OCCUPATIONAL AND HOUSEHOLD BURDENS OF MALARIA ON UKWUANI-NDOKWUA FEDERAL CONSTITUENCY OF DELTA STATE, NIGERIA.

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ABSTRACT

This study examined the occupational effects of malaria burden on selected households. Using the clustered sampling technique, four hundred and sixteen (416) participants were ethically selected from the human population of the Ukwuani-Ndokwua federal constituency of Delta State, Nigeria. A self-structured questionnaire was then used to fetch sociodemographic, occupational, and daily spending record on malaria infections on households. Research questionnaire was validated by specialists, medical professionals, and researchers in public health. Participants were also given a pre-test to administer, allowing for reliability testing. While comparing differences in mean for obtained records with the one way analysis of variance (ANOVA), results were presented as mean $\pm$ SD as p-values < 0.05 was adjudged as statistically significant. On malaria infection records, result showed a mean and standard deviation of 3.29 and 0.69, implicative that it impacted persons of all economic levels on average at a rate of 3.36. This thus suggests that 2 (0.4%) of respondents were poorly informed, whereas, 70 (15.7%) of them had fair level, with 374 (83.9%) having good level of knowledge. On the household records on malaria infection, about 112 (25.1%) respondents reported that they spray insecticides daily before sleeping at night, while 176(39.5%) reported that they spray insecticides weekly in their house to prevent mosquito bites, 196(43.9%) reported there is always a standby mosquito net to help them curtail malaria, 176(39.5%) reported they don't used any of the above mention because of the high cost of such commodities. Due to the dearth of anti-malarias, it is especially true in regards to the financial burden that anti-malarial drug sales be heavily discounted in order to reduce the cost of malaria treatments. It is advised that effective awareness campaigns and sound belief systems be implemented in order to reduce

the negative effects of religion on malaria treatment in the evaluated location.

Keywords: Malaria Burden, Occupation, Ukwani LGA

INTRODUCTION

Malaria is a vector-borne disease carried in the saliva of the female anopheles mosquito; a living agent of common African etiology. The disease is currently regarded as a life threatening one with nearly half of the world population being vulnerable to the infection [1]. Malaria remains a major global health challenge with an estimated 2-3 million deaths of malaria infection occurring annually and it is responsible for the untold morbidity in approximately 300-500 million people yearly [1].

Malaria disease is caused by parasites that are spread by mosquitoes, the anopheles mosquitoes and it is a serious disease affecting children and adults but it consequences are graver among children and pregnant women [2]. Malaria generally had severe devastating impact on humans and it is believed to be associated with poverty, or a cause of poverty [3], which can lead to a major hindrance in economic development. The high prevalence of malaria combined with the economic burden it imposes on society are the major challenges of health system in the African region especially Nigeria. Particularly the poorer and vulnerable households are at increased risk of the burdens of malaria and the cost of malaria is far worse for complicated cases [4, 5]. The environmental and socio-demographic factors predominantly is believed to affect the burden of malaria at household level [4]. Despite a decline in the morbidity and mortality of malaria worldwide, the current level is unacceptably high and the burden of malaria varies across different parts of the world. In the period between 2010 and 2018, the number of malaria cases declined by about 9.2% from the level of 251 million cases in 2010 to 228 million cases in 2018 [6].

The burdens of malaria are high among tropical regions of the world, including Nigeria [7]. The disease is a major public health concern in sub-Saharan Africa (SSA) as it is a leading cause of avoidable disability and death, especially among children [8], being in the top three causes of childhood death despite the increasing prevention and control methods which implies that it is associated with a high economic and social burden [5]. Malaria costs may be substantial in relation to household income in sub-Saharan Africa, especially in poorer socioeconomic groups [9], after taking into account factors such as initial poverty, economic policy, and tropical location; The rate of economic growth per capita in countries with malaria was estimated to be 1.3% per year slower between 1965 and 1990, compared with countries without malaria [4]. This suggest that the long-term effect of this lower growth rate is an income per capita, in a country like Nigeria with intensive malaria that is only around one third of that in a country without intensive malaria [9]. Consequently, the objective of this study will provide adequate knowledge of the health system cost and household cost of malaria treatment to enable managers to make informed decisions on resource allocation and efficiency in malaria prevention and control.

