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Research Article

Financial Burden of Malaria Treatment by Households in Northern Nigeria

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ABSTRACT

Malaria poses risk for 97% of Nigeria's population while the remaining 3% of the population live in the malaria free highlands. The Federal Ministry of Health estimated financial loss due malaria and put it at ₦32 Billion per annum with the largest share from the northern geopolitical zone. This figure is particularly huge for a region where poverty stare her people at face. Hence, the financial burden of malaria treatment by households in northern Nigeria was investigated. The Harmonized Nigeria Living Standard Survey (HNLSS, 2010) data was used. The direct cost of malaria treatment on individual such as the direct spending on treating malaria and number of work days lost to incapacitation while income loss represents the indirect cost. The study profiled the incidence, estimated the direct and indirect cost of treatment, and compared the financial burden of malaria treatment within the study area. The direct cost of treatment steeps lowest at the rural sector occupied mostly by farmers estimated at ₦311.18 while the non-farm occupation incurred the highest direct cost estimated at ₦1246.11. Similarly, the least direct cost of treatment by sectors was evident in the rural sector estimated at ₦475.73. The number of days and income loss by the sick person and the care-givers were 3.46days and 3.15days respectively while the lowest income loss in these days were valued at ₦1933.86 and ₦2739.20 respectively. The estimated financial burden rose from 1.15% and 1.96%. The study therefore recommended the strengthening of the "Roll Back Malaria Project".

Keywords: *Direct Costs, Financial burden, Harmonized Nigeria Living Standard Survey, Indirect Costs, Poverty*

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INTRODUCTION

Malaria has been one of the most potent scourges of mankind from time immemorial and it remains one of the three major communicable diseases (AIDS and tuberculosis). It is the number one public health problem in Nigeria and accounts for the major cause of hospitalization, morbidity and mortality. Malaria is a major public health problem in Africa. It contributes significantly to the poor health situation in Africa, with the region having the greatest burden of malaria cases in the world as documented in different literatures (Gallup and Sachs, 2000; WHO, 1999 and 2002; WHO/UNICEF, 2003 and 2005). Despite being a largely preventable and treatable disease, malaria is responsible for an estimated 800,000 deaths globally each year (WHO 2010), with the majority of morbidity and mortality occurring in young children in sub-Saharan Africa. In addition to its impact on health, malaria imposes a heavy economic burden on individuals (Chima *et al* 2003) and entire economies (Sachs and Malaney, 2002). Malaria therefore is not only a public health problem but also a developmental problem. Similarly, Roll Back Malaria project estimated 300 million acute cases of malaria every year around the world resulting in more than one million deaths. Approximately, 90% of the deaths occur in Africa especially in young children which have serious demographic consequences on the continent. Reports from the National Malaria Control Programme (NMCP), under the supervision of the Nigerian Ministry of Health (MoH) depicts that 60 percent of outpatient visits to health facilities, 30 percent of childhood death, 25 percent of death in children below one year; and 11 percent of maternal deaths and 10% of low birth weight (NMCP Strategic Plan 2009-2013) occur as a result of malaria episodes. Furthermore, the federal Ministry of Health (MoH) estimates a financial loss for malaria in the form of treatment costs, prevention, loss of man-hour and other indices at 32 Billion Naira per annum.

Malaria illness imposes great burden on the society as it has adverse effects on the physical, mental and social

wellbeing of the people as well as on the economic development of the nation. The financial and economic burden attributable to malaria mortality arises from reduction in the available work force which leads to a reduction in employment size and national output. A strong correlation between malaria and poverty has also long been recognized. Not only does malaria thrive in poverty but it also impedes economic growth and keeps households in poverty (Teklehaimanot and Mejia, 2008). The available record shows that at least 50% of the population of Nigeria suffers from at least one episode of malaria each year while malaria accounts for 45% of all out-patient visit. Therefore, it imposes great burden on the country in terms of pain and trauma suffered by its victims as well as loss in output and cost of treatments. The disease is often treated in Nigeria by self-medication, use of local herbs, use of service spiritualists or and the use of clinical/hospital services. Similarly, usual preventive measures include use of medicine (prophylaxis), insecticides (coils and sprays), ordinary mosquito nets, insecticides treated nets (ITNs) and windows and door nets (Jimoh *et al*, 2007). Empirical evidence from other related studies depict the agricultural sector bears about 75 per cent of the direct economic burden of malaria in Nigeria which translates to about 3 per cent of the real GDP that is lost annually in agricultural outputs to the malaria disease. (Jimoh, 2009).

