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Financial burden of households on the treatment of malaria in Southern Nigeria

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ABSTRACT: The number of deaths attributed to malaria is highest in Nigeria when compared with other countries of the world. This study estimated the monetary expenditure of households in Southern Nigeria in the treatment of malaria as well as the income forgone as a result of incapacitation due to the ailment. The study employed the cost-of-illness approach to estimate the financial burden of malaria treatment using the data contained in the Harmonized National Living Standard Survey (HNLSS) 2010. The results show that more cases of malaria were reported among children aged under-five while immunity increases with age up till age 45. Females, farming households and rural residents were also more vulnerable than their respective counterparts. The pattern of the distribution of direct and indirect cost was mixed across the three zones in the study area. Malaria poses both health and financial challenges to households. The financial burden of malaria is too high for a country like Nigeria whose majority of her citizens wallow in poverty. It is therefore recommended that the drug subsidy policy of government should be reviewed in order to increase the awareness of the public of its availability at subsidized rate. Massive public education on the importance of prevention as against treatment as well as the importance of seeking prompt treatment will also go a long way in ameliorating the indirect burden of malaria which forms a larger proportion of the total burden of malaria to households.

Keywords: Cost burden, cost of illness approach, direct and indirect costs, incapacitation, malaria.

JEL classification: Q

INTRODUCTION

Assessing progress in reducing the burden of malaria, to track the targets and milestones of the global trends, is a key mandate of the World Health Organisation (WHO) Global Malaria Programme (GMP). An estimated 219 million cases of malaria occurred worldwide in 2017 compared with 239 million cases in 2010 and 217 million cases in 2016 (Table 1). The WHO African Region still bears the largest burden of malaria morbidity, with 200 million cases (92%) in 2017, followed by the WHO South-East Asia Region (5%) and the WHO Eastern Mediterranean Region (2%) (Table 1) (World Malaria Report, 2018). Health and well being are vital issues of importance in social protection particularly for people in developing countries. Over 1.3 billion people have no access to adequate or affordable healthcare. Health coverage is particularly bad for families living in rural areas; health posts are sparsely scattered and the lack of doctors and nurses is severe (WHO, 2015). Health has an intrinsic value (it produces well-being) and an instrumental value (it is an important determinant of economic development). The instrumental value is the result of the direct impact of health improvements on labour productivity and the economic burden of illnesses; but it also reflects an indirect impact on economic growth through education. Better health during childhood increases the opportunities to benefit from education and thereby to improve future income. Due to its direct and indirect impact, health is one of the important determinants

Table 1a. Estimated Malaria Cases from 2010 to 2017 (Number of cases in Million).

Parameter	2010	2011	2012	2013	2014	2015	2016	2017
Lowest 95% C.I.	218.0	210.5	206.7	200.5	199.6	198.7	200.4	202.8
Estimated Total	238.8	229.1	226.4	221.0	217.1	214.2	216.6	219.0
Upper 95% C.I.	285.4	273.2	271.6	266.2	259.3	257.2	259.0	262.0

Source: WHO (2018).

Table 1b. Estimated malaria cases by WHO Regions, 2017 (Number of cases in '000')

Parameter	African	American	Eastern Mediterranean	South East Asia	Western Pacific	World
Lowest 95% C.I.	184500	880	3630	8560	1395	202800
Estimated Total	200500	976	4410	11290	1857	219000
Upper 95% C.I.	243600	1128	5560	14840	2399	262000

Source: WHO (2018).

of the incidence of poverty as well as its persistence over time, known as "poverty traps". Poverty traps that are created by an adverse health shock not only expose numerous people to poverty, but also exclude them from contributing productively to the economy. It is therefore important to establish a link between health management programs and social protection in a way to minimise the impact of illness on families and caregivers (Sullivan et al., 2017). Frenk et al. (2007) stressed that when exposed to an adverse health shock, families can react by selling assets, using credit or finding additional sources of income, which can include child labour, and/or decreasing the consumption of other goods and services. All these methods, depending on their magnitude, can trap a family already in poverty or impoverish a family that was not previously poor depending on the burden of illness (catastrophic or non-catastrophic).