MATERIALS AND METHODS

Study Design

The study was community based, assessing reports from a cross-section of subjects who were resident in the study area to investigate the economic burden of malaria on households and Government health system from January, 2022 to December, 2022, especially with regard to cost implications and available management options to target populace. Thus, the study was cross-sectional and descriptive in nature, selecting households randomly from the Ukwani Local Government Area of Delta State. A retrospective costing approach was also used to estimate household level of economic burden on malaria.

Study Area

Current study was conducted in the Ukwuani-Ndokwa Federal Constituency of Delta State, Nigeria. The Ukwuani people (also called Ndokwa Ethnic Nationality) are located in the southern part of Nigeria in the western part of the Niger Delta. This study was conducted in households located in the different communities of Ukwuani-Ndokwa Federal Constituency of Delta State, South-south, Nigeria. The said area is located in Delta North senatorial district of the state, and comprise of the Ukwuani and Ndokwa ethnic nationalities of the Nigerian people. The people are predominantly farmers and they speak a common language called "Ukwuani" [10].
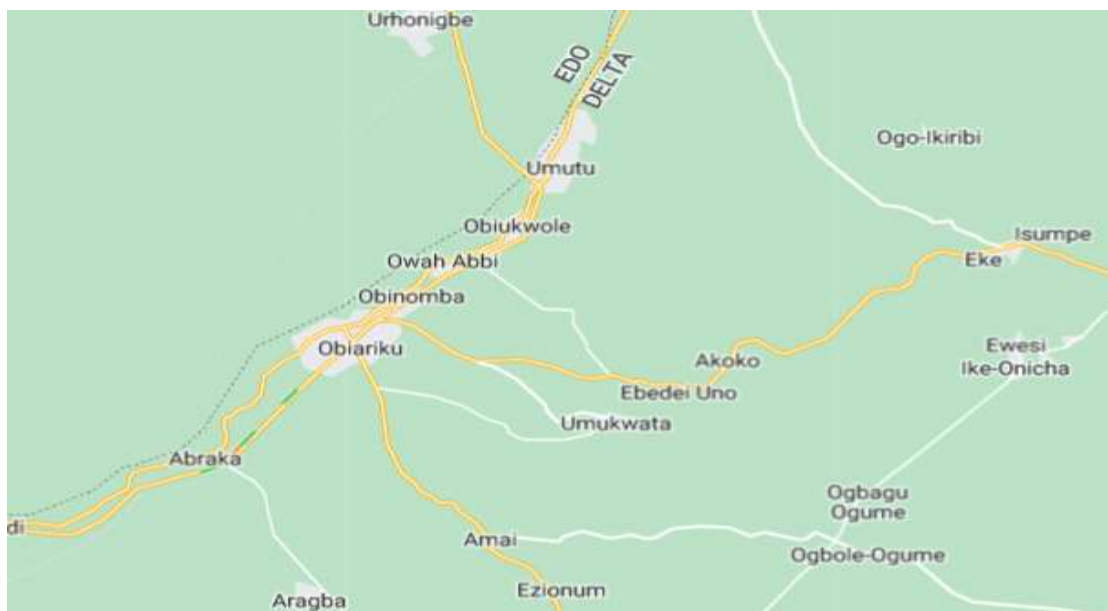
Source: (Google map, 2022)

Delta State is an oil rich and agricultural producing state that is situated in the South-South geo-political zone of Nigeria. It has an estimated population of 4,112,445 (males: 2,069,309; females: 2,043,136). The capital city is Asaba which is located at the northern end of the state, with an estimated area of 762 square kilometers (294sq miles); while Warri is the economic nerve center of the state, also the most populated and located in the southern end of the state [11]. The state has a total land area of 16,842 square kilometers

(6,503sq miles) and covers a landmass of about 18,050 km²,accounting for more than 60% of the total area. The state lies approximately between Longitude 5°00 and 6°.45' East and Latitude 5°00 and 6°.30' North. It is bounded in the north and west by Edo State, the east by Anambra, Imo, and Rivers States, southeast by Bayelsa State, and on the southern flank is the Bight of Benin which covers about 160 kilometers of the state's coastline [11]. Delta State is generally low-lying without remarkable hills.

The state has a wide coastal belt inter-lace with rivulets and streams, which form part of the Niger Delta [12]. Delta state has 25 local government areas across the three senatorial districts namely: north, central and south senatorial districts. Ukwuani-Ndokwa federal constituencyis composed of twenty-seven clans namely Akoku, Amai Ebedei, Eziokpor, Ezhionum, Obiaruku, Umuebu, Umukwata, Umutu, Utagba-Ogbe, Emu, Ogume, Abbi, Utagba Uno, Onicha Ukwuani, Aboh, Utchi Ibrede, Onugbokor, Umuolu, Ibedeni, Ashaka, Ase, Okpai, Afor, Ossissa, Inyi (Wikipedia, 2021).