However, several studies in the past that had measured the financial or economic costs and consequences of illness (Tuberculosis, HIV/AIDS, and malaria) for patients and their families, do not fully explore the literature. The need to look beyond the monetary incurred in treating malaria as a challenge to human development prompted this study. This study therefore guided itself by answering the following questions. What are the socio-economic characteristics of respondents in the study area? What are the elements of direct and indirect costs of malaria illness to individual? What is the average cost incurred per individual in malaria illness treatment? What is the number of productive days lost due to malaria illness? What is the impact of malaria illness costs on individual income? What difference exists between the means of direct cost spent on malaria treatment across the geo-political zones in Northern Nigeria? Specifically, health is known to have two-way relationship with wealth and income. Health enhances the productivity which enables an individual or a nation to accumulate income or wealth. Individuals with higher income or nations with higher wealth have evidently been found to enjoy better health status. This causal nature of the relationship between health and the economic or labour market outcomes is the bedrock to understanding these linkages. The link between productivity and health played a key role in theories of economic development based on the idea of nutrition-based efficiency wages which had become central in the study of economic history (Dasgupta 1993, and Fogel 1994). Moreover, the concern about the links between malaria illness, financial burden and impoverishment has placed health at the center of development agencies' poverty reduction targets and strategies given the magnitude of malaria illness which contributes to impoverishment, income loss, and consumption levels below minimum needs (WHO, 2002; Barnett *et al*, 2001; World Bank, 2000). The study aimed to provide accurate and relevant information into the financial burden of malaria in northern Nigeria households which may help health policy makers in designing malaria controlling strategies, efficient allocation of resources and policy design and the scaling up of both new and old interventions for malaria endemic areas and spot gap for further research. Therefore, finding from this study could help to re-strategize in the pursuit of some development goals of the MDGs particularly the target of improving maternal health through addressing malaria menace. In addition, various studies have estimated the economic burden of non-communicable disease like malaria around Africa and especially Nigeria, however, as at the time this research was conducted, none had applied the cost of illness approach to estimate the financial burden of malaria even in a wide geographical setting like Nigeria.

Hyacinthe *et al*. (2013) examined the financial burden of non-communicable diseases (NCDs) in low and middle-income countries; the findings were specifically on costs of obtaining the medical care and the costs attached to inability to work. The result suggests that NCDs pose a heavy financial burden on many affected households, but poor households are the most financially affected when they seek care. The use of originator brand medicines constitutes higher than necessary expenses and the financial costs deter many people suffering from NCDs from seeking the necessary care needed. Also, the costs associated with income-earning opportunities are also significant for many households. Hence, NCDs exerts a substantial financial burden on many households especially the poor in low and middle-income countries (LMICs). Ajani and Ashagidigbi (2008) upheld that malaria has effect on the overall farm income of the rural households while applying descriptive and multiple regression techniques. They established that malaria incidence had significant effect on the health and farm income of the farmers through increase in the number of days incapacitated (an average of 22 days) and an income loss of N15,231.50 during their incapacitation days. Also, other determinants of productivity of farmers like farm size, education, food expenditure and non-food expenditure, the results were statistically significant at one percent while household size was statistically significant at five percent. However, age and days of incapacitation were not statistically significant at ten percent in explaining the variation in the annual income realized from the farm which was used as a measure of productivity of farmers. Oyekale and Omotayo (2013) in a study on the effect of malaria on farming households' welfare in Ido local government area of Oyo state, Nigeria. The study found that average incapacitation period due to malaria in a year was 12.18 days, the treatment cost was N8,513.33, total cost of incapacitation was N15,534.17, total cost of prevention was N2,647.083, hence total cost due to malaria was estimated at N26,694.17, and the average income of the respondents was N634,304.2. This indicated that respondents lost as much as 4.21% of their income per annum on malaria. Jimoh, (2009) reported the malaria burden and agricultural output in Nigeria and evaluates basically the malaria burden on the Nigerian agricultural sector. The result indicates that the economic burden of malaria, in terms of loss of agricultural output is about N 3.953 million for every reported case of malaria per 100, 000 persons which is high and therefore colossal. This finding with evidence from other similar studies suggest that the agricultural sector bears about

75 per cent of the direct economic burden of malaria in Nigeria and represents about 3 per cent of the real GDP that is lost annually in agricultural outputs to the malaria disease.

