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The Cost Implications of Malaria Burden on House Hold Expenditure among Socio-Economic Classes in Bayelsa State, Nigeria

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Abstract

Understanding the economic burden of malaria is a pre-requisite to mounting long term control intervention among social classes in malaria endemic areas. The study determined the effect of malaria on house hold expenditure in Yenagoa metropolis during January, 2016 and March, 2016. A descriptive study design was adopted. Data were collected through a structured questionnaire from 287 respondents and analyzed using simple percentage, ANOVAs and Chi- square as statistical tools.

The result showed that per capita income of respondents were lower than international standard.The average direct cost (cost of treatment) was higher than the indirect cost (cost of prevention). The monetary values of direct and indirect cost were N19.945.71 and N3423.41 respectively. These values vary across socio economic classes; differences were not significant (χ^2c=642.99; df=5; P>0.05). The average cost of treatment per malaria episode (including direct and indirect costs) across occupational status ranges between N677.90 and N19,759.07. These values vary across occupational status. The differences were not statistically significant (χ^2c=642.989; df=5; P>0.05). The average loss days to malaria were 9.51 days, translating to an average of N42,319.50 per loss days per malaria episode. The implication of this result has called for prompt attention from government, health planners and other agency for special interventions.

Keywords: Malaria burden; Household expenditure; Socioeconomic classes; Bayelsa state

Introduction

Malaria is caused by haemoprotozoan parasites of the genus *Plasmodium* and is transmitted through the infective bites of female *Anopheles* mosquito of the family *Culicidae*. It is one of the leading causes of death in Africa [1]. Over 20-30% of Hospital admission and 30%-50% of outpatient consultation in Africa are attributed to malaria infection [2]. In Nigeria alone, malaria accounts for >200,000 death annually [3].

More than 60% of the world's population, estimated to 350-500 million is affected by the disease, >700,000 and 2.7 million people die annually from malaria, while 74% of the world population lives in malaria endemic areas and 19% lives in epidemic prone area. Only 7% are known to be living in low risk or malaria-free areas [4].

Malaria, does not only constitute a health problem, it is also an economic problem [5] and are considered the disease of the poor [6]. When the burden is measured in terms of Disability-Adjusted Life Years (DALYs), 58% of the total malaria burden is concentrated among the poorest countries while only 0.2% of total global DALYs are lost by the richest country [7].

At the household level, malaria affects productivity of the people and their capacity to acquire assets. The cost of prevention and treatments reduces household's resources as most members spend their productive time caring for those under malaria attack while they themselves seek rescue from the onslaught of the disease [8]. Studies have shown that malaria has a direct impact on household's income, labour productivity and labour market participation [9].

The economic burden of malaria is the subject of much debate at both international, regional and local level [10-14]. Calculating the loss of productivity resulting from malaria related sickness is a pre requisite necessary to estimate the economic burden of malaria [15]. In some part of Nigeria, studies showed that the direct and indirect costs due to malaria burden was estimated to exceeded US $2 billion10 whereas, in some other places, households spend between $2 to $25 and $20 to $15 respectively on malaria treatment and prevention each month [8,12]. However, there is scarcity of this information in Bayelsa state. This is a pioneering study to estimate the economic burden of malaria among socio-economic classes in Yenagoa metropolis of Bayelsa State. The objective of this study is to determine the time and income loss due to malaria illness among the socio economic classes.

Materials and Methods

Study area

This study was conducted in Yenagoa metropolis (4053′N and 5017′E). It is the capital city of Bayelsa State and also the head quarter of Yenagoa municipal.

Study design

The study adopted a cross sectional and descriptive study design to determine the effect of malaria infections on household expenditure, from January, 2016-March, 2016.

Sample and sampling technique

The study population comprise of all household in Yenagoa metropolis, Bayelsa State. The study area was divided into three zones bases on the existing development centres. The zones are: Epie-Attissa zone, Gbarain-Ekpetiama zone and Okordia/Zarama-Buseni zone. The samples were all individual of the households in these zones. Two hundred and ninety four (294) households were selected across the zones. Selection of household in the entire zone was based on willful acceptance.

