si} * w) + (T_{ci} * a_{ci} * w)] \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

F = Total financial costs of health care during the period (in Naira)
F_d= Financial cost of drugs, herbs etc (in Naira)
F_f =Financial cost of medical consultancy (in Naira)
F_{tr}=Financial cost of travel to health provider (in Naira)
F_l = Financial cost of subsistence (special feeding) during the illness in Naira
T = Total time costs (days of forgone production)
T_s= Time costs of the sick person (days of forgone production)
T_c= Time costs of the caregiver(s) (days of forgone production)
w = Daily wage rate in Naira
n =Number of malaria illness episodes
a =Age coefficient
s = Related to the sick individual
c =Related to the caregivers.
* = multiplication sign.
The age coefficient '*a*' values (which represents productivity coefficient) was assigned following the assertions of Sauerborn *et al.*(1996) that economic productivity of individual rises from very early twenties to around age 40 years and decline steadily afterwards. Therefore, for the purpose of this study, coefficient '*a*' took on the following values:
Age less or equal 17 years = 0.5
18-40 years = 1.0
41-55 years = 0.75
56-65 years = 0.67
Above 65 years = 0.5

Therefore:

Economic cost of Malaria illness is:

$$E = \sum_{i=0}^{n} (F_i + T_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

However, following Akinbode *et al*. (2011) and Sanusi (2013), Preventive cost (PC) of malaria is included in

the model and the Economic cost adopted for this study was as given below:

$$E = \sum_{i=0}^{n} (F_i + T_i + \text{PC}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

In most cases, the expenses on consultation and drugs were inseparable, thus the two were combined during the analysis. The manday was estimated by using the average male adult work for about 8 hours a day as used by Olukosi and Erhabo, (1998). Thus the actual total hours devoted to farm work was converted to man equivalent (male adult) by multiplying those of male by 1, those of female by 0.75 and those of children by 0.5, an assumption that average working condition prevail.

Estimation of catastrophic malaria treatment

Although, WHO (2005) recommended the traditional 10% of household income and 40% of non-food expenditure as thresholds. In this study, the extent of catastrophic payments was assessed following Onwujekwe *et al. (*2010) study in southeast Nigeria, with the level of catastrophic malaria treatment expenditure computed as:

(i) The percentage of average monthly malaria treatment expenditure divided by the households' average monthly income.
(ii) The percentage of average monthly malaria treatment expenditure divided by the households' average monthly non-food expenditure.
(iii) The percentage of average monthly malaria treatment expenditure divided by the households' average monthly total expenditure.
While several authors have adopted a threshold 10% of household income as catastrophic (Ranson, 2002; Pradhan and Prescott, 2002; Wagstaff and Van Doorslaer, 2003), this study adopted a threshold of 5% in line with Onwujekwe *et al.(*2010) who carried out a similar study in the southeast Nigeria, using a threshold of 5%.

Ethical considerations

Written informed consent was obtained from all the heads of the households participated in the data collection (interview) and assurance given to them that all information received would be handled confidentially. Participants were informed that participation is voluntary. The respondents were also assured of their right to withdraw from the interview at any time they would wish during the interview. The survey was also anonymized so that household or individual information is not identifiable.

Table 1: Socio-economic characteristics of food crop farming households.

Variables	Frequency	Percentage	Mean	S.D
Sex of the household head				
Male	350	88.6		
Female	45	11.4		
Age of Household head (years)				
Less than 45	49	12.4		
45-54	106	26.8		
55-64	152	38.5	56.41	9.34
Above 64	88	22.3		
Marital status of household head				
Married	349	88.4		
Widow/Widower	45	11.4		
Single	1	0.3		
Household size				
2-5	111	28.1		
6-9	266	67.3	6.518	1.63
Above 9	18	4.6		
Household head's years of Schooling				
0 (No formal education)	146	37.0		
1-6	142	36.0		
7-12	100	25.3	4.80	4.65
Above 12	7	1.8		
Farming experience (years)				
1-10	11	2.8		
11-20	96	24.3		
21-30	93	23.5	29.53	10.78
31-40	142	36.0		
Above 40	53	13.4		
Farm size (Hectares) cultivated				
Less than 1	13	3.3		
1-1.5	120	30.4		
1.6-2.0	193	48.9	1.722	0.5569
2.1-3.0	57	14.4		
Above 3	12	3.0		
Household's farm income (₦ / Annum)				
Less than 200,000	8	2.0		
200,000-299,999	58	14.7		
300,000-399,999	97	24.6		
400,000-499,999	100	25.3	452711.70	153704.70
500,000-599,999	68	17.2		
600,000-699,999	35	8.9		
700,000 and above	29	7.3		

Source: Field survey, 2015.