MATERIALS AND METHODS

The selection of the study sites was based both on the malaria epidemiological zones namely, the forest, the savannah and the grass-land zones, and the geo-political zones. Nigeria can be broadly divided into six geo-political zones which are south-west, south-east, south-south, north-central, north-east and the north-west. The north-central, north-east and the north-west constitutes the northern Nigeria which comprises of 19 States: Adamawa, Gombe, Bauchi, Jigawa, Plateau, Kebbi, Zamfara, Niger, Sokoto, Benue, Borno, Kaduna, Kano, Kogi, Kwara, Nassarawa, Taraba, Yobe, Katsina and the FCT. However, the epidemiological zones of malaria were not adhered strictly to because of the difficulty and ambiguity that may evolve in the process of converting the epidemiological zone to their geo-political zones. Therefore, the epidemiological zones were relaxed in this study while adopting the geo-political zones.

Data Source: The Harmonized Nigeria Living Standard Survey (HNLSS, 2010) data was used. This data provided information on individual direct spending on treating malaria, indirect cost incurred by the sick and the caregiver as measured by the number of workdays, and individual and household expenditure which was used as a proxy for income because of difficulty attached to getting their income, this is in line with the work of Hyacinthe *et al* (2013).

The *per capita* total household food and non-food consumption expenditure in regionally deflated prices which includes spending on foods, cooking fuel, cleaning, lightning, rent, transport, education, etc. was used for the research. Days lost due to reported fever was valued into monetary terms using an average daily income rate estimated from the consumption expenditure data which were obtained from the survey.

Of the 4703 individuals sampled across the six geo-political zones only the North Central, North East, North West, comprises of 433, 494, 1271 respondents, respectively were used. The respondents used in the study comprised of individuals who had malaria illness two weeks prior to the survey period.

Data Analysis: Due to data limitation and inability to deduce qualitative data from the survey, Willingness to pay Approach was jettisoned for the cost of illness approach. The cost of illness was estimated by applying accounting sense using medical and non-medical direct costs of malaria and indirect cost of malaria. The data required has a component on micro data involving cost of illness to individuals or households. The ability to pay for malaria care was assessed through the income and expenditure structure of households that were obtained through expenditure from the household survey. The direct cost varies due to demand factors such as preferences for special foods and supply factors such as service availability, transportation, cost of drugs and other out-of-pocket costs in getting treatments primarily. The indirect cost includes productivity lost by malaria patients or households against malaria attack and the cost involved as well as households' standard of living. Therefore, indirect cost was estimated using the number of workdays lost multiplied by daily income.

Model Specification

COI = MC+ NMC + LL+ CBM + IL +CPS

Where:

MC (Medical costs): personal expenditures on consultation and diagnosis, treatment and care of the disease.

NMC (non-medical costs): personal expenditures on treatment of the disease. Both medical and non-medical costs are the direct cost of malaria treatment, which are borne by households;

LL (labour loss): is the indirect cost or the productivity cost of malaria, i.e., the burden due to loss of labour via malaria mortality and morbidity;

CBM (cost of behaviour modification): is the cost caused while modifying social and economic decisions in response to risks of contracting malaria, e.g., choice of crop or migration decisions that are adversely affected by land or labour productivity;

IL (investment loss): is the malaria cost on the long-term growth process because it negatively impacts accumulation of human and physical capital;

CPS is the cost of pain and suffering and other intangible losses developed by malaria.

For this work, application of the cost-of-illness approach entails inclusion of only MC, NMC and LL components, due to the difficulties associated with attaching monetary values to the other costs like CBM and CPS as used by Okorosobo *et al* (2011). Also, as a result of expected skewness that may arise from the costs data, the data was transformed into logarithm in order to achieve the assumption of normality usually required. Logarithm transformation is widely applied in the cost of illness studies because the geometric mean is always lower than the arithmetic mean therefore solving the problem of a potential overestimation of the means when the data are not transformed as applied by Chuma *et al* (2006).