Research instrument

The instrument used for data collection is a self structured questionnaire tag: The Economic Burden of Malaria Infection in Yenagoa Metropolis (EBMIY) in Bayelsa State. Each questionnaire comprised of two sections: A and B. Section A contained demographic information of respondents. Section B contains items that illicit the response of household on their daily expenditure to malaria infections. The research instrument were corrected and validated by expert in measurement and evaluation to have satisfied the purpose for which the research was designed. The questionnaires were first pilot tested in ten households. The scores were analyzed using spearman rank correlation coefficient. The correlation was positive (r=0.66) and confirmed to be reliable.

Method of data collection

A total of 294 households were selected based on accessibility and acceptance across the three zones. In each zone, a pre interview was held with individual household. Willful household was issued a copy of the questionnaire to fill. This continued until the sample size was attained. The sample size was determined by standard method [16]. A duly filled questionnaire was retrieved from the respondents. A total of two hundred and eighty seven questionnaires were retrieved. These were used for all the analyses.

Method of data analyses

Data were clean up and cross-checked for correctness before analysis. Data checked was coded and entered to Microsoft office excel 2007. Thereafter, it was exported into SPSS version 16.0 for statistical analysis. Both descriptive and analytical statistical procedures were utilized. Descriptive statistics like percentage, mean and standard deviation were used for the presentation of demographic data. Significant differences between household income expenditure on malaria infection across socio economic status were determined in ANOVAs and Chi-square at a confident level of 0.05.

Results

Out of the two hundred and eighty seven (287) questionnaires retrieved, male respondent accounted for 53.66% while female accounted for 46.34%. The age (years) characteristics of the respondents were <14(7.32), 15-20(7.65), 21-26(15.68), 27-32(25.98), 33-38(17.03), 39-44(8.71), 45-50(5.57), 51-56(4.53), 57-62(2.79), 63-68(2.09), 69-74(2.09), >75(1.39) respectively.

Percentages of the married, single and devoiced are 44.6%, 36.7% and 18.5% respectively. More respondent (28.8%) had SSCE. Other academic qualification of the respondents in the order of decreasing frequency are NCE (12.9%), B.Sc/ B.A, B.Ed (12.5%), FLSC, OND, HND (11.8%) , PhD (8.4%) and M.Sc/M.A (4.5%).

The socio economic status of the respondents by occupational group was civil servant (23.7%), students (22.3%), trader (18.8%), artisans (12.5%), farmers (11.8%) and professionals (11.1%). The income characteristics of the respondents showed great disparity. The percentage of those whose monthly income was between 5000 and 35000 ranges from 11.8%-10.5%. Four to eight percent of the respondents had monthly income that ranged from 36000-75000, while 0.3-1.7% represent respondents whose monthly income ranges from 76000 and above. Details demographic information is shown Table 1.

Variables	Frequency	Percentages
Sex	154	53.66
Male	133	46.34
Female		
Age (yrs)	21	7.32
<14	22	7.65
15-20	45	15.68
21-26	72	25.98
27-32	49	17.03
33-38	25	8.71
39-44	16	5.57
45-50	13	4.53
51-56	8	2.79
57-62	6	2.09
63-68	6	2.09
69-74	4	1.39
>75		
Qualification	34	11.8
FSLC	74	25.8
SSCE	37	12.9
NCE	33	11.8
OND	34	11.8
HND	36	12.5
BSc,B.A,B.Ed	13	4.5
MSc, MA	24	8.4
PhD	2	0.7
OTHERS		
Marital status	105	36.7
Single	129	44.9
Married	53	18.5
Divorced		
Occupation	68	23.7
Civil servant	33	11.8
Farmer	32	11.1
Professionals	54	18.8
Trader	36	12.5
Artisan	64	22.3
Students		
Income level	30	10.5
<5000	40	13.9
6000-15000	35	12.2

16000-25000	34	11.8
26000-35000	23	8.0
36000-45000	14	4.9
46000-55000	13	4.5
56000-65000	12	4.2
66000-75000	5	1.7
76000-85000	4	1.4
86000-95000	7	2.4
96000-105000	3	1.0
106000-115000	5	1.7
116000-125000	2	0.7
126000-135000	5	1.7
13600-145000	4	1.4
146000-155000	1	0.3
156000-165000	2	0.7
166000-175000	5	1,7
176000-185000	1	0.3
186000-195000	4	1.4
196000-205000	9	3.1
>205000	29	10.1
Undefined		

Table 1: Demographic information of respondents.

