IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 19, Issue 4 Ser. 1 (July. – August. 2024), PP 48-55
www.Iosrjournals.Org

Economics Of Health Care In The Treatment Of Malaria Infection In Port Harcourt, Nigeria: A Household Survey

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Abstract
This paper evaluated the economics of health care in the treatment of malaria infection among households in Port Harcourt, Rivers State Nigeria. A cross sectional survey research design was adopted to investigate key aspects of the study involving qualitative and quantitative research method, conducted in three public health institutions from three local government Councils of Rivers State, Nigeria. Target population of patients was 2,200 and the sample size of 338 determined using the Taro Yamani sampling formula was used for the study. The sample size represents 15.4% (approx.) of the target population. Findings show that over 47% of the respondents spent between N5,000 to N15,000 each month (N60,000 – N180,000 or average of $120 per annum for the treatment of malaria and that represents between 5 to 15% of most respondents annual earnings. A significant statistical association was established between malaria diagnosis, treatment and household spendable income as well as with mortality rate. Based on these findings, it was recommended that effective and efficient malaria eradication policies and programmes coupled with national health insurance scheme and free malaria treatment should be implemented to mitigate the high cost and huge economic burden of malaria treatment in Nigeria.

Keywords: *Economic burden, health care, spendable income, mortality rate, malaria infection*

Date of Submission: 18-07-2024 Date of Acceptance: 28-07-2024

I. Introduction

Health economics evaluation is becoming increasingly popular in advanced and less advanced countries of the world. This has opened up the possibility of using statistical approach to measure health economic data with the basic objective of gathering valuable health information that could mitigate the cost of health treatment and to improve health care delivery. Ill-health can contribute to impoverishment, which is broadly defined as a process of household asset depletion and income loss that cause consumption levels to fall below minimum needs. The impoverishment process was brought into sharper focus by the social and economic impact of the human immune deficiency virus/acquired immune deficiency syndrome (HIV/AIDS) epidemic (Ainsworth *et al* 1998), Bernett et al (2001), World Bank (1997) and the ravaging effects of the Covid 19 otherwise known as the Corona Virus.

Concerns about the links between ill-health and impoverishment has placed health at the center of development agencies poverty reduction targets and strategies (DFID, 1999, World Bank 2000) and strengthened arguments for a substantial increase in health sector investment to improve access for the world's poorest people to combat poverty as well as reduce disease burdens (WHO 2002). Household interactions with health services, and the costs people incur due to illness, are also central to the performance of healthcare interventions, particularly their coverage and equity implications. Health services can also impose regressive cost burden, with poor households spending a higher proportion of their income on health care than better-off households (Russel, 2004).

Malaria remains one of the most devastating parasitic diseases in the world. It contributes considerably to the poor health situation in Africa. The global incidence of the disease is estimated to 350 to 500 million clinical cases annually, resulting in 1.5 to 2.7 million deaths each year in sub-saharan Africa and parts of Asia (WHO, 1997, 1999, 2000, Kioko, 2007). About 90% of these deaths occur in young children below the age of five years, who have not yet acquired clinical immunity, and pregnant women, whose immunity to malaria is temporarily impaired. It accounts for an estimated 25% of all childhood mortality below the age of five years, excluding neonatal mortality (WHO, 1997).

In 2018 an estimated 228 million cases of malaria occurred worldwide (95% confidence interval/CI; 206 – 258 million). Compared with 251 million cases in 2010 (95% CI:231 – 278 million) and 231 million cases in 2017 (95% CI: 211-259 million). Most malaria cases in 2018 were in the World Health Organization (WHO) African Region (213 million or 93%) followed by WHO South-East Asia Region with 3.4% of the cases and the WHO Eastern Mediterranean Region with 2.1% (WMR, 2019). This report also showed that in 2018, there were an estimated 405,000 deaths from malaria globally, compared with 416,000 estimated death in 2017 and 585,000 in 2010. Children accounted for 67% (272,000) of all malaria deaths worldwide while about 11 million pregnancies in moderate and high transmission Sub-Sahara Africa (SSA) have been exposed to malaria infection. In Sub Saharan Africa (SSA) Malaria is responsible for, between 30 to 50% of outpatient visits and between 10 and 15% of hospital admissions (WHO 2015). In addition, the disease exerts enormous pressure on scarce health resources in SSA countries. In general, it is estimated that malaria account for an average of 3% of the total global disease burden. More evidence points to significantly increasing malaria morbidity and mortality in SSA due to non-adherence to full treatment courses (protocol) namely combination therapy, early diagnosis and prompt effective treatment (WHO, 2015).

