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DETERMINANTS OF HEALTH-RELATED QUALITY OF LIFE (HRQOL) IN ADULT PATIENTS UNDERGOING ANTI-MALARIAL TREATMENT AT A SECONDARY HEALTHCARE FACILITY IN ILORIN, NIGERIA

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ABSTRACT

This study aimed to evaluate the health-related quality of life (HRQoL) and related factors among patients receiving antimalarial treatment at a General hospital Ilorin (GHI). Participants were drawn after a sample size of 291 participants were calculated. An EQ-5D-5L, EQ-VAS instrument was used to collect the data (from July to September 2023). Informed consent was obtained from all participants, and Ethical approval was obtained from Ministry of Health Ethical Research Committee (ERC) and Ethical Review and Research Committee of General Hospital Ilorin (GHI) with assigned number: ERC/MOH/2023/07/130 and GHI/ADM/134/VOL.I/081 respectively. Of the 291 participants included, 182 (62.5%) were female, and 109 (37.5%) were male. Most of the participants were aged 18–24 years (93; 32%), had tertiary education (195; 67%), and had low incomes, earning less than ₦3,000 (126; 43.3%). Also, a significant majority lacked health insurance (211; 72.5%). The most commonly used treatment was Artemether/Lumefantrine (281; 96.6%). The mean EQ-5D utility scores and EQ-VAS scores were 0.74 ±0.152 and 67.17±19.48 respectively. The EQ-5D descriptive system had 11111 as the health state of majority of participants 89(30.6%) followed by 11121 (19)6.5%, both states having utilities of 0.9 and 0.646 respectively. Sixty-three-point six percent of participants had problem in the pain and discomfort domain. The results of multivariate regression analysis showed marital status (p=0.005) and family history (p= 0.004) of any disease correlated with EQ-5D-5L index score (Health state). These variables contributed approximately 58.93% and 41.07% respectively to the EQ-5D index score of patients. The findings indicate that malaria patients in this study generally reported a good health-related quality of life. Most participants experienced minimal problems across domains except for pain/discomfort Socio-demographic factors such as marital status and family history of disease had significant influence on HRQoL, suggesting that social support and underlying health vulnerabilities play crucial roles in patients' well-being. Overall, malaria's impact on HRQoL extends beyond clinical symptoms,

underscoring the need for patient-centered care that addresses both physical and psychosocial factors.

Keywords: EQ-5D-5L, EQ-VAS, HRQoL, Malaria fever, Nigeria, Quality of life

INTRODUCTION

Malaria is the most common parasitic disease in the tropical zone (Akogun, 2008). The parasitic disease malaria, which can be fatal, is caused by Plasmodium protozoa. According to Abeysinghe (2017), the five distinct species that have been related to human infection are *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae,* and the zoonotic *Plasmodium knowlesi,* which is widespread in south-east Asian nations. The most frequent cause of severe malaria worldwide is *Plasmodium falciparum*. The female Anopheles mosquitoes that carry the disease bite humans and transmit it to them (Hawbani, 2021). Anopheles gambiae, Anopheles arabiensis, Anopheles moucheti, and Anopheles funestus are the four main malaria vectors involved in transmitting the parasite in Nigeria (Sinka *et al.,*2012; Akpan *et al.,*2018). Malaria is a disease spread by mosquitoes that result in fatigue, fever, and chills. Although there are several antimalarial medications available for the treatment of malaria, severe forms of the disease continue to be a major health concern that can be fatal (Hawbani, 2021).

Globally, malaria is a serious public health issue (Ezebialu *et al.,* 2012). Malaria is an endemic illness that affects Nigeria and is a major public health issue, particularly in sub-Saharan Africa, as it carries about 80% burden of the disease (WHO, 2017). According to the World malaria report, the statistics suggests that there were 247 million cases of malaria across the world in 2021 and estimated number of deaths recorded from malaria cases in 2021 is 619,000 (WHO, 2022). In Nigeria there were 68 million cases of malaria and 194, 000 death cases estimated in 2021. Nigeria has one of the highest prevalence of malaria globally accounting for about 22% of the global malaria burden (Adejoro L. (2022).