Almost 80% of all malaria cases globally were in 15 African countries and in India. Nearly 50% of all cases globally were accounted for by 5 countries; Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). About 82% of estimated vivax malaria cases in 2017 occurred in just five countries (India, Pakistan, Ethiopia, Afghanistan and Indonesia). Of the 87 countries that had an indigenous malaria case in 2017, a decrease in malaria cases of more than 20% compared with 2016 was estimated in 20 countries, and an increase of a similar magnitude was estimated in 20 countries. Most of these changes occurred in countries with low to very low malaria burden, and in several countries the absolute difference was small (Nigeria Malaria Fact Sheet, 2011). In Nigeria, the ailments accounts for more deaths than in any other country, with about 97% of the population at risk (Nigeria Malaria Fact Sheet, 2011). Asides its health consequences, malaria also has a significant financial implication due to the high amount of money spent on its treatment. Laxminarayan (2004) reported that both the sick person and the care givers are adversely affected by the disease. Governments at different levels including international and non-governmental organization had over the years devise different approaches in form of policies and programmes with a view to reducing the incidence of the disease. Prominent among such approaches includes distribution of free mosquito treated nets, subsidizing anti-malaria drugs, creating awareness on the prevention and the need for prompt treatment in case of infection (especially among the pregnant and the nursing mothers). Despite all these, the financial burden of malaria is still high as measured by the huge proportion of households' income spent on its treatment as well as long days of incapacitation and absenteeism (and the subsequent reduction in productivity) and loss of income. For instance, a study by Uguru et al. (2009) reported that Enugu State households incurred US$3.84 per capita per month as direct cost in the treatment of malaria alone, representing 2.9 percent of their monthly income as reported by Onwujekwe et al. (2000).

Of the methods of quantifying the burden of an illness, the cost of illness approach is the most intuitive (WHO-WEF, 2011) as it estimates the maximum amount of money that could potentially be saved or gained if a disease were to be eradicated. The cost of malaria treatment can be divided into two: direct cost and indirect cost. The direct costs are the cash expenses on doctor's fees, laboratory tests and drugs (often termed as direct medical cost). It also includes payments for food, lodging, transport charges to and from health care facilities or drug stores and miscellaneous expenses associated with seeking and obtaining medical care as well as care givers visiting patients at hospital or clinic (often termed the direct non-medical cost). The indirect costs are estimated as productivity loss and income forgone due to morbidity and mortality as a result of the disease. This includes income/

wage lost, school days missed and reduced productivity and output due to absenteeism as a result of malaria both by the patient and the care giver.

Most microeconomic studies on the burden of malaria over the years have shown that the magnitude of the indirect costs is always higher than the direct costs (with few showing otherwise). Shepard et al. (1991) aggregated the cost of treating a case of malaria in Sub-Saharan African in 1987 as $9.84, out of which $1.83 was direct cost and $8.01 was indirect cost. Ettling et al. (1993) reported that low income households in Malawi spent approximately 9.6% of their annual income on malaria treatment depending on the source of treatment. Alaba and Alaba (2009) estimated an average of ₦357.21 per household for the treatment of malaria in rural Oyo State in Nigeria with the burden higher in the agricultural sector than in the non-agricultural sector. Okorosobo et al. (2011) estimated the indirect cost of malaria treatment in Nigeria to be higher than the direct cost, even though the reverse was found for other countries compared in the study. Onwujekwe et al. (2013) estimated that a total of US$12.57 and US$23.20 was spent by outpatients and inpatients respectively for the treatment of malaria in Enugu State with the indirect cost been the highest for each categories of patients. Omotayo and Oyekale (2013) estimated the annual mean cost of malaria treatment per farm household in Ido Local Government Area of Oyo State Nigeria to be N26,694.58 representing ₦11,160.41 as direct costs and N15,534.17 as indirect cost.