Scope of Study
Due to the non-invasive approach to fetching data, this study was conducted on human subjects, and was targeted at a population of residents of Ukwani-Ndokwa federal constituency of Delta State, Nigeria; who have been exposed to, or relied on available treatment options for malaria from the local community for 3 years or more.

Population of Study
The study population was targeted at the population of humans who were resident in Delta state of Nigeria. This population as projected by the national populations' commission for year 2016 is valued at 5,663,362 [9].

Sample and Sampling Technique
Using the stratified multistage sampling technique, a minimum sample size for this study will be drawn from the above population by way of the Fishers formula as describe by Oriakhi and Onemolease, (2012) [13]

$$N = \frac{Z2\ PQ}{d2}$$

Where N = minimum sample size,
Z = Standard deviation score at 95% level = 1.96,
P = 50% (0.5) proportion of households infected Malaria at one time or the other,
Q = Complimentary probability = (1 – P) = 1- 0.5 = 0.6,
d = Error margin = 5% = 0.05.
N = 1.96 2 x 0.5 x 0.6 / 0.052 = 0.9264556224/ 0.0025 = **370.**
However, considering a non-response rate of 10%, the sample size for the study will be increased as follows: n = N/1-f

n= 371/1-0.1 =371/0.9 = 412.22; n is approximately 412 households.

By assuming 50% of households would have had at least one confirmed malaria case in the past one-year period with 5% of margin of error at 95% confidence interval and a design effect of 2, the calculated sample size will be 412 households. Therefore the calculated sample size will be proportionally allocated base on the number of households that will be selected in Ukwuani Local Government Area of Delta State for the study.

Research instrument
The instrument used for data collection was a self-structured questionnaire tag: The Economic Burden of Malaria in Ukwuani LGA (EBMIU) of Delta State. The questionnaire comprises of three (3) different sections: Section one (1) contained socio-demographic information of household respondents. Section 2 contained items that illicit the response of household on their daily expenditure to malaria infections. While Section 3 housed items that elicits response of household members on their expenditure towards malaria treatment in the Government health system.

Validity and Reliability of Instruments
Questionnaire was validated by experts and medical personnel / researchers in the public health area, alongside with self-evidence measures to ensure it is presentable to respondents. A pre-test method was also used to administer it to participants outside the study population, thus checking it for reliability. The research instrument was corrected and validated by expert for measurement and evaluation to satisfy the purpose for which the research was designed. The questionnaire was also subjected through pilot testing in approximately ten (10) households. The scores were analyzed using the spearman rank correlation coefficient and the correlation result obtained was confirmed for its reliability in terms of precision and accuracy before being adopted for used.

Exclusion Criteria
All household heads that are too old or too ill to respond to the questions and those who refuse to consent were excluded from the study. Also, non-resident subjects who reside far from study area were excluded from the study.

Inclusion Criteria
Selected households who must have at least one confirmed malaria infection case during the period of the study as well as those who had lived in the study community for at least more than one-year period will be eligible to participate in the study.

Method of data collection
A total of 412 households were selected based on accessibility and acceptance across Ukwuani-Ndokwa federal constituency. A self-structured, interviewer administered

questionnaire was employed for data collection in the study. The contents of the data collection questionnaire were developed based on the household costing tool that was primarily developed A pre-interview was held with individual household. Willful household was issued a copy of the questionnaire to fill and coded. This continued until the sample size was attained. A duly filled questionnaire was retrieved from the respondents immediately after completion. Stratified multistage sampling strategy was employed to select the study participants. In the first stage, 30% of the study population were selected using simple random sampling strategy through computer-generated random numbers. Thereafter, the health records of malaria patients were reviewed from health center located within the selected community in Ukwuani-Ndokwa federal constituency, comprising of the aforementioned towns. All households that fulfill the inclusion criteria were retrieve from the family case files of the Hospital records and the household numbers will be listed.