WHO and World Bank report shows that malaria is responsible for an estimated annual loss of 45 million disability adjusted life years (DALYs) worldwide. This was higher than the loss of 39 million DALYs reported in 1998 and more than 36 DALYs in 1999 (WHO, 1999, 2002, World Bank 1993). In SSA, more than 10% of all disability adjusted life years were lost to malaria in 2000 (WHO, 2002). It has furthermore being estimated that among the ten leading causes of loss in DALYs in the world in 2000 malaria is ranked eighth with a share of 2.8% of the global disease burden (WHO, 2002, Kioka, 2007). Recent estimates shows economic losses due to malaria in sub-sahara Africa to over, US dollars 12 billion annually (Gallup an Sachs, 1998, WHO, 2000). Here malaria exerts a devastating effect on the development potential of SSA countries and mostly affects the disadvantaged and economically susceptible households, who constitute the bulk of economic labourers. Available data indicates that malaria imposes high and regressive cost burden on household that have a sick family member, with poor household spending, a higher proportion of their income on healthcare than the better-off households (Russell, 2004; Goodman *et al* 2000), Kioko, 2007). Further to this expenditure on insecticides, drugs, and equipment, large numbers of malaria patients make health personnel get stretched beyond capacity, thus affecting the standard of care they give to patients. From the above, malaria is a serious problem affecting many sectors of a country economy.

Malaria is ranked first, accounting to 10% of the disease burden (WHO, 2002). In addition, to the disease burden, it is estimated that the total cost of malaria to Africa increased from US dollars 1.8 in 1995 to US dollars 2 billion in 1997 (WHO, 1997).Malaria is the main cause of anaemia among pregnant women and can lead to miscarriage, still-birth, underweight – low birth weight (LBW) babies and maternal mortality. It has also been shown that frequent malaria can lead to disabling neurological sequalae. Further, the disease is the major cause of school absenteeism among school children slowing intellectual development of children in malaria endemic area (Lucas 2005) with about 2% of children who suffer from cerebral malaria experience brain damage including epilepsy (WHO, 2003).

Malaria affects labour supply of household, increase income shocks, household production, gross domestic product (GDP) substantially imposing substantial social and economic costs impeding economic development through human capital, premature deaths, medical costs and reduction of savings and investments (Lucas 2005, Laxminarayan, 2004, Goodman *et al* 2000, Malaney & Sachs, 2002). Total household malaria burdens amounted to 9-18% of annual income for small farmers in Kenya and 77-13% in Nigeria, with total annual value of production loss due to malaria estimated to be 2-6% and 1-5% of GDP in Kenya and Nigeria respectively. Aggregate cost of malaria to be US dollars 3.15 per capital /equivalent to 0.6% GDP) following from the above, a larger proportion of the health sector budgets, are spent on malaria control and treatment, studies show 40% of the public health expenditure 30-50% of hospital admissions and up to 50% of outpatient visits in countries with high malaria transmissions. Researchers have placed the economic burden on households due to malaria prevention measures to between US dollars 0.23 and US dollars 15 each month, and between US dollars 1.79 and US dollars 25 due to treatment measures (Leighton and Foster 1993, Evans et al 1997, Kirigia et al 1998, WHO 2002, Kioko, 2007).