HRQoL is characterized as, "those components of self-perceived wellbeing that are related to or altered by the presence of disease or treatment" (Karimi and Brazier, 2016). The phrase "to identify the sub-set of the important or most common ways in which health or health care impact upon well-being" is used to describe HRQoL in a more specific mann er on occasion (Peasgood *et al.,* 2014). It may relate to “values attributed to various health conditions.” These quantities, also known as utilities, are used to compute QALYs and assess the advantages of health technologies (Karimi and Brazier, 2016).

Health-related quality of life (HRQoL) measurement approaches typically incorporates two fundamental concepts: subjectivity and multidimensionality. Subjectivity ensures that the affected individual's perspective is taken into account, while multidimensionality acknowledges that a comprehensive understanding of the impact of illness and treatment necessitates assessing various essential life domains. These domains comprise at least three broad categories: physical, psychological, and social functioning, all of which can be influenced by disease and/or treatment. Consequently, two primary sets of instruments are employed to measure HRQoL. One group is generic HRQoL measures which ask questions that are usually general enough to

apply to almost everyone (Patrick and Erickson 1993).

About eight billion euros are spent annually on malaria-related costs in African nations (WHO, 2022), which pose a significant barrier to the growth of the human population and economy (Damme-Ostapowicz *et al.,* 2012). Through escalating poverty, reducing educational possibilities, and increasing absenteeism from job and school, malaria affects the affected population's entire quality of life (Ouattara *et al.,* 2011). The concept of quality of life is highly helpful for processes of improving health, treatment, and holistic care, as well as for processes of rehabilitation.

Studies on quality of life emphasize that the patient's somatic state, mental status, social relationships, and physical fitness should all be taken into consideration throughout the evaluation. For a great quality of life, having good physical and mental health is essential (Addington-Hall and Kalra, 2001).

Studies has shown that malaria negatively affects health-related quality of life (HRQoL) by reducing physical functioning, causing pain and discomfort, limiting social participation, and affecting mental well-being (Andrade et al., 2024, 2025). The impact of malaria on HRQoL can be measured using generic tools such as the SF-36 and EQ-5D-5L, as well as malaria-specific questionnaires, which capture these multidimensional effects (Jimam, Ismail, & Dayom, 2020; Makatita et al., 2019).

Ilorin, Nigeria, is a good location for studying the health-related quality of life (HRQoL) of malaria patients for several reasons. The city has year-round malaria transmission, making it a holoendemic area with a high rate of infection (Ojurongbe et al., 2011). Ilorin also has people from different social and economic backgrounds, education levels, and ethnic groups, which makes it suitable for understanding how malaria affects people in diverse situations (Aderamo, 2012; National Population Commission [NPC] & ICF, 2021).

The city also has strong research and healthcare facilities, including the University of Ilorin and the University of Ilorin Teaching Hospital (UITH), which provide access to health data and research support (Federal Ministry of Health [FMoH], 2021; UITH, 2023). In addition, malaria remains one of the leading health problems in the region, emphasizing the need to study how the disease affects people's quality of life (World Health Organization [WHO], 2023).

Considering the paucity of empirical data on HRQoL assessments in adult malaria patients in Nigeria, the aim of this study is to strengthen the current evidence-base and evaluate the Health-Related Quality of Life among Malaria Patients attending General Hospital Ilorin, Kwara State.

METHODOLOGY

Study Setting

This study was conducted in Ilorin, the capital of Kwara State in the North-Central geopolitical zone of Nigeria. As of the 2012 census, the population of Ilorin was officially recorded at 1,084,681, with a notable annual growth rate of 3.22%. The city spans an area of 765 square kilometres and is geographically situated at coordinates 8º30´N latitude and 4º32´E longitude.