Techniques and Approaches of Cost Estimation
The outcome variable was targeted on data relating to economic burden of malaria. The independent variables were the socio-demographic and socio-economic characteristics of households, disease severity and duration of illness, malaria episodes, distance to health facility and availability of anti-malarial drugs. In this study the economic burden of malaria was referred to the level of expenditure that threatens households' livelihoods due to malaria. All households that spent more than 5% of their monthly income to pay for the diagnosis and treatment of malaria will be classified as catastrophic payment or high economic burden and those households who paid less than this was classified as low economic burden. The cost of illness approach was used to estimate the economic burden of malaria in the study area. The costs per episode of malaria to the patient and to the household will be estimated by using the prevalence-based retrospective costing approach. In this study total costs, direct costs, and indirect costs associated with malaria illnesses was determined.

Ethical Consideration
Appropriate research ethical clearance was obtained from the ethical review committee of Novena University, Ogume, Ukwuani-Ndokwa federal constituency and Delta State primary healthcare Board. All study participants were well informed about the aim of the study, benefits and risks. Following this, informed written consent was secured from study participants. Study participants' confidentiality was maintained. No personal identifiers were used in the data collection tools and codes were used in place of it. Data was kept in protected and safe locations. Paper based data were kept in a locked cabinet and computer-based data were passworded and secured. The recorded data were not accessed by a third person, except the research team. Data sharing was enacted based on the consent and permission of research participants and the ethical and legal rules of data sharing.

Statistical Analysis
Obtained data were analyzed and presented using percentage, mean and standard error of means (SEM). The data from the obtained variables were analyzed using the student t-test of comparison, while accepting

a p-value< 0.05 as statistically significant. All statistical analysis and data presentation were performed with the graph pad prism version 8.

RESULTS

Table 1: Personal Information and Occupational Status of Respondents

	Frequency (n)	Percentage (5)
Age (Years)		
15 – 25	126	28.3
26 – 35	106	23.8
36 – 45	106	23.8
46 or above	108	24.2
Marital Status		
Single	170	38.1
Married	222	49.8
Divorced	22	4.9
Widowed	14	3.1
Separated	18	4.0
Educational Qualification		
FSLC	48	10.8
SSCE	144	32.3
OND/NCE	122	27.4
HND/BSC	132	29.6
Occupation		
Civil/Public servant	162	36.3
Trader	160	35.9
Farmer	124	27.8
Religion		
Christian	402	90.1
Islam	16	3.6
African Tradition	24	5.4
Others	4	0.9
Blood Genotype		
AA	228	51.1

	Frequency (n)	Percentage (5)
AS	120	26.9
SS	20	4.5
Others	56	12.6
Don't Know	22	4.9

Table 1 shows personal information of respondents. One hundred and twenty six 126(28.3%) were within the age range of 15-25 years, 222(49.8%) of the respondents were marred, 144(32.3%) of them had SSCE as their educational qualification, 162(36.3%) were Civil/Public servants, 402(90.1%) were Christians, 228(51.1%) had AA as their blood genotype.

Table 2: Household Information on Respondents

	Frequency (n)	Percentage (5)
Gender		
Male	174	39.0
Female	272	61.0
Household Status		
Male	146	32.7
Female	86	19.3
Wife	140	31.4
Child	42	9.4
Grand ma	16	3.6
Grand pa	6	1.3
Others	10	2.2
Ethnicity		
Ukwuani-Ndokwa	262	58.7
Ika	54	12.1
Urhobo	22	4.9
Ijaw	10	2.2
Itsekiri	18	4.0
Isoko	28	6.3
Igbo	42	9.4
Others	10	2.2
Main income earner		
Yes	264	59.2
No	182	40.8

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Main decision maker in home		
Yes	230	51.6
No	216	48.4
Household size		
1-4	194	43.5
5-9	232	52
10+	20	4.5

Table 2 shows personal information of respondents. It reported that 272(61%) were females, household status showed that 146(32.7%) respondents were males, most respondents 262(58.7%) were from Ukwuani-Ndokwa, 264 (59.2%) were main income earners, most respondents 230(51.6%) were main decision maker in their home, majority 112(25.1%) respondents had a household size of 6, while 172(38.6%) had 2 adults in their household. One hundred and fourteen (25.6%) of the respondents had 2 household member less than 18 years, 156(35%) of them had their major household occupation as farming.