Statement of Problem

The economic impact of malaria on countries, households and individuals is increasingly becoming a subject of considerable interest. Emerging evidence from macro-economic studies indicate that malaria endemic countries stand to lose billions of dollars in national income due to the impacts of morbidity and mortality from the disease on labour supply. In Nigeria, malaria has been shown to account for over 40% of the total monthly curative healthcare costs incurred by households compared to a combination of other illnesses, the cost of treating malaria and other illnesses depicted 7.03% of the monthly average household income, and treatment of

malaria cases alone contributed 2.91% of these costs (Onwujekwe *et al* 2013). Households spending on malaria can be classified into expenditure on prevention and expenditure on treatment.

Individual or household direct cost of malaria treatment include direct payment for drugs, consultation, laboratory tests, transportation fees to and from the facility (Asenso-Okyere *et al*, (1997) while the indirect cost is the productive time lost due to malaria. Despite its devastating health effects, empirical evidence of the economic impact of the disease on households in Port Harcourt South-South Nigeria, remain largely unknown aware. Effective control programme requires a clear understanding of the economic burden of the disease to guide resource allocation across the various activities of the programme. This study fill the knowledge gap that exists concerning the economic burden of malaria at the household and individual level in Port Harcourt, Rivers State, South-South, Nigeria. Hence the general objective of paper is to evaluate the economics of health care in terms of cost in the treatment of malaria infections by households.

II. Conceptual Review

Economics of Health

All health decisions involve economic considerations. As such there is a marriage between health and economics. Most economic decisions take enormous toll on the finance of a whole family or household income, sometimes keeping them poorer than the burden of the disease itself. Reducing the burden of avoidable illness and disability will reduce the human and economic cost imposed on populations (Nwankwo, 2004). The fact that public health and economic prosperity is a two way street is made clearer in president Franklin Roosevelt's new Deal – the Panoply of social and economic programmes enacted between 1933 and 1938 in the United State of America (USA) and credited with pulling the country out of the great depression, has been decrypted as a massive public health program. Corroborating this viewpoint Clearance James Gamble (1894 - 1966), Professor of Economics and Social Demography at Harvard School of Public Health has shown that wealth makes health, and health makes wealth showing that healthier people are more productive and less likely to cost health dollar (Bloom, 2011; Gutman 2014).

Shirley Johnson–Lans in the book: A health economics Primer (2006) made sterling revelation; health economics as paralleling a rise in popular interests, becoming a pivotal area of research and policy. This discipline according to her is concerned with value, more specifically with maximizing well-being in a world where choices must be made about the allocation of scarce resources. Prices are important both as indicators of value or willingness to pay on the demand side, and of the cost of production on the supply side, cost-effectiveness of treatment and use of cost benefit analysis in decisions, consumer price index (CPI), quality adjusted year life measurement. These are good reason for this discipline in problem solving in medicare including physician visits, care in hospitals and clinics, laboratory tests, the use of pharmaceuticals, and long-term nursing care at home or in an institution, treatment of both mental and physical illness, and more broadly constructed alternative non-western forms of healing as well (Johnson-Lans 2006).

Health Economics and Poverty: The association between poverty and ill-health are bi-directional. Ill-health is a major contributor to individual and community poverty. The ill are unable to contribute maximally to the economic and social development of the communities in which they live, despite this decreasing productivity, they must also require resources for their care. Ill-health is a major pauperizing factor (Osibogun, 2014). The Osibogun equation emphasizes that cost of illness is beyond the cost of treatment, individuals, families and communities are sent to poverty and are kept there.

The Osibogun Equation, Ill-health and Poverty

CI = CT + CTB + COF + SC + COPM (where Cl = cost of illness, CT = Cost of treatment, CTB = Cost of treatment seeking behaviour, COF = Cost of opportunities forgone, SC = Social costs, and COPM – Cost of pain and misery). Investing in health should therefore make sound economic sense as part of that investment if properly applied would save costs that can be incurred due to illness (Osibogun, 2014, Russell, 2004). Conventional economics conceptualizes and measures poverty in terms of income and expenditure (consumption). Using this approach, the economic burden of illness can be measured using two related indicators:

i. Healthcare expenditure as a proportion of household income (direct cost burden) (Russell, 1996). Recent studies have clarified healthcare payment above 10% (percent) of income as catastrophic for households, assuming that above this threshold payments are likely to cause cuts to food consumption, debt and impoverishment (Prescott, 1999). A more refined indicator changes the income denominator to that remaining after basic consumption needs have been met (capacity to pay). A healthy expenditure burden greater that 40% percent) or 50% (percent) of capacity to pay is assumed to be catastrophic for household (WHO, 2000).