The General Hospital Ilorin boasts a multidisciplinary team of specialists and 600 bed spaces, providing comprehensive care to patients from Kwara and neighbouring states, including Oyo, Osun, and Kogi. Previously serving as a temporary site for the University of Ilorin Teaching Hospital,

this well-equipped secondary health facility is strategically located in the Ilorin West Local Government Area, with geographical coordinates 8º32´14.298´´N and 4º38´50.327´´E."

Study Population

The study population consisted of outpatient individuals aged 18 years and older, who had confirmed malaria fever diagnoses, were receiving treatment, and had provided voluntary verbal and written informed consent. Exclusion criteria comprised inpatient status, pregnancy, lactation, and negative malaria test results

Sample Size

Sample size was determined using the following formula (Pourhoseingholi, 2013),

$$n = \frac{Z^2P(1-P)}{d^2}$$

Isiko et al. (2021) reported a malaria prevalence of 0.22 (22%), which is used as the assumed prevalence in this study.

At 95% Confidence interval d=0.05 at Z score of 1.96

$$n = \frac{Z^2P(1-P)}{d^2}$$

$n = 1.96^2 \times 0.22 \times (1-0.22) / 0.05^2$

$n = 263.6$

$n = 264$

Adjusting for the non-response rate at 10%

$n = 264 \times 10\%$

$n = 26.4$

$n = 264 + 27$

$n = 291$

Study design, sampling technique and data collection tools

The study employed a cross-sectional design, with participants recruited through convenient sampling. The EQ-5D-5L instrument developed by EuroQoL group was applied in this study (EuroQoL group, 2018). The questionnaire contains three parts: Sociodemographic characteristics (sex, age, marital status, educational level, religion, employment status, monthly income, family history of any diseases, other health problems, health insurance, anti-malaria drug of choice for treatment). EQ-5D-5L tools to assess health-related quality of life (Buchholz *et al.,* 2018). The EQ-5D-5L includes five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression), each with five levels to define possible health states (no problems, slight problems, moderate problem, severe problem, inability to/extreme problems) Each component of HRQoL has five possible score option (1, 2, 3, 4 and 5). A patient's response “I have no problem” on each component was scored as 1, a patient's response “I have slight problems” was scored as 2, a patient's response “I have moderate problems” was scored as 3, the patient's response “I have severe problems” was scored as 4 and the patient's response “inability to/extreme problems” was scored as 5. The score was used to generate a single utility score ranging from 0-1 for each respondent.

The single utility score was generated using weights determined from temporal trade-off utilities in a Zimbabwean population since Nigeria does not have a country-specific weight. Zimbabwean utility weights were selected for this analysis because Zimbabwe and Nigeria have similar health state characteristics. Both nations have comparable health conditions to low-income nations (Polin *et,al* 2021). For example, for a patient that has the health state of 11111, single utility score was computed using Zimbabwean utility weights as shown in table I.

Table I: Computation of a Single Utility Score from Zimbabwean Utility Weights

Dimension	Level	Zimbabwean utility weights	Weight (decrement)	Explanation
Mobility (MO)	**1**	**0.00**	**0.00**	**No problems**
Self-Care (SC)	**1**	**0.00**	**0.00**	**No problems**
Usual Activities (UA)	**1**	**0.00**	**0.00**	**No problems**
Pain/Discomfort (PD)	**1**	**0.00**	**0.00**	**No problems**
Anxiety/Depression (AD)	**1**	**0.00**	**0.00**	**No problems**
Constant	**—**		**0.10**	**Fixed subtraction applied to all states**

Utility score = 1- (sum of decrements+ Constant) 1-0.1=0.900

Part three contained the EQ-VAS which was used to assess how good or bad the patients' health was on that day. The scale is numbered from 0 to 100 of which "0" represent the "worst imaginable health state" and "100" represent "best imaginable health state." Validated, standardized, and structured questionnaires were administered by interviewers for data collection.

