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Economic and Demographic Impacts of Malaria on Nigerians in Ukwuani-Ndokwua Federal Constituency of Delta State

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Abstract

This research looked into the sociodemographic, economic, and malaria-related records of respondents in Delta State, Nigeria's Ukwuani Ndokwa Federal Constituency. To gather sociodemographic and malaria-related information about chosen participants within the study region, a self-structured questionnaire was used. Specialists, doctors, and public health researchers verified the research questionnaire, and participants were given a pre-test to deliver to ensure reliability. The independent variables evaluated the subjects' sociodemographic and socioeconomic traits, the severity and length of the illness, malaria episodes, as well as the accessibility of anti-malarial medications and the distance to a health center. The dependent factors retrieved information about the financial costs of malaria. The precision and consistency of the data was then checked using the graph pad prism version 8.1. Data cleaning was done after data input by running frequencies and performing step-by-step data analysis. The immediate, indirect, and overall costs of malarial disease were then investigated. The sum, mean, median, and standard deviation for each expenditure category were calculated. The final result was given as mean±SD in the multivariate model, where variables with p 0.05 were considered statistically significant. Results showed that malaria is a terrible disease that can impact people from any class or income level, with an average mean±SD of 3.360.744. For malaria treatment options and economic burden, result also proved that the use of Artemisinin-based Combination Therapy (ACT) is most efficient, and places less economic burden on respondents' income with a mean and STD of 2.71±0.84 respectively. Sulphodaxin-Pyrimentamin proved to be a cheaper choice for most respondents, considering their income at mean and STD of 2.68±0.83. Also, respondents also asserted that whenever malaria strikes, the use of Agbo, a trado-medical herbal concoction is cheap and efficacious for them; with a mean and STD of 2.70±1.01, while anti-malarias proved too expensive. We recommend similar study on low income earners to corroborate this.

Keywords: Economic Impacts Malaria Delta State

Introduction

An estimated 435,000 malaria deaths have been recorded globally in 2017 of which more than 60% of them are children of under-five years [1]. Although in the last decade, significant reductions in malaria morbidity and mortality have been achieved through increased funding for malaria control and elimination, among other reasons, which supported the scale-up of malaria prevention tools, such as insecticide-treated nets, and of case management, with rapid diagnostic tests (RDTs) and other treatment procedures which include artemisinin-based combination therapy [2]. 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 [3]. Malaria generally had severe devastating impact on humans and it is believed to be associated with poverty, or a cause of poverty which can lead to a major hindrance in economic development [4].

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 [1, 5]. The environmental and socio-demographic factors predominantly is believed to affect the burden of malaria at household level [5]. 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].

Malaria is a deadly disease that affects the labor productivity and economic performance of endemic nations like Nigeria. It is a significant health, economic, and social burden in sub-Saharan Africa. Malaria continues to cause more than 200 million infections and almost 100,000 fatalities each year [7]. In places with sustained transmission, malaria accounts for up to 50% of outpatient visits, 30% to 50% of inpatient hospital admissions, and 10% of the continent of Africa's total illness burden [6].

According to Onwujekwe et al. (2006), malaria is Nigeria's top public health concern and kills around 300,000 people annually [8]. There are more than 200 million cases of malaria worldwide, with malaria affecting almost 50% of the population of Nigeria [5]. As a result, this study will offer useful data that can be used to better understand the financial cost of treating malaria in government-owned health facilities and homes, which will then allow for the evaluation of the possible financial effects of malaria prevention and control. It will also provide valuable information of the health system cost and household cost for malaria treatment to enable managers to make informed decisions on resource allocation and efficiency in malaria prevention and control [9]. This study evaluated the demographic and economic burdens of malaria on households and selected government health facilities in Ukwuani-Ndokwa Federal Constituency of Delta State, Nigeria.