RESULTS

The descriptive analysis of HNLSS 2010 survey data shown in Tables (1, 2, and 3, respectively) indicate that in all the three geopolitical zones namely North East, North Central and North West, age groups 0-4 to 15-19 constitute 60.7%, 58.7% and 63.5% respectively. This implies that a huge percentage of these groups depend on their parents for care (health inclusive) and shelter. Also, the age groups between 20-39 and 35-39 (which participate more in the productive activities) made up 22.2%, 22.2% and 18.6% respectively, while other age groups share the remaining percentages. The result also revealed that most of the respondents in the North East, North Central and North West were married (39.8%, 33.4% and 37.9% respectively). The never married or singles constitutes only 9.1%, 13.5%, and 8.2% respectively. Majority of the respondents had information on malaria from mass media and health practitioner like nurse and doctor. The survey also indicates that 49.8% of the respondents in the North East, 59%

(North Central), and 43.6% (North West) experienced fever in the last two weeks. Treatments were sought majorly from government health facilities 24.2%, 32.7% and 20.5% in the North East, North Central and North West respectively. Similarly, 91.2% in the North East, 90.4% in the North central and 94.4% in the North West spent between 0-3 days seeking advice/treatment. However, due to the severity of the illness, 4.6% in the North East, 4.3% in the North Central and 2.5% in the North West spent 4-7days seeking advice/treatment while other respondents spent more than 8days.

Table 1:
Percentage distribution of age groups of respondents

Age Groups	North East	North Central	North West
0-4	26.3	21.6	28.0
5-9	16.4	20.5	17.2
10-14	9.8	8.6	11.1
15-19	8.2	8.0	7.2
20-24	5.9	6.1	4.3
25-29	6.7	5.2	4.6
30-34	6.2	4.4	6.7
35-39	3.4	4.5	3.0
40-44	2.6	4.6	2.6
45-49	2.1	3.5	2.5
50-54	5.8	3.0	7.7
55-59	2.3	1.3	0.9
60-64	1.9	4.0	2.1
65 and above	2.4	4.7	2.2
Total	100	100	100

Table 2:
Percentage Distribution of Respondents by Gender

Gender	North East	North Central	North West
Male	55.0	53.2	56.8
Female	45.0	46.7	43.2
Total	100	100	100

Table 3:
Percentage Distribution of Respondents Marital Status

Marital Status	North East	North Central	North West
Married (Monogamous)	39.8	33.4	37.9
Married (Polygamous))	0.1	0.1	0.1
Informal or Loose Union	0.4	0.0	0.4
Divorced	0.2	0.1	0.1
Separated	0.8	1.4	0.1
Widowed	*1.2*	5.1	0.7
Never Married	9.1	13.5	8.2
No response	48.4	46.4	52.4
Total	100	100	100

Also, due to affordability and availability of Chloroquine, (unlike the new brands of ACT's), 19.4% in the North East, 23.5% in the North Central and 16.0% in the North-West zone adopted Chloroquine as their brand. The result also found that most of the respondents in the North West (96%) and North East (94.7%) spared 0-3days to provide care but it was only 26.7% in the North Central. However, 73.3% of the respondents provided care to sick household member(s) in 4-7days in the North Central. Lastly, the results also found that majority are rural dwellers engaging directly or indirectly in agriculture while less than 20% (North West); (North East); and 26.7% (North Central) of the respondents domiciled in urban areas.

Table 4:
Percentage Distribution of Respondents Cause of Malaria

Causes of Malaria	North East	North Central	North West
Mosquito	*57.4*	47.7	55.7
Dirty food	*0.4*	1.5	0.7
Dirty liquid	1.0	2.0	0.9
Climate or Weather	0.6	3.9	0.4
Other	0.1	0.3	0.2
Don't Know	1.2	0.3	0.6
No response	39.3	41.8	41.4
Total	100	100	100

Table 5:
Direct Cost Components in the Northern Geopolitical zones

Direct Cost Components	North East (₦)	North Central (₦)	North West (₦)
Amount paid for primary level consultation	*550.72*	672.26	516.06
Amount paid for hospitalization	1134.89	997.75	839.48
Amount spent on drugs	2462.71	7237.92	3051.20
Amount spent on transportation as relates to illness	266.56	224.73	245.52
Average	**593.09**	**948.85**	**667.29**

Table 6:
Direct Cost by Occupation of Household Head across Geopolitical Zones

Occupation	North East (₦)	North Central (₦)	North West (₦)
Farm	490.34	1246.11	311.18
Non-Farm	526.43	1069.99	701.43
Average	497.39	1279.74	391.47

Causes of Malaria: In Table 4, the descriptive results further reveal that malaria illness due to mosquito alone constitutes 57.4% in the North East; 55.7% in the North West; and 47.7% in the North Central. Also, dirty food, dirty water and climate were estimated at 2% in the North East, 7.4% in the North Central and 1.5% in the North central. However, 1.2% of the population sampled in the North East; 0.3% in the North Central; and 0.6% the North West; did not know the cause of malaria. The symptoms of malaria relayed in the survey are fever, headache, nausea, vomiting, body weakness, seizure and other.