ii. Production and income loss caused by illness as a proportion of normal income, indirect cost burden. The asset portfolios at peoples disposal, including policy derived resources and less tangible assets like social relationships also influences their ability to cope, or their vulnerability or resilience to shocks such as illness.
iii. Asset portfolios and coping processes
iv. Livelihood outcomes

WHO handbook defined Total costs to consist of direct medical costs (ie administration costs, laboratory tests, X-ray examinations, drug costs, hospitalization costs, and adverse drug effects costs), direct non-medical costs (ie transportation, food and the costs of food supplements) and income loss (WHO 2017).

Malaria Treatment

World Health Organization (WHO) in its 2015 publication: Guidelines for the treatment of malaria, third edition listed core principles in the treatment of malaria used by the guidelines development group: (a) Early diagnosis and prompt, effective treatment of malaria – uncomplicated falciparum malaria can progress to severe forms of the disease, especially in the people with no or low immunity, and severe falciparum malaria is almost always fatal without treatment.

(a) Programmes should ensure access to early diagnosis and prompt effective treatment within 24 – 48 hours of the onset of the malaria symptoms.
(b) Rational use of anti-malaria agents: To reduce the spread of drug resistance, limit unnecessary use of anti-malaria drugs and better identity other febrile illness in the context of changing malaria, epidemiology, anti-malaria medicines should be administered only to patients who truly have malaria. Adherence to full treatment course must be promoted. Universal access to parasitological diagnoses of malaria is now possible with the use of quality-assured rapid diagnostic tests (RDTs), which are now also appropriate for use in primary health care and community settings.
(c) Combination therapy – preventing or delaying resistance is essential for the success of both national and global strategies for control and eventual elimination of malaria. To help protect current and future anti-malaria medicines, all episodes of malaria should be treated with at least two effective anti-malaria medicines with different mechanisms of action (combination therapy).
(d) Appropriate weight – based dosing: To prolong their useful therapeutic life and ensure that all patients have an equal chance of being cured, the quality of anti-malaria drugs must be ensured and anti-malaria drugs must be given at optimal dosages. Treatment should maximize the likelihood of rapid clinical and parasitological cure and minimize transmission from the treated infection. To achieve this, dosage requires should be based on the patients weight and should provide effective concentrations of anti-malaria drugs for a sufficient time to eliminate the infection in all target populations.

The WHO (2015) guidelines further recommended the following: (a) diagnosis of malaria: All cases of suspected malaria should have a parasitological test (Microscopy or Rapid diagnostic test (RDT) to confirm the diagnosis both supported by a quality assurance program (b) treating uncomplicated P. falciparum malaria: treat children and adults with uncomplicated P. falciparum malaria (except pregnant women in their first trimester) with one of the following recommended artemisinin – based combination therapies (ACT):

- Artemether + Lumefantrine
- Artesmuate + amodiaquine
- Artesunate + mefloquine
- Dihydroartemisinic + piperaquine
- Artesunate + sulfadoxine – pyrimethamine (SP)

Theoretical Review

In this paper, the interdependence between the economy and health is highlighted and the main theory in health economics is well analyzed. The paper is hinged on the neoclassical model and the agency theory. According to the neo-classical theory, the decisions we make as individuals, a nation or even as entities, considered as rational choices, are controlled by market interaction through the forces of demand and supply also known as market exchanges. On the other hand, the agency theory permits the presentation of elements that help in economic policy making and to smooth the interrelationship between principal of health institutions and the health workers. These two different theoretical approaches complement each other in explaining the operations and management of the health care sector. However, the theoretical progress in the field of health economics are still inadequate in terms of the generation of new knowledge by research, which mainly concerns the regulation and organization of the health care system (Khaldi & Arib, 2022).