Materials and Methods

Study Design

In order to determine the economic impact of malaria on households and the public health system from January 2022 to December 2022, the study used reports from a cross-section of subjects who lived in the study area. Special attention was paid to the cost implications and management options available to the target population. The study was therefore cross-sectional and descriptive in design, choosing at random houses from the Delta State Ukwani Local Government Area. A retrospective costing method was also employed to calculate the financial burden of malaria on households.

Study Area

The Ukwuani-Ndokwa Federal Constituency in Delta State, Nigeria, was the site of the current study. The Ukwuani people, also known as the Ndokwa ethnic nationality, are situated in the western Niger Delta in southern Nigeria. In the South-South Nigerian state of Delta, households in the several communities of Ukwuani-Ndokwa Federal Constituency participated in this study. The Ukwuani and Ndokwa ethnic nationalities of Nigerians live in the aforementioned area, which is part of the state's Delta North senatorial constituency. The majority of the population are farmers, and they all speak Ukwuani as their primary language [10].

Source: (Google map, 2022)

In Nigeria's South-South geopolitical region is Delta State, an oil-rich and agriculturally productive state. There are around 4,112,445 people living there (males: 2,069,309; females: 2,043,136). Asaba, the state's capital, is in the northern part of the state; it has an estimated area of 762 square kilometers (294 square miles), while Warri, the state's commercial hub and most populous city, is in the southern part [11].

The state covers a landmass of roughly 18,050 km2 and has a total land area of 16,842 km2 (6,503 sq miles), making up more than 60% of the total area. The province is roughly located between Latitude 5:00 and 6°30' North and Longitude 5:00 and 6°45' East. The state is bordered by the states of Bayelsa to the southeast, Edo to the north and west, Anambra, Imo, and Rivers to the east, and the Bight of Benin to the south, which makes up about 160 kilometers of the state's shoreline [12]. The majority of Delta State is low-lying and devoid of notable peaks.

Scope of Study

Due to the non-invasive method used to collect the data, this study involved human participants and was intended for people living in the Ukwani-Ndokwa federal constituency of Delta State, Nigeria, who have had at least three years of exposure to or reliance on community-based malaria treatment options.

Population of Study

The human populace living in Nigeria's Delta state was the study's target population. The national demographics commission has estimated this population to be 5,663,362 as of the year 2016 [12].

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 [12].

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

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.

Research Instrument

The tool used to gather data was a self-structured questionnaire titled The Economic Burden of Malaria in Ukwuani LGA (EBMIU) of Delta State. There are three (3) distinct parts in the questionnaire: Sociodemographic details about the home respondents were included in section one [1].

Items in Section 2 prompted responses from households about how much money they spent each day fighting malaria illnesses. While Section 3 contained items that asked family members how much they spent on malaria treatment through the public health system.

Validity and Reliability of Instruments

To make sure it is presentable to respondents, the questionnaire was validated by specialists and medical professionals/research-

ers in the field of public health, along with self-evidence measures. Its reliability was also tested using a pre-test method, which was given to participants who weren't part of the research population. In order to achieve the goals for which the study was designed, the research instrument was corrected and validated by experts for measurement and evaluation. Additionally, the questionnaire underwent pilot testing in about ten homes [10]. The spearman rank correlation coefficient was used to analyze the scores, and before the correlation result was used, it was verified for its dependability in terms of precision and accuracy.

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

Based on accessibility and approval throughout the Ukwuani-Ndokwa federal constituency, a total of 412 households were chosen. The research used a self-structured questionnaire that was administered by an interviewer to collect data. The information in the data gathering questionnaire was created using the primary designed household costing tool. A pre-interview was conducted with individual household. A copy of the questionnaire to complete and code was given to each willful family. Up until the sample size was reached, this persisted. After conclusion, a properly filled out questionnaire was promptly taken from the respondents. The study participants were chosen using a stratified multistage sampling method. 30% of the study population were chosen in the first step using a straightforward random sampling strategy and computer-generated random numbers. After that, the health records of malaria patients from the health center within the chosen community in the Ukwuani-Ndokwa federal constituency, which includes the aforementioned towns, were examined. The household numbers of all the households that meet the inclusion requirements have been pulled from the hospital's family case files.