Table 3: Percentage Household and Occupational Information of Respondents

	Frequency (n)	Percentage (%)
No of Adults in Household		
<5	400	89.7
5-9	42	9.4
>9	4	0.9
Household member less than 18years		
0-2	290	65
3-5	138	31
6+	18	3.9
Major household occupation		
Business	18	4.0
Civil servant	62	13.9
Farming	156	35.0
Others	26	5.8
Teaching	34	7.6
Trading	150	33.6

Table 3 showed personal information of respondents. It shows that 400(89.7%) had <5 adults in their household, 42(9.4%) had 5-9 adults, 4(0.9%) had >9 adults. Also, 290(65%) had 0-2 household member less than 18 years, 138(31%) had 3-5 household member less than 18 years, 18(3.9%) had 6+ household members less than 18 years. For the major household occupation, eighteen (4%) had business as their

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major household occupation, 62(13.9%) were civil servants, majority were into farming, 34(7.6%) were into teaching, 150(33.6%) were into trading, while26 (5.8%) had other major occupation.

Table 4: Knowledge on Malaria Infection

	SD	D	A	SA	Mean	Standard Deviation
Have you ever been down with malaria	8 (1.8)	38 (8.5)	216 (48.4)	184 (41.3)	3.29	0.70
For the past 3 years of more, I have never been down with malaria	92 (20.6)	192 (43.0)	100 (22.4)	62 (13.9)	2.30	0.95
Malaria is a very dreadful disease that affects people of any income and/or class	10 (2.2)	42 (9.4)	172 (38.6)	222 (49.8)	3.36	0.74
There are more reports of malaria in Africa than other parts of the world	26 (5.8)	58 (13.0)	186 (41.7)	176 (39.5)	3.15	0.86
Globally, malaria kills more infants than adults every minute	30 (6.7)	84 (18.8)	218 (48.9)	114 (25.6)	2.93	0.84
Malaria can be well managed if the right policy and health care professionals are adequately provided	22 (4.9)	44 (9.9)	134 (30.0)	246 (55.2)	3.35	0.85
The female anopheles mosquito is the pathogen, not vector for malaria	78 (17.5)	78 (17.5)	182 (40.8)	108 (24.2)	2.72	1.02
Different treatment/management options exists for malaria across different groups	14 (3.1)	64 (14.3)	214 (48.0)	154 (34.5)	3.14	0.77
Different risk factors, especially low income levels have contributed hugely to the high level of malaria in Africa	16 (3.6)	54 (12.1)	224 (50.2)	152 (34.1)	3.15	0.77
Inadequate use of mosquito net and ignorance are the main reasons for quick spread of malaria	20 (4.5)	42 (9.4)	222 (49.8)	162 (36.3)	3.18	0.78

SD = Strongly Disagree;   D = Disagree; A = Agree;   SA = Strongly Agree; values are expressed as n(%)

Table 4 showed respondent's knowledge on malaria infection. Have you ever been down with malaria had a mean and Standard Deviation of 3.29±0.697, malaria is a very dreadful disease that affects people of any income and/or class had a mean and Standard Deviation of 3.36±0.744, there are more reports of malaria in Africa than other parts of the world had a mean and Standard Deviation of 3.15±0.859, globally, malaria kills more infants than adults every minute had a mean and Standard Deviation of 3.15±0.859, malaria can be well managed if the right policy and health care professionals are adequately provided had a mean and Standard Deviation of 3.35±0.851, the female anopheles mosquito is the pathogen, not vector for malaria had a mean and Standard Deviation of 2.72±1.019, different treatment/management options

exists for malaria across different groups had a mean and Standard Deviation of 3.14±0.772, different risk factors, especially low income levels have contributed hugely to the high level of malaria in Africa had a mean and Standard Deviation of 3.15±0.765, inadequate use of mosquito net and ignorance are the main reasons for quick spread of malaria had a mean and Standard Deviation of 3.18±0.778.

Table 5: Household records on Malaria Infection

	Yes n (%)	No n (%)
I spray insecticides daily before sleeping at night	112(25.1)	334(74.9)
No, I spray insecticides weekly in my house to prevent mosquito bites	176(39.5)	270(60.5)
No there is always a standby mosquito net to help me curtail malaria	196(43.9)	250(56.1)
None of the above for me, because of the high cost of commodities	176(39.5)	270(60.5)
Be that as it may, I often treat malaria quarterly in a year	180(40.4)	266(59.6)
Because of my blood genotype status, I don't treat malaria at all because I hardly suffer it.	120(26.9)	326(73.1)
Household routines like good hygiene is the reason I don't suffer malaria	178(39.9)	268(60.1)
Yes, because I can afford to eat good food daily, I have a strong immunity against malaria parasite	152(34.1)	294(65.9)