Ethical clearance for the study was obtained from the Osun State Specialist Hospital Osogbo Health Research Ethics Committee (Clearance number: HREC/27/04/2015/SSHO/027).

RESULTS

Socio-Economic characteristics of the respondents

Table 1 revealed that 88.6% of the households' head were male, age was 56.41±9.34 years, 88.4% were married, and household size was 7±2 persons. Years of schooling was 4.80±4.65, which is far below the universal basic education of at least 6 years (primary school) with 37.0% of them had no formal education. Years of farming experience was 29.53±10.78. Average farm size cultivated was 1.72±0.56 and the annual farm income was estimated to be ₦452,711.70±153,704.70 (equivalent to ₦37,725.97 per month).

Distribution of respondents by types and cost of malaria preventive measures adopted

Table 2 shows that households in the study area spent an average of (₦154.8 ±89.59) on mosquito coils, which

Table 2: Average households monthly expenditure of malaria preventive measure.

Preventive Measure	Monthly Cost (₦)	Std deviation	Min.	Max.
Mosquito coils	154.48	89.59	0	400.00
Mosquito repellants	0.00	0.00	0.00	0.00
Insecticides e.g raid, mobil, mortain, begon etc.	264.61	329.19	0.00	1200.00
Prophlactic drugs e.g Fansidar, Amalar, Artesunate, Maloxine etc.	450.22	153.62	0.00	1200.00
Herbs for preventive purpose e.g local concoction, powdered medicine, etc.	398.23	240.29	0.00	1500.00
Total	1267.54			

Source: Field survey, 2015.

Table 3: Average workdays lost to malaria sickness and care-giving.

Forms of Workdays lost	Workdays lost	Std dev.	As % of total workdays lost to malaria	Min.	Max.
Workdays lost by the sick persons	51.28	19.92	69.8	11	112
Workdays lost by the care-givers	22.21	13.48	30.2	0	70
Total workdays lost	73.49		100		

Source: Field survey, 2015.

is the most frequently, used malaria preventive measure. ₦264.61±329.19 was spent on insecticides (e.g raid, mobil, mortain, begon etc). Prophylactic drugs (e.g Fansidar, Amalar, Artesunate, Maloxine, etc.) cost households ₦450.22±153.62 per month. Households' monthly expenditure on herbs for preventive purposes (e.g local concoction, powdered medicine, etc) stood at ₦398.23±240.29. The total monthly expenditure on malaria prevention in the study area was estimated at ₦1267.54k. This implies that the respondent households adopted prophylactic drugs, local herbs and burning of mosquito coils as malaria preventive measures.

Estimation of workdays lost to malaria

Table 3 shows that households lost an average of 51.28±19.92 workdays to presumptive malaria illness with minimum and maximum values of 11 and 112 workdays, respectively. The workdays lost to care-giving was estimated at 22.21±13.48 with minimum and maximum values of 0 and 70 workdays, respectively. This implies that 30.2% of workdays lost to presumptive malaria are attributable to care-giving alone; while the bulk of the workdays lost (69.8%) is actually due to malaria sickness of the adults and older children who provides source of family labour on the farm.

Economic cost of malaria

Table 4 presents the economic cost which malaria imposed on food crop farming households within a year in the study area. Results indicated that the average household cost-of-illness per year was ₦96,434.94k. Out of this sum, ₦24,262.89 (25.2%) was spent on treatment (consultations, drugs and herbs) per year, ₦1269.77 (1.3%) was the cost of traveling to the health providers including patients medicine stores to purchase drugs, ₦2109.67 (2.2%) was for subsistence (i.e. cost of special feeding for the sicks) while ₦10,434.10k (10.8%) was spent on prevention such as purchase of mosquito coils, insecticides, mosquito bednets (i.e ITNs or LLINs) and prophylactic treatments. An annual average of 73.49 workdays lost to presumptive malaria illness (the sicks and caregivers) was obtained, which was estimated at ₦58,358.51k, representing 60.5% of the households total cost of malaria illness. This finding is consistent with Omotayo and Oyekale (2013) who valued the workdays lost to malaria among farming households in Ido local government area of Oyo state to be 58.2% of the total cost of malaria in the area.