Techniques and Approaches of Cost Estimation

The result variable was focused on information about the financial cost of malaria. The sociodemographic and socioeconomic characteristics of the households, the severity and length of the illness, malaria episodes, the proximity to a medical center, and the accessibility of anti-malarial medications were the independent factors. The amount of expenditure that poses a threat to household livelihoods as a result of malaria was referred to in this research as the economic burden of malaria. All households categorized as catastrophic payment or high economic burden paid more than 5% of their monthly income for the diagnosis and treatment of malaria, while households that paid less were classified as low economic burden. The economic impact of malaria in the study region was estimated using the cost of illness method. 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

The Oguma, Ukwuani-Ndokwa federal constituency, the Delta State primary healthcare Board, and the Novena University ethical review committee provided the necessary ethical approval for the study. All research participants were fully informed of the study's objectives, advantages, and disadvantages. Following that, research participants' written informed consent was obtained. The privacy of study subjects was protected. Codes were used in lieu of personal identifiers in the data collection tools. Data was stored in secure environments. Data on paper was stored in a locked cabinet, and data on computers was password-protected and secured. Except for the research crew, no other party had access to the recorded data.

Statistical Analysis

Utilizing percentage, mean, and standard error of means, the obtained data were analyzed and displayed. (SEM). Using the student t-test of comparison and taking a p-value of 0.05 as statistically significant, the data from the obtained variables were examined. The graph pad prism version 8 was used for all statistical analysis and data display.

Table 1: Demographic Information 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
AS	120	26.9
SS	20	4.5
Others	56	12.6
Don't Know	22	4.9

Table 1 includes the interviewees' personal data. One hundred twenty-six respondents (126, or 28.3%) were between the ages of 15 and 25; 222, or 49.8%, were married; 144, or 32.3%, were civil or public employees; 402, or 90.1%, were Christians; and 228, or 51.1%, had the AA blood genotype.

Table 2: 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 exist 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 2 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 3: 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 3 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 4: Records on 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 4 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 5: Economic Burden of Malaria on Household Members

	Mean	Std. Deviation
Approximately how many minutes did it take you to get to there you received treatment (minutes)	29.64	19.66
How much did you spend on transportation to receive this treatment (to and fro) (Naira)	1035.52	1479.08
How much did it cost to receive this treatment (Naira)	10375.88	11764.34
Total cost (Naira)	10834.85	10049.54

Table 4.8 showed economic burden of malaria on household members. Approximately how many minutes did it take you to get to there you received treatment (minutes) had a mean and Standard Deviation (SD) of 29.64±19.88. How much did you spend on transportation to receive this treatment (to and fro) (Naira) had a mean and St of 1035.52±1479.08? How much did it cost to receive this treatment (Naira) had a mean and SD of 10834.85±10049.54?

Discussion

Understanding the economic effect of malaria on households, the health system, and society as a whole is essential for informing policy decisions and evaluating creative strategies to help control and eliminate malaria. In countries like Nigeria and all of Africa, where malaria transmission is allegedly higher among less fortunate people who are at a much higher risk of contracting the illness, this kind of knowledge is particularly crucial.

The goal of this research was to evaluate the financial and occupational costs of malaria on a sample of households in Del-

ta State's Ukwuani-Ndokwa federal constituency. The research only included individuals who resided in the Ukwuani-Ndokwa federal constituency of Delta State, Nigeria, worked in hospitals or in health management, and had used or been exposed to community-based malaria treatment alternatives for at least three years. In families living in a region with high malaria transmission, the variables affecting the cost of treating malaria illness were evaluated. With a 5% error margin at a 95% confidence level, it was anticipated that 50% of families would have had at least one confirmed episode of malaria in the preceding year. As a consequence, the data was gathered from a sample of about 412 homes (n=412). Based on the number of homes chosen for the study from the Ukwuani Local Government Area in Delta State, the sample size was estimated and distributed properly.