Table 5 showed household records on malaria infection, 112(25.1%) reported that they spray insecticides daily before sleeping at night, majority 334(74.9%) reported they didn't.one hundred and seventy-six (39.5%) reported they spray insecticides weekly in their house to prevent mosquito bites, majority 270(60.5%) reported they didn't. One hundred and ninety-six (43.9%) reported there is always a standby mosquito net to help them curtail malaria, majority 250(56.1%) reported they didn't. One hundred and seventy-six (39.5%) reported they used all of the above mention despite the high cost of such commodities, majority 270(60.5%) reported they didn't. One hundred and eighty (40.4%) reported be that as it may, they often treat malaria quarterly in a year, majority 266(59.6%) reported they didn't. One hundred and twenty 120(26.9%) reported because of their blood genotype status, they don't treat malaria at all because they hardly suffer it, 326(73.1%) reported did. One hundred and seventy-eight (39.9%) reported household routines like good hygiene is the reason they don't suffer malaria, majority 268(60.1%) reported it wasn't. One hundred and fifty-two (34.1%) reported because they can afford to eat good food daily, they have a strong immunity against malaria parasite, majority 294(65.9%) reported it wasn't so.

Table 6: Household burdens and Malaria Treatments

	SD	D	A	SA	Mean	Standard Deviation
I can afford to buy the best and most expensive of anti-malaria medication	88 (19.7)	146 (32.7)	144 (32.3)	68 (15.2)	2.43	0.97

Too many water logging gutters in my environment, hence, it is difficult to cob mosquito excesses, irrespective of income	30 (6.7)	78 (17.5)	178 (39.9)	160 (35.9)	3.05	0.90
Due to economic burden, I prefer the use of trado-medical treatment options in managing malaria	72 (16.1)	130 (29.1)	158 (35.4)	86 (19.3)	2.58	0.98
Well, my religious belief is against taking lives in any form, so I don't even treat my environment	146 (32.7)	192 (43.0)	68 (15.2)	40 (9.0)	2.00	0.92
The presence of children in my house makes it difficult to manage malaria	100 (22.4)	160 (35.9)	128 (28.7)	58 (13.0)	2.32	0.96
Household utilities are more often than not, a breeding ground for malaria parasite and mosquito	44 (9.9)	104 (23.3)	222 (49.8)	76 (17.0)	2.74	0.86
My low salary income is a huge economic burden on me, especially with respect to treating malaria frequently	64 (14.3)	62 (13.9)	198 (44.4)	122 (27.4)	2.85	0.98

SD = Strongly Disagree; D = Disagree; A = Agree; SA = Strongly Agree; values are expressed as n (%)

Table 6 showed household burdens and malaria treatments. I can afford to buy the best and most expensive of anti-malaria medication had a mean and Standard Deviation of 2.43±0.97. Too many water logging gutters in my environment, hence, it is difficult to cob mosquito excesses, irrespective of income had a mean and Standard Deviation of 3.05±0.90. Due to economic burden, I prefer the use of trado-medical treatment options in managing malaria had a mean and Standard Deviation of 2.58±0.98. Well, my religious belief is against taking lives in any form, so I don't even treat my environment had a mean and Standard Deviation of 2.00±0.92. The presence of children in my house makes it difficult to manage malaria had a mean and Standard Deviation of 2.32±0.96. Household utilities are more often than not, a breeding ground for malaria parasite and mosquito had a mean and Standard Deviation of 2.74±0.86. My low salary income is a huge economic burden on me, especially with respect to treating malaria frequently had a mean and Standard Deviation of 2.85±0.98.

Table 7: Malaria Treatment Options and Economic Burden

	SD	D	A	SA	Mean	Standard Deviation
I am aware of different treatment options for malaria, especially with orthodox	22 (4.9)	66 (14.8)	224 (50.2)	134 (30.0)	3.05	0.80

	SD	D	A	SA	Mean	SD
medicine						
The use of Artemisinin-based Combination Therapy (ACT) is most efficient, and places less economic burden on my income	40 (9.0)	120 (26.9)	214 (48.0)	72 (16.1)	2.71	0.84
No, Sulphodaxin-Pyrimentamin is a cheaper choice for me, considering my income	38 (8.5)	134 (30.0)	208 (46.6)	66 (14.8)	2.68	0.83
Whenever malaria strikes, the use of Agbo, a trado-medical herbal concoction is cheap and efficacious for me	64 (14.3)	120 (26.9)	148 (33.2)	114 (25.6)	2.70	1.01
Well, anti-malarias are very expensive to afford in my area, maybe due to poor government subsidy	44 (9.9)	90 (20.2)	146 (32.7)	166 (37.2)	2.97	0.99
I rely on dexamethasone and vitamin C, a common drug around my neighborhood	128 (28.7)	144 (32.3)	118 (26.5)	56 (12.6)	2.23	1.00
Very little or no government policies are on ground to strengthen malaria healthcare givers and available management options	14 (3.1)	66 (14.8)	252 (56.5)	114 (25.6)	3.04	0.73