Despite malaria been recognized as a serious health challenge, there has not been enough studies to investigate the extent of its burden at the household level. Most studies had looked at its effect on the national economy or on some selected strata of the society (Leighton and Foster, 1993) even though decisions about treatment and coping strategies are based on negotiations within the household because the cost mostly falls on household budget (Sauerborn et al., 1995). This study provided an estimate of the naira value of treating malaria by Nigerian households in the southern part of the country. This, we hope, will be instrumental in public health policy debates on malaria treatment, thus helping policy makers to chart new paths to eradicate it. The direct and indirect components of the burden were presented separately to enable policy makers in formulating appropriate policies and programs in tackling the menace. The patterns and costs of malaria incidence have been reported to be highly place-specific. Thus, this study compared the financial burden of malaria between the three geopolitical zones in the study area.

METHODOLOGY

Study area

The study was conducted in the Southern part of Nigeria which is made of three geo-political zones with seventeen states in all. The inhabitants are mainly of Yoruba and Igbo descendants with farming as their major occupation (Come to Nigeria, 2014). The population as at the 2006 census stood at 65,198,068, ranging from 16,431,555 in the south east and 27,722,432 in the south west. The population of the south south zone was estimated at 21,044,081 (NPC, 2014).

Data and analytical techniques

The study made use of the health and the expenditure sections of the Harmonized National Living Standard Survey (HNLSS) conducted by the National Bureau of Statistics (NBS). The health section contains data on households spending in the treatment of malaria as well as number of days of work/school lost due to malaria. The household expenditure section, on the other hand, contains information on households spending on various food and non-food items. Responses on all households in the study area reporting case(s) of malaria during the survey were used for the study.

This study adopted the cost of illness approach in estimating the naira amount incurred by households in the southern part of the country in the treatment of malaria. The study assumed an average household size of four. The costs were transformed into logarithm to assume the property of normality required for parametric tests while geometric mean was used to avoid overestimation as it is lower than arithmetic mean. After modifications to Malaney (2003) and Okorosobo et al. (2011), the cost of malaria treatment was estimated as:

COI = Private Medical Cost + Labor Loss

The private medical cost, which represents the direct cost of malaria, was estimated as the summation of the expenditure on medical consultation, hospitalization, medicine and transport related to treatment seeking (both by the sick and the care giver). That is,

$$DC = \sum (F_c + F_h + F_d + F_t)$$

Where: DC = Total direct cost or financial cost of malaria, F_c = Financial cost of medical consultation, F_h = Financial cost of hospitalization, F_d = Financial cost of drugs/medicine, $\mathrm{F_t}$ = Financial cost of transport related to malaria and Σ = Summation sign.

Labor loss, which represented the indirect cost, was captured as productivity loss due to absenteeism and estimated as the value of lost workdays for each person who suffers from malaria and adult care-givers. Expenditure was used as the proxy for income/wage following Chuma et al. (2007), Chuma and Molyneux (2009), Chuma et al. (2010) and Sawadogo et al. (2013). Expenditure of households on different items were

Table 2. Socioeconomic characteristics of respondents.

Parameters	South East (%)	South South (%)	South West (%)
Age			
0 – 4	12.8	16.0	12.5
5 – 9	8.8	11.9	8.3
10 – 14	8.9	6.6	5.5
15 – 19	7.2	7.1	6.1
20 – 24	6.7	6.5	5.3
25 – 29	5.2	8.6	6.6
30 – 34	4.5	7.6	4.9
35 – 39	5.3	6.4	5.2
40 – 44	3.9	5.5	5.4
45 – 49	5.5	5.6	3.6
50 – 54	7.1	4.9	6.6
55 – 59	6.1	3.4	4.0
60 – 64	7.8	5.3	8.0
65 and above	10.2	4.6	18.0
Gender			
Male	49.1	47.6	48.5
Female	50.9	52.4	51.5
Sector of residence			
Urban	22.1	16.7	32.6
Rural	77.9	83.3	67.4