Table 1 displays details about the respondents' private affairs. Majority 162 (36.3%) of respondents were civil or public servants, majority 402 (90.1%) were Christians, majority 228 (51%) had AA as their blood genotype, majority 272 (61%) were females, household status revealed that majority 146 (32.7%) were males, and majority 262 (58.7%) were from Ukwuani. The majority of respondents, or 222 (49.8%), were married. A majority of 114 (25.6%) households had two members under the age of 18, and 156 (35%) of those households had farming as their primary employment. Malaria was allegedly the primary reason for 68% of outpatient consultations and 49% of hospital admissions in Nigeria in 2015, according to reports [13]. The Global Fund to Fight AIDS, Tuberculosis, and Malaria and the US President's Malaria Initiative buy the majority of the anti-malarial medications the nation needs due to a lack of money and a weak health system.

Table 2 lists the respondents' understanding of malaria infection. Malaria is a terrible illness that affects people of all socioeconomic classes and has been recorded more frequently in Africa than anywhere else in the world. It also kills more infants than adults worldwide every minute. However, malaria can be successfully managed if the right policy and medical staff are put in place. Different malaria treatment/management options exist for different groups, with a mean and STD of 3.140.772. Different risk factors, especially low-income levels, have greatly contributed to the high level of malaria in Africa, with a mean and STD of 3.150.765. Inadequate use of mosquito net and ignorance are the main causes of malaria, with mean and STD of 3.350.851 and 2.721.019, respectively.

176 people (39.5%) said they spray insecticides once a week in their home to prevent mosquito bites, 196 people (43.9%) said they always have a mosquito net ready to use to help them prevent malaria, and 112 people (25.1%) said they don't use any of the above because of the high cost of such items. Table 3 shows household records on malaria infection. However, 180 (40.4%) reported that they frequently treat malaria every three months, and 120 (26.7%) stated that this was due to 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.

Relative to other reports reported in delta state that males were with a higher malaria prevalence (89.13%) and hence were invariably more susceptible to malaria infection [15]. 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 [14].

Studies on the effects of malaria on the households and economies of patients and their families have mainly been carried out in low- and middle-income nations. Most of them made an attempt to calculate the direct and indirect costs of malaria to ascertain how much it would cost households. The most popular technique for determining both direct and indirect costs is the Cost-of-Illness (COI) method. A third category of malaria-related expenses has been categorized as intangible costs in numerous researches. However, it is the most divisive and little known [15]. 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.

For the present study, household duties and malaria treatments are listed in Table 4. With a mean and standard deviation of 3.050.90, mosquito populations in my area are challenging to manage regardless of income due to the excessive amount of water that clogs gutters, with a mean and standard variation of 2.740.86, household utilities are frequently a breeding ground for the malaria parasite and mosquito. My meager wage is a serious financial burden. The results of the investigation are completely consistent with Chuma's (2010) reports [16, 17].

The research also shows that households in the study region are burdened with a significant amount of direct financial expenses, which can be further divided into two major categories: spending on malaria prevention and spending on treating malaria. Households in malaria-endemic nations primarily use insecticide-treated mosquito nets and interior residual spraying to prevent the disease from spreading, but they also use mosquito coils and lotions. The need for malaria treatment and the adoption of preventative measures vary based on the season and geographic differences, and as a result, so do the associated costs [18, 19].

According to the most recent research, families in poverty are more likely to experience malaria-related complications because they must devote a disproportionately higher percentage of their income to the disease's treatment and prevention, as well as suffer financial losses as a result of sickness or caregiving.

For instance, the average yearly cost of malaria in Malawi was 9.8% of household income for those with low to high incomes compared to 63% of household income for those with extremely low incomes. A brief illness' severe impacts on families may have increased or forced them into poverty [20, 21]. On the other hand, in developing countries, poverty might result in greater rates of malaria transmission. For example, malaria is an illness that is common in developing Asia and Africa. However, poverty may not always be a direct cause of malaria. Ecology and climate have a major impact on the prevalence and severity of the disease [22].

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