Only 41.5% in the North East, 28.2% in the North Central and 44.8% in the North-West zones express fever as symptom of malaria. Headache and body weakness constitute 5.4% and 7.4%; 15.5% and 6.0% and 3.75% and 5.8% in the North East, North Central and North West respectively. Furthermore, nausea and vomiting as symptoms of malaria constitute 1.1% and 2.9% in the North East, 1.6% and 2.8% in the North Central and 0.7% and 1.3% in the North West respectively.

Given the above results, fever constitutes the highest percentage of malaria symptoms and the least percentage was found in body seizure.

Table 7: Direct Cost by Gender across Geopolitical Zones

Gender	North East (₦)	North Central (₦)	North West (₦)
Male	*582.05*	1082.89	935.09
Female	642.84	1169.75	440.97
Average	614.27	1127.04	675.33

Table 8: Direct Cost by Sectors across Geopolitical Zones

Sector	North East (₦)	North Central (₦)	North West (₦)
Urban	*900.50*	1591.47	1685.44
Rural	559.90	958.16	475.73
Average	614.27	1127.04	675.33

Table 9:
Indirect Cost by Care Givers in the Study Area

Zones/Variables	Average Days Lost	Income Lost (₦)
North East		
Age Group		
20-39	5.16	2774.06
40-59	6.58	3876.43
60 and above	8	5648.10
Gender		
Male	6.36	4495.11
Female	6.16	3097.30
Sector		
Rural	6.38	3686.12
Urban	5.25	3720.69
Occupation		
Farm	7.63	3876.12
Non-Farm	8.5	10067.35
North Central		
Age Group		
20-39	4.38	2899.87
40-59	3.15	3581.81
60 and above	7.71	5736.25
Gender		
Male	5.05	3588.13
Female	4.05	3613.20
Sector		
Rural	4.50	3171.97
Urban	4.69	4523.03
Occupation		
Farm	4.40	2739.20
Non-Farm	3.58	2894.89
North West		
Age Group		
20-39	6.69	4297.97
40-59	6.72	5021.51
60 and above	6.30	4794.14
Gender		
Male	6.81	4039.73
Female	6.58	5186.78
Sector		
Rural	5.92	4096.80
Urban	10.94	8357.04
Occupation		
Farm	4.42	2944.40
Non-farm	4.43	3401.36

Costs of Malaria: (Direct and Indirect)

The direct cost components indicate (that on the average), the North-central (₦948.85) was the highest, while the Northeast (₦593.09) was the least (Table 5). However, farming and non-farming household heads in the north-central zone incurred the highest cost on direct treatment, while the household heads in the northwest zone spend the least (Table 6). In Table 7, the result showed that the average direct cost of malaria treatment by gender followed somewhat similar pattern like that recorded for the sectors (see Table 8). The result of sector distribution indicates that the urban sectors across the northern zones generally recorded higher average direct costs while their rural counterparts recorded lower average cost of treatment on malaria.

On the other hand, the indirect costs (table 9) show that the rural sector spent between 4.5days and 6.4days providing care while the income loss ranges between ₦3171.97 and ₦4097.00 while the urban sector spent between 4.7days and 10.9days providing care with an income loss that ranged between ₦3720.69 and ₦8375.04. In similar vein, people whose major occupation is farming recorded between 4.4days and 7.6days providing care and experienced income loss between ₦2739.20 and ₦3876.39 while their non-farm counterparts spent between 3.6days and 8.5days providing care income loses that ranged between ₦2894.89 and ₦10067.35. Furthermore, the average number of days lost by sick individuals (20-39years) ranged from 3.5days and 4.4days with income loses that ranged between ₦1933.86 and ₦3048.05. Those between 40 - 59years lost between 3.7days and 6.2days seeking treatment with income loss within those days ranging from ₦2975.60 to ₦3994.34 while the sick persons from 60years and above spent between 5.7days and 7.4days with income loss between ₦2967.42 and ₦4150.41. This study agrees with the findings of Okorosobo *et al.* (2011) conducted around Africa countries that the average number of days lost to malaria illness was estimated at 10.8days in Ghana, 4.8days in Nigeria, 6days in Rwanda, and 8.4days in Uganda. However, it is not in tune with the finding by Oyekale and Omotayo (2013) wherein it was captured that average incapacitation period due to malaria in Oyo State (South Western) was12.2days and a total income loss of about ₦16000.