Source: Authors' computation.

summed up for each household, divided by twelve to give the monthly value and then by thirty to give daily expenditure. The result was then multiplied by the number of days the sick person and the care giver were absent from work. The indirect cost or time cost of malaria was therefore estimated as follows:

$$IC = \Sigma(T_m * w)$$

Where: IC = Indirect cost or time cost of malaria (Income lost due to malaria morbidity), T_m = Number of days of work missed, w = Daily wage rate in Naira and Σ = summation sign

Hence, the cost of malaria in the study area was estimated as:

$$COI = \Sigma(DC + IC)$$

The financial burden was then calculated as below:

$$CB_m = \frac{DC}{HI} * 100$$

Where: CB_m = Cost Burden of malaria and HI = Household Income.

RESULTS AND DISCUSSION

Socioeconomic characteristics of respondents

The socioeconomic characteristics of the respondents in relation to malaria illness were presented in Table 2. Across the three zones, vulnerability was the highest among children below the age 5 years, with those in the South-south been the most vulnerable. This could be the reason why most states of the federation offer free health care services to children especially those below age 5 and pregnant women and also in consonance with the epidemiology of the disease in the country. Immunity/ resistance to the ailments slightly increases with increase in age up till age 45 to 49. The number of malaria ailment cases reported among the females were many than the males with females in the South-south recording the highest number of attacks. Farming households were also mostly affected by the ailment, again the South-south zone recorded the highest value of 42.7% and the South east the least (36.9%). Rural households reported more cases of malaria than their counterparts in the urban areas.

Direct cost of malaria treatment

The average out of pocket cost for the treatment of malaria

Table 3. Direct cost of malaria.

Parameters	South East (₦)	South South (₦)	South West (₦)
Age group			
0 – 4	918.20	751.53	1177.62
5 – 9	715.98	664.33	898.13
10 – 14	1354.41	829.91	721.69
15 – 19	1099.47	1104.85	790.94
20 – 24	1070.50	1159.17	1030.13
25 – 29	1030	768.77	1094
30 – 34	1231.66	722.83	898.87
35 – 39	1618.32	938.19	817.80
40 – 44	1781.42	884.86	1267.03
45 – 49	1421.31	895.69	1347.21
50 – 54	1472	924.75	1228.03
55 – 59	1507.52	1010.36	851.90
60 – 64	1773.05	2873.67	862.55
65 and above	1567.24	1090.53	1064.47
Average	1240.10	908.59	993.77
Occupation			
Farm	992.41	698.90	845.45
Non-Farm	900.82	1030.01	1031.43
Average	947.3691	766.19	953.4229
Sector of residence			
Rural	1342.09	859.53	960.17
Urban	966.0429	1158.127	1015.17
Average	1245.58	914.03	993.77
Gender			
Male	1282.93	962.53	981.11
Female	1214.13	861.79	1006.57
Average	1244.55	914.03	993.77

Source: Authors' computation.

by households in the three geo-political zones was presented on the basis of age, household head's occupation (farm vs non-farm), sector of residence (rural vs urban) and gender in Table 3. The estimation of the direct cost on the basis age shows that the working class in the South east recorded the highest out of pocket cost (₦1391.60), followed by the south west (₦1066.87) while those in the South-south recorded the least cost (₦913.08). However, the direct cost of treatment among children under age five was highest in the South west. Similarly, in the South east, households whose heads are engaged in the non-farm sector of the economy recorded a higher cost than those in the farm sector. The same pattern was observed when the direct cost was compared on the basis of area of residence among the three zones; urban residents recorded higher cost than the rural residents. On the basis of gender, male respondents recorded higher out of pocket cost than the female respondents in South east and South-south.