Empirical Reviews

Piabuo et al (2017) carried out a study on health expenditure and economic growth a review of the literature and an analysis between the economic community for Central African States (CEMAC) and selected African countries. Data for their study was obtained from the World Development Indicators (2016) database and the panel, fully modified/dynamic ordinary least square were used as econometric techniques of analysis. Findings showed that health expenditure has a positive and significant effect on economic growth in both samples as a unit change in health expenditure can potentially increase GDP per capita by 0.38 and 0.3 units for the five other African countries that achieve the Abuja target and CEMAC countries respectively.

Ukpai, *et al* (2023) evaluated the economic burden of malaria infection on households in Nigeria employing a correlation survey research design. Results indicate a significant positive correlation between economic burden measures using direct and indirect costs of malaria treatment and the disposable income as well as high poverty rate of the surveyed households in Rivers State Nigeria. Findings show a correlation between direct and indirect cost of treating malaria and high rate of poverty as well as reduction in dispensable income of surveyed households

People's ability to access healthcare at low cost is central to reducing poverty as well as improving health. Cost burdens of healthcare may deter or delay healthcare utilization or promote use of less effective healthcare sources or practices – particularly by the poor, becoming ineffective in reaching the poor, generate less benefit for the poor than the rich and impose regressive cost burdens example, poor households more frequently opted for care outside the modern sector than better off households, cost of malaria treatment as well as distance to health facilities, are significant barriers to access for poor households. Policy makers need to better understand patient barriers to accessing and using treatment which include the economic burdens that both diseases impose on poor household budgets and their ability to work (Worrall *et al* 2003 & Sauerborn *et al*, 1996).

The average expenditure to treat malaria was $22.9, which was all incurred through out of pocket payments. Some reported using health insurance. It was found that use of household savings, (79.5%) followed by reduction in other household expenses (22.5%) were the most common coping methods. The reduction of other household expenses was significantly more prevalent with the average (QH) socio-economic status group ($P < 0.05$), indicating catastrophic nature of malaria treatment expenditure. Chima also reported the use of weak data in calculating the indirect costs which fail to account for seasonal variation, the difference between the average and marginal product of labour and the ways households and firms cope in response to episodes (Chima, *et al* 2003).

In Owujekwe (2010) in Nigeria, the average cost to treat a case of malaria was 79.5 naira ($6.64) for adults and 789.0 naira ($6.58) for children. The monthly malaria treatment expenditure as a proportion of monthly household non-food expenditure was 7.8%, 8.5% and 5.5% and 3.9% for the most poor, very poor, poor and least poor socio-economic status group. Malaria treatment also accounted for 7.1% and 5.0% of non-food expenditures for rural and urban dwellers, respectively and more than 95% of the people financed their treatment through out-of-pocket payment (OOP), with no socio-economic group and rural-urban variance as opposed to insurance payment mechanisms and free exemptions (Onwujekwe *et al.*). Studies indicate that most health related expenditures were between 2.5% and 7.0% of household income and few estimated the cost burdens for households to be above 10%. Income analyst assume that 10% cost burden is likely to be catastrophic for household economy though may not be for high income households that can cut back on luxuries or those that can mobilize assets and social networks to pay for treatment (Prescott, 1999, Russel 1996). A large proportion of spending on malaria goes towards pharmaceuticals which account for 62% of direct cost for mild malaria and 70% for severe malaria (Aspensi-Okyere & Dzator, 1997) in study in Ghana. Transport cost for seeking malaria treatment are also significant, particularly for rural population, needing long distances and this accounts for 22% of direct cost of malaria in Sri Lanka and 14% in Ghana.

Health economists, welfare economists and development scholars have in the past attempted to identify costs using three main approaches namely. (1) production function approach (2) cost of illness approach (COI) approach and (3) contingent valuation method (CVM). Rolle, *et a*l 2018) have used the production function approach to identify economic burden of malaria' identifying using regressive analysis that malaria affect productivity and labour, increased health expenditure and school enrolment negatively.