SD = Strongly Disagree; D = Disagree; A = Agree; SA = Strongly Agree; values are expressed as n(%)

Table 7 showed malaria treatment options and economic burden. I am aware of different treatment options for malaria, especially with orthodox medicine had a mean and Standard Deviation of 3.05±0.80. The use of Artemisinin-based Combination Therapy (ACT) is most efficient, and places less economic burden on my income had a mean and Standard Deviation of 2.71±0.84. No, Sulphodaxin-Pyrimentamin is a cheaper choice for me, considering my income had a mean and Standard Deviation of 2.68±0.83. Whenever malaria strikes, the use of Agbo, a trado-medical herbal concoction is cheap and efficacious for me had a mean and Standard Deviation of 2.70±1.01, well, anti-malarias are very expensive to afford in my area, may be due to poor government subsidy had a mean and Standard Deviation of 2.97±0.99. I rely on dexamethasone and vitamin C, a common drug around my neighbourhood had a mean and Standard Deviation of 2.23±1.00. Very little or no government policies are on ground to strengthen malaria healthcare givers and available management options had a mean and Standard Deviation of 3.04±0.73.

DISCUSSION

In order to inform policy decisions and assess innovative strategies to assist malaria control and elimination, it is crucial to comprehend the economic impact of malaria on households, the health system, and society as a whole. This kind of information is especially important in places like Nigeria and throughout Africa, where malaria transmission is supposedly higher among less fortunate people who are

at a much higher risk of contracting the illness.

This study aimed at assessing the occupational and economic burdens of malaria on selected households in Ukwuani-Ndokwa federal constituency of Delta State. The study only included people who worked in hospitals or in health management, lived in the Ukwuani-Ndokwa federal constituency of Delta State, Nigeria, and had used or been exposed to community-based malaria treatment alternatives for at least three years. The factors influencing the cost of treating malaria sickness were assessed in families in the high malaria transmission area. It was envisioned that 50% of families would have experienced at least one confirmed episode of malaria in the previous year, with a margin of error of 5% at a 95% confidence level and a design effect of 2. As a result, a sample size of around 412 houses (n=412) was used to collect the data. The sample size was estimated and appropriately dispersed based on the number of homes selected for the study from the Ukwuani Local Government Area in Delta State.

Information about the respondents' personal lives is shown in Table 1. Most respondents 222(49.8%) were married, majority 144(32.3%) had SSCE as their educational background, majority 162(36.3%) were civil or public servants, majority 402(90.1%) were Christians, majority 228(51.1%) had AA as their blood genotype, majority 272(61%) were females, household status revealed that majority 146(32.7%) were males, majority 262(58.7%) were from Ukwuani. Majority 114 (25.6%) had 2 household member less than 18 years, 156(35%) had their major household occupation as farming.

According to reports, malaria in Nigeria is the primary reason people seek medical attention, accounting for 68% of outpatient consultations and 49% of hospital admissions in 2015 [14]. The Nigerian Ministry of Health offers free malaria diagnosis and treatment in public health facilities, but these services demand a significant investment in human resources and health systems. The US President's Malaria Initiative and the Global Fund to Fight AIDS, Tuberculosis, and Malaria purchase the majority of the anti-malarial medications needed by the nation due to a lack of resources and inadequate health system financing.

Respondents' knowledge about malaria infection is displayed in Table 2. Had a mean and STD of 3.290.697, malaria is a very dreadful disease that affects people of any income and/or class, more cases of malaria have been reported in Africa than in other parts of the world, and malaria kills more infants than adults worldwide every minute. However, if the proper policy and medical personnel are implemented, malaria can be effectively managed. The female Anopheles mosquito is the pathogen and not the vector for malaria, with a mean and standard deviation of 3.350.851 and 2.721.019, respectively, different treatment/management options exists for malaria across different groups had a mean and STD of 3.14±0.772, different risk factors, especially low income levels have contributed hugely to the high level of malaria in Africa had a mean and STD of 3.15±0.765, inadequate use of mosquito net and ignorance are the main reasons for quick spread of malaria had a mean and STD of 3.18±0.778.