Estimates of Health Expenditure, Malaria Share and Financial Burden of Malaria Treatment with the Socio-economic Characteristic in Northern Nigeria

In Table 10, the analysis revealed that the least average health expenditure across the age group was ₦9189.18 while the highest malaria share and financial burden was analysed at 16.47% and 3.94% which is perhaps due to low resistance against malaria parasite attack characterized by the 60years and above age group in the North East. From the North Central Zone, health expenditure ranged between ₦9725.01 and ₦10372.34 while the malaria share (6.08%) was minimum and financial burden also lower than the North-East zone analysed at 1.26%. The health expenditure from the North West shows relative difference while the malaria share was highest between the zones estimated at 9.72% and the financial burden of 1.76% records the peak in the North West respondents.

Estimating Health Expenditure, Malaria Share and Financial Burden of Malaria Treatment between the Zones

The study further established that the health expenditure of the respondents ranged between ₦7520.23 and ₦10276.24, and malaria alone accounts for between 6.15% and 10.50% while the financial burden across the zones ranged between 1.15% and about 2%. Within the zones, the North-West zone had the least financial burden of 1.15%, while the North Central (1.96%) had the highest (see Table 11).

Pair Wise Comparison of Means between the Study Area: The pair-wise comparison of means was estimated through the T-test to ascertain if there are significant differences within the zones. The result of the test reflects variation among the study area while the T-statistics value was used to affirm the significant differences among the zones at different levels of significant. The table reveals that there are significant differences between the geopolitical zones at all level of significance. The result established that there exists a significant difference between the means of North East when paired with North Central at 1% level while further test shows significant difference between the means (direct cost) of North East and North West at 10% level while the means between North Central and North West was significant at 5% significant level (see table 12).

Table 10:
Health Expenditure, Malaria Share and Financial Burden of Malaria Treatment by Socio-Economic Characteristics in Northern Nigeria

Zones/Variables	Per Capita Expenditure (₦)	Health Expenditure (₦)	Health Share (%)	Direct Cost (₦)	Malaria Share (%)	Financial Burden (%)
North East						
Age Group						
20-39	48792.61	9312.80	19.09	937.47	10.07	1.92
40-59	40066.80	9495.91	23.70	387.37	4.08	0.97
60 and above	38363.16	9169.18	23.90	1509.92	16.47	3.94
Gender						
Male	43467.37	10685.34	24.58	582.05	5.45	1.34
Female	42681.22	8277.55	19.39	642.84	7.77	1.51
Sector						
Rural	40355.73	8876.42	21.99	559.90	6.31	1.39
Urban	60992.65	13284.50	21.78	900.50	6.78	1.48
Occupation						
Farm	31322.45	7508.66	23.97	490.34	6.53	1.57
Non-Farm	44899.07	10399.32	23.16	526.43	5.06	1.17
North Central						
***Age* Group**						
20-39	59132.44	10719.60	18.13	869.80	8.11	1.47
40-59	49045.40	9725.01	19.83	670.71	6.89	1.37
60 and above	49831.13	10372.34	20.81	630.30	6.08	1.26
Gender						
Male	53208.42	9647.24	18.13	1082.89	11.22	2.04
Female	52990.51	10960.06	20.68	1169.75	10.67	2.21
Sector						
Rural	47552.95	9265.55	19.48	559.90	6.04	1.18
Urban	70665.57	13375.78	18.93	900.50	6.73	1.27
Occupation						
Farm	42117.01	8559.08	20.32	1246.11	14.56	2.96
Non-Farm	52430.38	9569.12	18.25	526.43	5.50	1.00
North West						
Age Group						
20-39	46740.74	8076.79	17.28	508.03	6.29	1.08
40-59	37959.31	6619.51	17.43	643.69	9.72	1.69
60 and above	34007.41	8084.84	23.77	597.62	7.39	1.76
Gender						
Male	38282.88	7835.11	20.47	935.09	11.93	2.44
Female	41698.08	7186.57	17.23	440.97	6.14	0.01
Sector						
Rural	38776.94	7395.91	19.07	457.73	6.19	1.18
Urban	48229.48	8109.84	16.82	1685.44	20.78	3.49
Occupation						
Farm	30337.39	5983.14	19.72	311.80	5.20	1.03
Non-Farm	43476.20	8135.83	18.71	701.43	8.62	1.61