Cost of illness (COI_ approach has also been used in several studies, estimating the treatment cost of malaria including relevant diagnostic tests in an accounting sense using direct costs, intangible (indirect costs) and institutional cost of malaria treatment (Fonta, 2006). In the use of cost of illness (COI) approach as exemplified by Onwujekwu et al study of household and the health system in Enugu state, South East Nigeria, the average cost of malaria treatment was identified as between $12.57 and $23.2 for out patients and inpatient respectively (Onwujekwe, *et al* , 2000).

III. Methodology

The study is a cross sectional survey. Thus a correlation survey research design was adopted to investigate key aspect of the study. The population of the study comprises male, female, adult and children in household in Port Harcourt City Local Government, Obio/Akpor Local Government and Eleme Local Government. The study locations were purposely and randomly selected to reflect geographical spread of population within Port Harcourt metropolis and surroundings with its hub of activities, environmental peculiarities, and holoendemicity of malaria episodes and this agrees with the World Health Organizations guidelines. The field work was carried out intermittently between April 2022 and June 2023. The technique employed involved bench work, questionnaire, oral interview and participant observation. The questionnaire was produced and distributed during world malaria day in April 25, 2022 and, at world diabetes day, 14 November 2022 and at various health centres from December 2022 to June 2023.

Sampling the Population

The sample size of the population was determined using the Taro Yamani formula for sample determination in smaller population

$$n = \frac{N}{1 + N(e)^2}$$

where n = Sample size
N = Population
I = A constant
e = Margin of error test of significance

$$n = \frac{2{,}200}{1 + 2{,}200(0.05)^2} = 338$$

Target population of patients was 2,200 and the sample size of 338 was used for the study. The sample size represents 15.4% n (approx.) of the target population.

Validity and reliability of the instrument

The study adopted the test and retest method. This involves first administering 20 copies of the questionnaires to 20 patients and others. After an interval of two weeks, the researcher re-administered the same instrument to the same 20 patients and others. Thus the instruments are reliable and were validated by team of experts and a cronbach alpha score of 0.71.

IV. Results And Analysis

Table 1 - Expenditures on malaria treatment

S/N	QUESTIONNAIRE	FREQUENCY	PERCENTAGE
	ECONOMIC BURDEN OF MALARIA IN HOUSEHOLDS		
1.	Which one of the malaria drugs do you use for your household healthcare?		
	Arthemeter-Lumefatrine (ACT)	145	42.8
	Sulphadoxine – Pyremethanine (SP)	85	25.1
	Others	30	8.8
	Missing data	78	23.0
2.	How much do you spend monthly to access Malaria Treatment?		
	N2,500 – N4000	40	11.8
	N5,000 – N10,000	85	25.1
	N11,000 – N15,000	77	22.7
	N16,000 – N20,000	60	17.7
	N20,000 – Above	35	10.3
	Missing Data	41	12.1
3.	Estimate the percentage of your income spent on accessing malaria treatment		
	1 – 4%	55	16.2
	5 – 9%	96	28.4
	10 – 14%	54	15.9
	15 – 19%	40	11.8
	20 – Above	23	6.8
	Missing Data	70	20.7
4.	Which of these do you spend more money on regarding Malaria		

	treatment?		
	Malaria Medicines	104	30.7
	Laboratory tests	85	25.1
	Hospital visits	24	7.1
	Health caregivers consultation	31	9.1
	Return visits from clinics	22	6.5
	Missing data	72	21.3
5.	Other Costs Involved In Accessing Care Services In Course Of Malaria treatment		
	Special diets	56	16.5
	Relatives true caring	62	18.3
	Farm, office, general time lost	180	53.2
	Recreation and spiritual time	34	10.0

Findings show that the commonest malaria drugs used by patients within this survey period isArthemeter-Lumefatrine (ACT) as it accounts for about 43% of the respondents. Over 47% of the respondents spent between N5,000 to N15,000 each month for the treatment of malaria and that represents between 5 to 15% of most respondents annual income and over 56% of the expenditure is on purchase of malaria drugs and laboratory tests. Besides, other costs involved in accessing health care services for the treatment of malaria include but not limited to special diet, farm, school, office, recreation , spiritual and general time lost and other intangible (indirect) costs

Statement of hypotheses

H_{0i}: There is no significant relationship between household spendable income and cost of treating malaria.
H_{02}: There is no significant relationship between high mortality rate and cost of malaria by households..
To test the stated hypotheses, economic burden was measured using household spendable income and mortality rate were correlated with household expenditure on malaria treatment.