Table 3 shows household records on malaria infection, 112(25.1%) reported that they spray insecticides daily before sleeping at night, 176(39.5%) reported they spray insecticides weekly in their house to prevent

mosquito bites, 196(43.9%) reported there is always a standby mosquito net to help them curtail malaria, 176(39.5%) reported they don't used any of the above mention because of the high cost of such commodities, 180(40.4%) reported be that as it may, they often treat malaria quarterly in a year, 120(26.9%) reported because of their blood genotype status, they don't treat malaria at all because they hardly suffer it, 178(39.9%) reported household routines like good hygiene is the reason they don't suffer malaria, 152(34.1%) reported because they can afford to eat good food daily, they have a strong immunity against malaria parasite.

Results from current study indicated that the prevalence of malaria was high (32%), and a bit over 1/10th of assessed households had a high economic burden of malaria in the study area. This high prevalence of malaria combined with the economic burden it imposes across the study area may be a major challenges of health system across the area, particularly the poorer and vulnerable households that are at increased risk of the burdens of malaria and the far worsening cost of managing it for complicated cases. On the knowledge of respondents to malaria, tables 3 and 4 show the levels of knowledge of malaria infection by the respondents. It shows that 2(0.4%) of the respondents have poor level of knowledge, 70(15.7%) have fair level of knowledge while 374(83.9%) have good level of knowledge.

Relative to other reports, Ito *et al.,* 2020 reported in delta state that males were with a higher malaria prevalence (89.13%) and hence were invariably more susceptible to malaria infection. Females showed a lesser susceptibility with a prevalence of 79.82%. In each blood group, females also showed a relatively lesser susceptibility across all blood groups. The report on malaria prevalence for current study disagrees with those of Ito et al (2020) [15]

Studies on the effects of malaria on the patients' and their families' household and economic circumstances have been conducted, primarily in low- and middle-income countries. The majority of them made an effort to estimate the direct and indirect costs of malarial disease in order to determine its financial impact on households. The Cost-of-Illness (COI) method is the most often used approach for estimating both direct and indirect costs. Several studies have classified a third category of malaria-related costs as intangible costs. But it is the most polarizing and not typically recognized [16]. In recent studies, the illness burden was attempted to be measured in terms of DALYs (disability-adjusted life years) lost. While a few studies have attempted to gauge the macroeconomic effects of the disease, this study does not specifically address the macroeconomic costs of malaria.

Table 5 and 6 of current study lists household responsibilities and malaria treatments. Due to the excessive amount of water logging gutters in my area, it is difficult to control mosquito populations, regardless of income, with a mean and standard deviation of 3.050.90. Because of the financial burden, I prefer to use traditional medical treatments to manage malaria, with a mean and standard deviation of 2.580.98. Household utilities are frequently a breeding ground for the malaria parasite and mosquito, with a mean and standard deviation of 2.740.86. My low salary income is a significant financial burden. The findings

of the current investigation are entirely consistent with the reports of Chuma, (2010) [17, 18].

The findings also demonstrates that households in the study area are required to pay a sizeable sum in direct financial expenses, which can be further broken down into two main categories: spending on malaria prevention and spending on treating malaria. Insecticide-treated mosquito nets and indoor residual spraying are the main methods used by households in malaria-endemic countries to stop the disease from spreading, but they also use mosquito coils and lotions. The adoption of prophylactic measures and the requirement for treatment for malaria varies depending on the season and geographic variances, and as a result, so do the associated costs [19, 20].

The latest research also showed that households living in poverty are most affected by malaria since they must spend a disproportionately higher percentage of their income for the illness' treatment and prevention as well as incur financial losses due to illness or caregiving. For instance, in Malawi, the average annual cost of malaria for households with extremely low incomes was 63% of household income as opposed to 9.8% for those with low- to high incomes. The harsh effects of a brief sickness on families could have forced them into or increased their poverty [21]. On the other hand, in developing countries, poverty might result in higher rates of malaria transmission. For instance, in developing Asia and Africa, malaria is a widespread disease. Malaria may not inevitably result from poverty, though. The prevalence and severity of the disease are significantly influenced by ecology and climate [22]. McCarthy et al's study from 2000 found that climate had a substantial impact on explaining differences in malaria morbidity.

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