Per capita monthly income of respondents in Yenagoa

The average per capita monthly income among the socio economic classes in Yenagoa was low (N42,156.79). The average per capita income in the increasing order of occupational status was; students (N11,828.13), farmers (N23,750.00), civil servant (N24,873.39), professionals (N39,570.92), traders (N48,018.87), artisans (N58,687.50). The differences was not statistically significant (χ^2c=7.7560; χ^2t=11.070; df=5; P> 0.05) (Table 2).

Malaria infection and household expenditure

The result indicates that the average direct cost (cost of treatment) amounting to N19,945.74 was higher than the indirect cost (cost of prevention) (N3,423.41). The total direct expenditure incurred on malaria cases recorded in the household survey amounted to N1,290,510. This amount translates to an average of N19,945.74 per case. Over 60% of the total direct expenditure is attributed to the cost of buying of drugs, 11.42% for laboratory test and 9.19% for hospital registration while 8.57% and 8.06% was incurred for consultation and transportation to hospital respectively. The differences were not statistically significant (χ^2c=0.0148; χ^2t=9.488; df=4; P>0.05) (Table 3).

The total monetary expenses incurred on prevention per month is estimated at (N982,520) which translated to an average of N3,423.41 per person per month. Forty five point forty seven percent of the household's total indirect expenditure per month was incurred on the procuring windows net, 28.23% on mosquito net and 3.08% on mosquito coils. Other unspecified expenses amounted to 8.12%. The differences were not statistically significant (χ^2c=0.0285; χ^2t=9.488; df=4; P>0.05) (Table 4).

The average cost of treatment per malaria episode (including direct and indirect costs) across occupational status ranged from N677.90 and N19,759.07. The cost of treatment across occupational status in order of their frequency are: professionals (N19759.07), Civil servants (N17110.59), Artisan (N12074.33), Students (N10804.77), Traders (N9066.85) and Farmers (N6770.90). The differences were statistically significant (χ^2c=642.989; χ^2t=11.070; df=5; P< 0.05) (Table 5).

Occupation	Total Amount (N)	Average Amount (N)
Civil Servant	5,316,000	24,873.39
Farmers	760,000	23,750.00
Professionals	1,236,000	39,570.97
Traders	2,280,000	48,018.87
Artisans	1,750,000	54,687.50
Students	757,000	11,828.13

Table 2: Per capita monthly income of respondents.

Variables	Total amount spent (N)	Average cost (N)	%
Transportation	110620	1114.24	8.57
Consultation	104000	4553.42	8.06
Registration	118600	3131.57	9.19
Laboratory test fee	147350	4211.81	11.42
Drugs	819940	6934.6	63.54
TOTAL	1290510	19945.74	100

Table 3: Direct cost implication of malaria infection (cost of treatment).

Variables	Total amount spent (N)	Average cost (N)	%
Cost of mosquito net	277390	1733.69	28.23
Cost of window net	446790	2939.41	45.47
Cost of insecticide spray	148330	1336.31	15.10
Cost of mosquito coil	30240	241.92	3.08
Other unspecified cost	79770	2115.83	8.12
TOTAL	982,520	3,423.41	100

Table 4: Indirect cost implication of malaria infection (cost of prevention).

Occupation	Expenditure		
	Average cost of prevention (N)	Average cost of treatment (N)	Total average cost (N)
Civil servant	10739.12	6371.47	17110.59
Farmers	4872.42	1875.48	6770.90
Professionals	11083.44	8675.63	19759.07

Traders	5872.02	3194.81	9066.85
Artisans	7197.22	4876.94	12074.33
Students	6478.59	4263.67	10804.77

Table 5: Household expenditure on malaria infection by occupational status.