Table 4: Summary of economic cost of presumptive malaria on households per year.

Cost Items	Cost	% of Total
Number of observation	395	-
Malaria episodes (number)	17.49	-
Workdays lost to malaria	73.49	-
Treatment cost (drugs and herbs) (₦)	24,262.89	25.2
Cost of Subsistence (feeding) in ₦	2,109.67	2.2
Transport cost (₦)	1,269.77	1.3
Financial cost of treatment (4+5+6) (₦)	27,642.33	28.7
Value of Days lost to malaria(₦)	58,358.51	60.5
Malaria Prevention cost(₦)	10,434.10	10.8
Economic cost of Malaria (7+8+9) (₦)	96,434.93	-
Annual farm income (₦)	452,711.70	-
Household total annual income (Farm + Non-farm income)	516,642.84	
Financial cost of malaria treatment as percent (%) of annual household farm income	6.1	
Financial cost of malaria treatment as percent (%) of annual household total income	5.4	
Total cost of malaria illness as percent (%) of annual household farm income	21.3	-
Total cost of malaria illness as percent (%) of annual household total income	18.7	

Source: Computed from field survey data, 2015.

Table 5: Catastrophe due to malaria expenditure for the respondents.

Monthly income (₦)	Monthly non-Food expenditure (₦)	Monthly total expenditure (₦)	Monthly malaria OOPS (₦)	Malaria OOPS as % of monthly income	Malaria OOPS as % of non-food expenditure	Malaria OOPS as % of monthly total expenditure
43053.57	13893.32	48180.30	2303.53	5.4	16.6	4.8
Remark				Catastrophic	Catastrophic	Non-catastrophic

Source: Computed from the field survey, 2015.

Sauerborn *et al.* (1994) reported that time costs of illness are about twice as high as financial costs (69%) of total economic costs of the illness. Similarly, Asante and Asenso-Okyere (2003) reported that the indirect cost of an illness is mostly more than half of the total cost of that illness. The value of workdays lost to malaria reflects the opportunity cost of time or labour earnings that were forgone as a result of malaria illness *i.e* time that could have been spent on farm activities but were lost to malaria illness. The average income of the respondent households was ₦452,711.70k/annum, that is, ₦37,725.98 per month. This also implies that respondents lost 21.3% of their farm income on malaria per annum. It can then be concluded that illness due to presumptive malaria cost food crop farming households in the area an estimated average annual income loss of ₦96,434.94k in the form of workdays lost, preventive and treatment costs. Also consistent with this finding is the study of Ayinde *et al*. (2015) who examined the economic effect of malaria on artisanal fish production in a coastal area of Nigeria, and found the average household cost of illness (COI) of ₦109,995.85k per year.

Catastrophe due to presumptive malaria treatment expenditure

Table 5 shows the overall mean monthly income, monthly non-food expenditure, monthly total expenditure and monthly malaria out-of-pocket expenditure estimated at ₦43053.57, ₦13893.32, ₦48180.30 and ₦2303.53, respectively. This implies that malaria out-of-pocket expenditure as percent of monthly income, monthly non-food expenditure and total expenditure are 5.4%, 16.6% and 4.8%, respectively. This implies that households in the study area spent 5.4% of their income on presumptive malaria treatment and prevention alone. Also, malaria treatment and prevention accounted for 16.6% of non-food expenditure of the households under study.

Catastrophe due to malaria expenditure based on various thresholds

Table 6 revealed that 53.2% of the households experienced catastrophic malaria treatment when the threshold was set at 5% of monthly income. 38.5% experienced catastrophe when the threshold was set at 5% monthly total expenditure, while almost all the households (99.2%) experienced catastrophe when the threshold was set at 5% monthly non-food expenditure. However, this value decreased to 87.3%, 12.9% and 0.8% at monthly non-food expenditure thresholds of 10%, 25% and 40%, respectively. Lower non-food expenditure among the households was observed from this result, an indication of poverty among the households; hence

Table 6: Catastrophe due to Malaria Expenditure based on various thresholds.