Data Collection Procedure

The compiled questionnaire, which comprised the informed consent form, socio demographic data form, the EQ-5D-5L instrument and EQ-VAS questionnaire, was administered to patients at the point of exit from the physician's consultation. For participants who were unable to read or write, the questionnaire was administered through an interviewer-assisted approach to ensure accurate responses. Data collection was conducted daily at the General Outpatient Department (GOPD), where well-trained research assistants were present to administer the questionnaires to eligible patients and provide necessary clarifications.

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (version 27). Descriptive analysis included mean, standard deviations and frequencies, which were used to analyse socio-demographics of patients, EQ-5D-5L descriptive system, EQ-5D-5L index scores (utility), and EQVAS. Independent t-test was used to find the relationship between utility score and EQ-VAS. Chi-square test was performed to analyse cross tabulation between patient socio-demographics and EQ-5D-5L descriptive system. Correlation between socio-demographics and utility score used pearson's correlation. Influence of socio-demographic on HRQoL were explored using multivariate regression analyses. The level of significance (α) was set at $P<0.05$

Ethical Approval

At the stage of data collection, informed oral and written consent were taken from respondents and the participants were assured that their participation would be

recorded anonymously. Participants were informed of the purpose of the study, they were also informed that the data will be used only for research purposes and kept confidentially.

Ethical approval was obtained from Ministry of Health Ethical Research Committee (ERC) and Ethical Review and Research Committee of General Hospital Ilorin (GHI) with assigned number: ERC/MOH/2023/07/130 and GHI/ADM/134/VOL.I/081 respectively

RESULTS

Socio-demographic and Clinical characteristics of the Study Population

The study population consisted of 291 patients, 109 (37.5%) were Males and 182(62.5%) were Females. Age group 18-24 years had the highest frequencies of 93 (32%). Forty-four (15.1%) of the participants had secondary level education while 195 (67.0%) had tertiary education. Majority of the respondents are married 50.8%), were self-employed (43.0%), had income below #30,000 (43.3%), were not on health insurance (72.5%) were on Artemether- Lumefantine (96.6%) respectively, as shown in Table II.

Table II: Socio-demographic Characteristics and Treatment Information of Patients with Malaria Fever attending General Hospital Ilorin (n=291)

Demographic Characteristics	Number of Patients (%) (N = 291)	p-value
Sex		0.001
Male	109 (37.5)	
Female	182 (62.5)	
Age		0.002
18-24 years	93 (32.0)	
25-34 years	54 (18.6)	
35-44 years	45 (15.5)	
45-54 years	52 (17.9)	
55-64 years	33 (11.3)	
65-70 years	12 (4.1)	
>70 years	2 (0.7)	
Marital		0.003
Single	120 (41.2)	
Married	148 (50.9)	
Divorced/Separated	7 (2.4)	
Widow/Widower	16 (5.5)	
Educational Status		0.002
Informal Education	18 (6.2)	
Primary Education	34 (11.7)	
Secondary Education	44 (15.1)	
Tertiary Education	195 (67.0)	
Religion		0.000
Christianity	132 (45.4)	
Islam	158 (54.3)	

African Traditional Religion	1 (0.3)	
Employment Status		0.002
Employed	84 (28.9)	
Self-Employed	125 (43.0)	
Unemployed	82 (28.2)	
Monthly Income		0.0030
Low (below #30,000)	126 (43.3)	
Lower middle (#30 000 to < #100 000)	97 (33.3)	
Upper middle (#100 000 to < #200 000)	49 (16.8)	
High (Above #200,000)	19 (6.5)	
Family History of Any Disease		0.431
Yes	41 (14.1)	
No	193 (66.3)	
I don't know	57 (19.6)	
Other Health Problems		0.0001
Yes	34 (11.7)	
No	210 (72.2)	
I don't know	47 (16.2)	
Health Insurance		0.0001
Yes	80 (27.5)	
No	211 (72.5)	
Treatment Medications		0.0001
Artemether-Lumefantrine	281 (96.6)	
Artesunate-Amodiaquine	1 (0.3)	
Artesunate-Mefloquine	2 (0.7)	
Dihydroartemisininpiperaquine	3 (1.0)	
Artesunate Plus Sulfadoxine-Pyrimethamine	4 (1.4)	

Statistical analysis was Chi-square (χ^2), level of significance $p<0.05$

MeanEQ-5D Index and EQ-VAS scores of patients

The Mean EQ-5D utility scores and mean EQ-VAS scores were 0.74 ±0.1525 and 67.17±19.481 summarized on table III.