Table2: Correlations

			HIS	MTC
Spearman's rho	House hold Spendable Income (HIS)	Correlation Coefficient	1.000	.774**
		Sig. (2-tailed)	.	.000
		N	282	268
	Malaria treatment costs (MTC)	Correlation Coefficient	.774**	1.000
		Sig. (2-tailed)	.000	.
		N	282	268

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Correlations

			MRS	MTC
Spearman's rho	Mortality rates (MRS)	Correlation Coefficient	1.000	.611**
		Sig. (2-tailed)	.	.000
		N	282	268
	Malaria treatment costs (MTC)	Correlation Coefficient	.611**	1.000
		Sig. (2-tailed)	.000	.
		N	282	268

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: Correlations

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Standard Error	Beta		
Constant : HIS	13241.515	34371.2		3.12	0.001
MTCs	0.538	0.1	0.611	5.485	0.000
Constant: MRS	68.15	262.115		.347	.604
MTCs	0.006	0.001	.636	6.410	0.000

a. Dependent variable: HIS, MRS
b. Cost of treating malaria

V. Summary Of Findings And Conclusion

Table 2 shows the effect of cost of treating malaria on the spendable income of households. A correlation of 0.774 suggests the existence of a strong nexus between the explanatory variable (cost of treating

malaria) and the criterion variable (household spendable income). The cost of malaria treatment has a calculated t-values of 5.485 with a corresponding p-value of 0.000 < 0.05 (alpha level of significance). Hence the findings lead to the rejection of the null hypothesis with the conclusion that the cost of treating malaria has a significant effect on Rivers State household spendable income.

Table 3 shows the effect of cost of treating malaria on mortality rate of households. A correlation of 0.611 suggests that a strong association exists between the explanatory variable (cost of treating malaria) and the criterion variable (mortality rates among households). Expenditure on malaria treatment has a calculated t-values of 6.410 with a corresponding p-value of 0.000 < 0.05 (level of significance). Hence the findings lead to the rejection of the null hypothesis with the conclusion that the cost of treating malaria has a significant effect on high mortality rates among Rivers state households in Nigeria.

This study supports the findings made by Ukpai, Okoronkwo and Osirim (2023) that there are significant positive relationships between economic burden (direct and indirect costs) of treating malaria infection and the disposable income as well as high rate of poverty of the sampled households in Rivers State, Nigeria.It further confirms that the treatment of malaria infection will not only affect the spending income of households but it could equally increase their rate of poverty and mortality. This outcome corroborates the assertion of Russel, 2004 and 2005 that ill-health can cause household impoverishment through income losses and medical expenses that trigger a spiral of asset depletion, indebtedness and cuts to essential consumption. The implication of these results is that the country's goal of eliminating the incidence of poverty and high mortality rates will not be achieved unless effective malaria control programmes are put in place.

VI. Recommendations

The study identifies and recommends based on our findings the need for government to rethink quality health care delivery in Nigeria by escalating its efforts in malaria eradication through intentional and well-thought-out public health intervention, which could help to reduce households' risk of contacting malaria infection. This could be complemented with a focused universal health coverage, national health insurance and free malaria treatment for households. In addition, government is called upon to strengthen the health system in Nigeria and to provide effective leadership as avenue to mitigate the huge economic burden of malaria treatment faced by households in Nigeria.

Ethical Issue and Conflict of Interest: The authors hereby declare that there is no ethical issue and conflict of interest in this paper.