Criteria	Catastrophic Threshold	Observation (n=395)	Percentage
Monthly income	Non-catastrophic (below 5%)	185	46.8
	Catastrophic (5% to less than 10%)	179	45.3
	Catastrophic (10% and above)	31	7.9
Monthly total expenditure	Non catastrophic (below 5%)	243	61.5
	Catastrophic (5% to less than 10%)	152	38.5
Monthly non-food expenditure	Non catastrophic (less than 5%)	3	0.8
	Catastrophic 5% to less than 10%	47	11.9
	10% to less than 25%	291	73.7
	25% to less than 40%	51	12.9
	40% as threshold	3	0.8

Source: Computed from the field survey, 2015.

nearly all of them experience catastrophic expenditure as the threshold was set at 5% of monthly non-food expenditure. Biritwum *et al.* (2000) had earlier carried out a study in northern Ghana and found that, while the cost of malaria care was just 1% of the income of the rich, it was 34% of the income of poor households.

DISCUSSION

Results from this study show that large household size, small farm size and low level of education are observed as part of the socioeconomic characteristics of the respondents. This may be compounded by poverty, in which most households may be undernourished, thereby become more vulnerable to many infections, including malaria. Nkonya *et al*. (2008) observed that larger household size could be associated with poverty and other vulnerability that may exclude such households from good quality living.

On average, household spent ₦1,267.54 on prevention of malaria monthly. This is almost 3% of their monthly income of ₦43,053.57. Also, 73.49 workdays were lost to presumptive malaria per household; this was valued at ₦58, 358.51k which is amounted to 60.5% of their total cost of the illness (malaria). This finding is consistent with Omotayo and Oyekale (2013) who valued the workdays lost to malaria among farming households in Ido local government area of Oyo state to be 58.2% of the total cost of malaria in the area. Asante and Asenso-Okyere, (2003) also reported that the indirect cost of an illness is mostly more than half of the total cost of that illness. The workdays lost to presumptive malaria have negative effect on productivity of the farm households. Ochi *et al.* (2015) reported decline in crop output due to days of incapacitation of the household member(s) as a result of malaria illness.

The Financial cost of malaria, (which represents the direct cost of treatment and prevention was ₦27,642.33 and ₦10,434.10, respectively). This is 6.1% of their annual farm income and 5.4% of their total annual income. This indicates that the financial cost of malaria consume a significant portion of households' income. The overall household loss to presumptive malaria which was estimated at ₦96,434.94k, in the form of preventive and treatment costs as well as workdays lost implies that respondents lost 21.3% of their farm income per annum on presumptive malaria. Mwabu (2007) reported income and production losses of 10-21% as part of the economic burden of malaria. The study revealed further that the household's monthly out-of-pocket expenditure on presumptive malaria was 5.4% of their monthly income and 16.6% of their monthly non-food expenditure. Going by the catastrophic threshold of 5%, presumptive malaria is catastrophic in the study area. These findings are consistent with Ichoku *et al* (2005) who reported that the average Nigerian household spends 3-5% of its income on healthcare while Onwujekwe *et al.* (2010) concluded that malaria treatment accounted for 7.1% of non-food expenditures for rural dwellers in the southern Nigeria. However, since the study examined catastrophe in relationship to presumptive malaria, it is possible that when only the malaria confirmed cases are used as the basis for the analysis, the level of catastrophe may be lower than computed.

Conclusion and Recommendations

Both direct and indirect costs associated with presumptive malaria represent substantial burden on the

households. The existence of catastrophic costs will adversely affect the health seeking behaviour of households, especially the poor and the rural dwellers, who may perhaps be making use of cheap but inappropriate treatment. Catastrophic payments can lowers productivity and further impoverished the already poor households. In order to reduce catastrophic spending on malaria treatment, there is need for policy actions that will reduce the amount of money paid out-of-pocket by the malaria victims. This will include promotion of health insurance, which must take care of rural dwellers and those who are in informal sectors of the economy. Similarly, the cost of malaria treatment should be reduced if not totally free, especially for the children, pregnant women, poor and other vulnerable groups. Also, governments and donor agencies should intensify efforts on subsidies on major anti-malarial drugs.

Authors' declaration

We declared that the study is an original research by us and we agree to publish it in the journal.

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