TABLE III: Mean EQ-5D Index and EQ-VAS Scores of Patients with Malaria Fever attending General Hospital Ilorin (n=291)

	Mean	Standard Deviation
EQ-5D Index Score	**0.74**	**0.1525**
EQ-VAS Score	**69.17**	**19.481**

EQ-5D Index Score: Represents the overall health-related quality of life (HRQoL), ranging from **0 (worst health state, equivalent to death) to 1 (perfect health)**. Higher scores indicate better quality of life.

EQ-VAS (Visual Analogue Scale) Score: Reflects the respondent's self-perceived health status on a **0–100 scale,** where **0** *denotes the* **worst imaginable health** and **100** denotes the **best imaginable health.**

The EQ-5D Score and VAS Score based on Socio-demographic Groups

The EQ-5D score and VAS score based on socio-demographic groups are presented in table **IV**.

Some of the groups showed significantly different p values for EQ-5D and EQ-VAS scores such as age group (EQ-5D 0.00, EQ-VAS 0.031) marital status (EQ-5D 0.000, EQ-VAS 0.002), and educational status (EQ-5D 0.000, EQ-VAS 0.033)

Table-IV: The EQ-5D score and VAS score based on socio-demographic groups of patients with Malaria Fever attending General Hospital Ilorin (n=291).

	Utility Score			EQ-VAS		
	Mean	**(SD)**	**p-value**	**Mean**	**(SD)**	**p-value**
Sex						
Male	0.728	0.141	0.198	69.246	9.217	0.960
Female	0.751	0.156		69.126	9.690	
Age						
18-24 years	0.801	0.131	0.000	74.656	0.852	0.031
25-34 years	0.742	0.182		69.126	1.350	
35-44 years	0.721	0.128		67.489	7.093	
45-54 years	0.728	0.138		65.423	7.820	
55-64 years	0.681	0.119		65.909	2.403	
65-70 years	0.647	0.102		59.917	7.891	
>70 years	0.512	0.549		60.001	6.569	
Marital Status						
Single	0.791	0.151	0.000	74.117	1.461	0.002
Married	0.723	0.136		66.181	7.203	
Divorced/Separated	0.594	0.100		57.143	5.236	
Widow/Widower	0.6229	0.161		65.000	7.889	
Educational Status						
Informal Education	0.683	0.170	0.000	64.167	5.835	0.033
Primary Education	0.694	0.145		64.382	8.314	
Secondary Education	0.680	0.120		64.455	5.194	
Tertiary Education	0.771	0.149		71.532	0.497	
Religion						
Christianity	0.758	0.152	0.146	71.235	0.350	0.089
Islam	0.729	0.149		67.278	8.541	
African Traditional Religion	0.900	0.000		95.800	0.000	
Employment Status						
Employed	0.735	0.140	0.165	66.095	9.306	0.114
Self-Employed	0.730	0.145		69.126	8.853	
Unemployed	0.769	0.168		72.390	0.307	
Monthly Income						
Low (below #30,000)	0.761	0.160	0.246	70.840	9.821	0.270
Lower middle (#30 000 to < #100 000)	0.729	0.144		68.485	8.716	
Upper middle (#100 000 to < #200 000)	0.739	0.137		69.184	9.432	
High (Above #200,000)	0.702	0.151		61.579	0.686	

Family History of Any Disease						
Yes	0.695	0.155	0.045	67.366	6.793	0.622
No	0.744	0.161		68.973	0.756	
I don't know	0.772	0.098		71.140	6.743	
Other Health Problems						
Yes	0.736	0.155	0.943	67.618	4.645	0.882
No	0.743	0.156		69.323	0.848	
I don't know	0.748	0.126		69.617	6.183	
Health Insurance						
Yes	0.740	0.131	0.877	72.660	17.523	0.060
No	0.744	0.158		67.848	0.054	