Household loses to malaria infection

Loses to malaria infection are measured in terms of time and monetary value lost. The total time lost to malaria infection recorded in the household survey amounted to 2596 days. This translates to an average of 9.51 days per malaria episode. The average loss days at home and loss days outside home due to malaria infection are 4.49 and 6.21 days per malaria episode respectively.

The total monetary value incurred per loss days to malaria infection per month recorded in the household survey is estimated at (N594,973,953). This translated to an average of N42,319.50 per loss days per malaria episode. The average cost of loss days at home is estimated at N19,995.50 while the average cost of loss days outside home is estimated at N27,634.50. The detail is shown in Table 6. The distribution of the time lost and the cost of loss days to malaria infection across occupational status is shown in Table 7.

Variables	Total	Average
Loss days at home	902	4.49
Loss days outside home	1694	6.21
Total loss days	2596	10.70
Cost of treatment per malaria episode(N)	2,290,123	4,450
Monetary cost of loss days(N)	594,973,953	42,319.50
ǂ Monetary cost of loss days (N) = Total loss days*Average cost of treatment (N)		

Table 6: Household loses to malaria infection.

Variables	Occupational status						
		CS	FM	PF	TD	AT	ST
Loss days at home	N	300	116	130	218	110	206
	X	6.1	5.8	5.2	5.9	5.5	5.6
Loss days outside home	N	570	178	198	412	230	324
	X	8.5	5,6	7.1	8.4	6.7	5.6
Total loss days	N	870	295	328	630	340	530
	X	12.25	9.22	10.53	11.88	9.94	8.28
Average cost of treatment (N)		17,110.59	6,770.90	19,757.07	9,066.85	12,074.33	10,804.97
Monetary cost of loss days (N)		209,604.73	43,987.69	209,050.96	107,714.18	120,018.84	89,463.49
Average cost of loss days (N)		3,082.42	1,332.96	6,532.84	1,994.71	3,333.86	1,397.87
CS=Civil servant; FM=Farmers; PF=Professionals; TD=Traders; AT=Artisans; SD=Students ǂ Monetary cost of loss days (N) = Total loss days* Average cost of treatment (N)							

Table 7: Household loses to malaria infection by occupational status.

Discussion

The economic implications of malaria infections in Yenagoa metropolis have been studied. The average per capita monthly income of respondents (N42,156.79) was lower than the international per capita income of employee [17]. This is an indication that the population still live below the poverty line. Per capita income defines the average income earned per person in a given area (city, region or country). It is often used to compare the wealth of one population with those of the others and measure a country standard of living [17].

The average direct cost of malaria treatment) (N19,945.74) was higher than the indirect cost of prevention) (N3,423.41). Similar result has been reported elsewhere [18]. The higher direct cost highlighted the monetary value of households in incurring drugs for treatment. These values vary with the economic status of individuals. This observation is in consonance with studies [19]. The costs of drugs used

for the treatment of uncomplicated malaria had been relatively high. Recently, the cost of ACT, which is the drug of choice for the treatment of uncomplicated malaria in the study location, may have been responsible for the higher cost of treatment observed at the time of the study. Over 60% of the total direct expenditure in this present study is attributed to the cost of buying of drugs. Studies [18], opined that it is expected that higher investments in prevention should lead to lower treatment cost. However, the higher treatment cost in this present study may be attributed to the absence of well defined malaria intervention in the area.

The variations in the cost of treatment and prevention among the socio economic classes highlighted the hypothesis of willingness to pay approach in malaria control [20]. The average number of loss days per malaria episode by household in Oyo was 16 and 15 days in the agrarian households and the non-agricultural segment respectively [10]. These values were higher than the present result. The reason for these variations is inconclusive. However, there is an indication that household in this location can possibly reduce labour force participation each time he is inflicted with malaria attack irrespective of the occupational status.

Conclusion

The malaria burden in the study locations correspond significantly with the low per capita income observed across the socio economic classes. More people in the study location were incapacitated by the malaria attack as they were kept away from offices, businesses and homes either in seeking treatments for themselves or assisting household to get treatment. This situation had resulted in the lost of huge amount of money interpreted as monetary cost of loss days. It is recommended therefore that government should intensify efforts in the malaria control intervention, paying more attention on the less privilege to health care and treatment opportunities.

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