Table 11:
Health Expenditure, Malaria Share and Financial Burden of Malaria Treatment in Northern Nigeria

Zones	Per Capita Expenditure(₦)	Health Expenditure(₦)	Health Share(%)	Direct Cost(₦)	Malaria Share(%)	Financial Burden(%)
North East	43071.20	9461.50	21.97	614.85	6.50	1.43
North Central	53104.25	10276.24	19.35	1040.27	10.12	1.96
North West	40085.87	7520.23	18.76	462.85	6.15	1.15

Table 8:
Pair-Wise Comparison of Means

Zones	North East	North Central	North West
North East		1.87*	5.26***
North Central			2.44**
North West			

Source: HNLSS, 2010
*** Significant at 1%; ** Significant at 5%; * Significant at 10%

DISCUSSIONS

The health expenditure constitutes the amount spent as relates to health care expenses by the respondents in the survey. The malaria share implies the percentage expenditure incurred on malaria treatment from the overall health expenditure. The financial burden of malaria treatment represents the percentage of average direct cost of malaria per income which states whether the cost is catastrophic or not catastrophic as it relates to the socio-economic characteristics of the respondents (table 6). The result of the health expenditure, malaria share and financial burden provides information about the threat which the direct cost of malaria treatment may pose to the expenditure of the respondents. This can be pictured as either catastrophic or non-catastrophic. From the foregone, health expenditure ranged from ₦6619.51-₦10719.60 while malaria share rose from as low as 4.08%-18.47% and financial burden 3.94 signifies the highest across the age group of all populations. Therefore, based on lessons learnt from research and estimation of age group as the socio-economic factor, direct cost on malaria treatment does not pose threat to the expenditure, thereby non-catastrophic Onwujekwe *et al,* 2000. Also, following Ettling, (1994); Asenso-Okyere, (1997); and Attanayake, (2000) who established that financial burden of malaria between 2% and 6% of their annual income is non-catastrophic. This study therefore affirms that the financial burden of malaria in the Northern zones of Nigeria is within the manageable level and the program like Roll Back Malaria is making huge impact positively.

In conclusion, this study had established that malaria direct cost of treatment is around the non-catastrophic threshold. Furthermore, the findings also support that of other health researchers that the health expenditure tends to be higher in rainy season when agricultural activities are higher and the opportunity costs of time loss by rural inhabitants was greatest. This research does not consider cost of preventing malaria attack especially against pregnant and nursing mother and coping mechanisms adopted by household in the northern Nigeria surveyed due to time constraint. Also, the cost incurred by government towards malaria treatment and the use of herbalist/spiritualist and alternative medicines like the trado-medical health care provider were not included in the analysis due to data limitation. These aspects may be considered in future studies.

The study established that malaria treatment is not catastrophic in the study area, therefore more programmes like the "Roll Back Malaria Project" that improves effective control of the disease through proper public enlightenment should be encouraged especially as it forms part of the Millennium Development Goals. This study recommends that sustainable effective health policy approach that will seriously tackle this health menace be more tailored towards little children as the study found that children between 0-4 years suffered the attack most. Malaria mostly affirmed to be caused by mosquito can be tackled through sharing and religion use of mosquito net and other anti-mosquito insecticides. In the same vein, source of information and awareness about malaria should be more circulated through other channels except health practitioner perhaps through health talk in town hall meetings, groups and religious group. It is important to know the source of information about malaria to the respondents because it informs in decision making of health policy makers. More programmes or cultures that will stimulate habit of seeking advice must be improved and sustained to achieve meaningful impact. This study recommends ACT (anti-malaria drug) which is an improved brand of malaria medicine have wider coverage and subsidized by foreign and local agencies to enable affordability by the rural population instead

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