Indirect cost of malaria treatment

The number of days lost and the corresponding income lost by both the sick and the care giver was presented in the Table 4 for both the care givers and the sick person. Indirect cost was highest in the South-south zone; an average of 21days and ₦13707.84 for care giver and 19 days and ₦19723.55 for the sick person. Females spent more days providing care in the study area than males, although the corresponding income loss was less than the males except in the south east zone, this may be due to the special care giver responsibility of women in Africa culture and religion. With the exception of the South west,

Table 4. Indirect cost of malaria

Variables	South East				South South				South West			
	Care giver		Sick person		Care giver		Sick person		Care giver		Sick person	
	Days lost	Income lost (₦)	Days lost (₦)	Income lost (₦)	Days lost	Income lost (₦)	Days lost (₦)	Income lost (₦)	Days lost	Income lost (₦)	Days lost (₦)	Income lost (₦)
Age												
18 – 39	3.5	2001.14	4.9	4052.07	6.5	4826.66	4.1	2526.18	4.8	4736.66	5.8	4864.89
40 – 59	4.4	3409.95	4.6	5001.51	4.2	2767.10	6.3	10351.85	5.3	3341.96	4.9	3348.98
60 and above	5.1	5040.74	6.0	4713.30	10.2	6114.08	8.3	6845.52	6.3	3692.28	7.5	3796.96
Gender												
Male	4.1	6326.29	5.0	5373.51	6.4	4495.84	4.3	2860.22	5.1	4057.16	6.9	4394.21
Female	4.7	7343.89	5.3	4143.28	6.4	4111.50	7.1	10003.50	5.6	3623.46	5.3	3381.23
Occupation												
Farm	3.7	2556.22	4.8	5937.39	4.6	2733.71	3.9	2390.01	4.6	2994.31	3.9	1978.73
Non-farm	4.1	3017.16	3.9	3065.10	4.3	5196.40	4.6	4337.93	4.7	3644.26	4.9	3920.10
Sector												
Rural	4.4	3567.88	5.3	5008.26	6.6	4239.67	5.4	3567.60	4.9	3384.74	7.5	4167.97
Urban	4.2	7719.04	4.5	3398.51	5.6	4294.34	7.7	19215.01	5.7	4087.52	5.2	3672.01

Source: Authors' computation.

female attacked by malaria spent more days at home, although, the corresponding income loss was less, except for the South-south zone. This may not be unconnected to the fact that most women are usually menially engaged due to high unemployment rate among female folks. Female care givers whose husbands are engaged in the non-farm sector of the economy can afford to lose more days and thus more income than those engaged in the farming activities. The lower number of days lost among the farming households could be due to the fact that farming activities are timely and the farmer could not afford to stay at home despite his health condition. With the exception of the south east, farming households attacked by malaria also spent less days at home and thus also forgo less income compared to non-farm households. Rural residents suffer longer incapacitation due to malaria than their urban counterparts and thus their care givers.

Financial burden of malaria

Among the respondents under age 20, children below the age of five recorded the highest financial burden except in the South-south where the burden was more severe among those in the age bracket 10 to 14. Female respondents also spent higher percentage of their income on malaria treatment across the three zones with the south east recording the highest burden of 1.71%. On the basis of area of residency of the respondents, malaria burden was the highest for rural households than for urban households, with the south east recording the highest burden of 1.88% (Table 5).

The result of the pair wise comparison between the zones shows that the means are significantly different among the three geo-political zones (Table 6). South-east and South-south are significantly different at 1%, likewise South-south

Table 5. Financial burden of malaria.

Variables	South East			South South			South West		
	Per Capita Expenditure (₦)	Direct Cost (₦)	Financial Burden (%)	Per Capita Expenditure (₦)	Direct Cost (₦)	Financial burden (%)	Per Capita Expenditure (₦)	Direct Cost (₦)	Financial burden (%)
Age (years)									
0 – 4	41683.42	918.20	2.20	46350.18	751.53	1.62	53346.59	1177.62	2.21
5 – 9	59731.67	715.98	1.20	51131.11	664.33	1.30	56007.93	898.13	1.60
10 – 14	62127.46	1354.41	2.18	44232.81	829.91	1.88	69124.75	721.69	1.04
15 – 19	76811.96	1099.47	1.43	55390.01	1104.85	1.10	65794.83	790.94	1.20
20 – 24	83633.64	1070.50	1.28	56995.6	1159.17	2.03	93846.66	1030.13	1.10
25 – 29	74858.9	1030	1.38	89541.89	768.77	0.86	95688.6	1094	1.14
30 – 34	79240.36	1231.66	1.55	71815.42	722.83	1.00	87899.35	898.87	1.02
35 – 39	68963.24	1618.32	2.35	63085.92	938.19	1.48	62980.37	817.80	1.30
40 – 44	64716.31	1781.42	2.75	49985.55	884.86	1.77	64202.47	1267.03	1.97
45 – 49	66336.94	1421.31	2.14	54798.03	895.69	1.63	105810.6	1347.21	1.27
50 – 54	61150.65	1472	2.41	52845.55	924.75	1.75	85220.77	1228.03	1.44
55 – 59	71735.67	1507.52	2.10	65961.83	1010.36	1.53	80030.41	851.90	1.06
60 – 64	79757.53	1773.05	2.22	51848.71	2873.67	5.54	100085.2	862.55	0.86
65 and above	98109.84	1567.24	1.60	106968.3	1090.53	1.10	101862.7	1064.47	1.05
Gender									
Male	69647.24	1282.93	1.84	64832	962.53	1.48	85763.51	981.11	1.14
Female	71173.03	1214.13	1.71	55923.94	861.79	1.54	78590.97	1006.57	1.28
Occupation									
Farm	62044.11	992.41	1.60	43396.68	698.90	1.61	43146.83	845.45	1.96
Non-farm	51969.31	900.82	1.73	51370.86	1030.01	2.00	66252.99	1031.43	1.56
Sector									
Rural	71236.42	1342.09	1.88	54395.5	859.53	1.58	68970.13	960.17	1.39
Urban	67289.69	966.04	1.44	90651.65	1158.12	1.28	88889.15	1015.17	1.14

Source: Authors' computation.

Table 6. Pair Wise Comparison of means between the zones.

Zones	South East	South South	South West
South East	-	10.22***	2.39**
South South	-	-	5.93***
South West	-	-	-

Source: Authors' computation; *** - significant at 1%; ** – significant at 5%

are different at 5%. Many reasons could be adduced for the differences in the burden of the illness as put forward by various authors in past research works on financial burden of illnesses. Such reasons include differences in transmission pattern, endemicity pattern, variation in the length of a malaria episode, illness perception by the respondents among others (Tanner and Vlassoff, 1998; Clarke et al., 2004; Chuma et al., 2010).

Conclusion

Malaria poses not only health but also financial challenges both to individuals and the economy as a whole as revealed by the study. No wonder its eradication is among the Millennium Development Goals (MDGs), a policy documents subscribed to by many nations of the world. Its burden remains a serious challenge especially to poor households who spent a considerably high percentage of their income on its treatment, no wonder these households wallow in abject poverty. Despite claims by the government on the subsidization of anti-malaria drugs, especially the new Artemisinin-based combination therapy (ACT), the cost of malaria drugs is still very high. This puts into doubt the effectiveness of the US $1 billion a year help proposed for African countries for the treatment of malaria in the Abuja target. The study revealed that no zone in the Southern part of Nigeria is free from the burden of malaria. Though the magnitude of the burden differs between the zones and along the different socio-economic characteristics' basis examined, the burden is too high for a country like Nigeria whose majority of her citizens live below the poverty line. The estimate of direct cost may be higher than was reported due to financial constraints that could prevent poor households (who are also the most vulnerable) from seeking treatment. This could possibly be responsible for the exacerbating indirect cost due to lack of treatment. Improving access to affordable health care service therefore has the tendency of increasing the direct cost while the indirect cost will be reduced for some households.

CONFLICT OF INTEREST

Authors declare that they have no conflict of interest.

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