KEY: SD: Standard deviation. Test: independent t- test, Level of significance $p<0.05$

EQ-5D Descriptive System

Patients' responses to five dimensions of EQ-5D-5L descriptive system are called health states. In this study we found 113 types of health states, with the highest health state being 11111, with 89 respondents (30.6%), followed by health state 11121, with 19 respondents (6.5%). The utility value for health state 11111 was 0.900 and for health state 11121 was 0.846. [**Table-V**].

Table-V: Health state of patients with Malaria Fever attending General Hospital Ilorin (n=291).

Health Status	Health Utility	Number of patients	Percentage (%)
11111	0.900	89	30.6
11121	0.846	19	6.5
Other status		183	62.9

Health Status Score Indicates the level of problems reported across five dimensions: **mobility, self-care, usual activities, pain/discomfort, and anxiety/depression**. 1 = No problems 2 = Slight problems 3 = Moderate problems 4 = Severe problems 5 = Extreme problems/unable Example: *11111* = perfect health. **Health Utility Score:** Derived from the EQ-5D-5L health status; reflects **overall health-related quality of life** on a scale of **0 to 1**, where 0 = worst health state (equivalent to death) 1 = perfect health. Higher scores indicate **better perceived health and quality of life**.

Profile of Participants across Different Domains of EQ-5D

Table-VI presents the responses for each domain of EQ-5D, which includes mobility, self-care, usual activities, pain and discomfort, and anxiety or depression from the malaria patients. The result revealed there were few extreme cases across all five domains of quality of life, with the highest being self-care (3.1%), where the patients reported being unable to take care of themselves. "Usual activities" and "pain/discomfort" were the quality-of-life domains with the most reported problems among the malaria patients. Number of patients who reported of having problems was 46.4% for "mobility", 38.5% for "Self-Care", 50.9% for "Usual Activities", 63.6% for "Pain/Discomfort", and 38.5% for "Anxiety/Depression."

Table VI: Profile of Participants across Different Domains of EQ-5D for Patients with Malaria Fever attending General Hospital Ilorin (n=291).

Dimension	N	%	Response of having problem (%)
Mobility			
No problem	156	53.6	
Slight problem	71	24.4	
Moderate problem	46	15.8	46.4%
Severe problem	15	5.2	
Unable/Extreme	3	1.0	
Self-Care			
No problem	179	61.5	
Slight problem	74	25.4	
Moderate problem	23	7.9	38.5%
Severe problem	6	2.1	
Unable/Extreme	9	3.1	
Usual Activities			
No problem	143	49.1	
Slight problem	72	24.7	
Moderate problem	58	19.9	50.9%
Severe problem	13	4.5	
Unable/Extreme	5	1.7	
Pain/Discomfort			
No problem	106	36.4	
Slight problem	81	27.8	
Moderate problem	75	25.8	63.6%
Severe problem	25	8.6	
Unable/Extreme	4	1.4	
Anxiety/Depression			
No problem	179	61.5	
Slight problem	68	23.4	
Moderate problem	25	8.6	38.5%
Severe problem	13	4.5	
Unable/Extreme	6	2.1	

Pairwise Correlation between Treatment and HRQOL

The treatment utility score indicates a positive impact or benefit from the treatment, the utility score also suggests a positive impact, Therefore, the correlation matrix showed that there is a positive and significant relationship between treatment and health-related quality of life as shown on **Table-VII** below:

TableVII: Pairwise Correlation between Treatment and HRQOL for patients with Malaria Fever attending General Hospital Ilorin (n=291)

	TREATMENT	UTILITY SCORE (r)
Treatment	**1.000**	**0.037 (0.000)**
UTILITY SCORE (R)	**0.037 (0.000)**	**1.000**

KEY

The correlation coefficient (r = 0.037) indicates a weak but positive relationship between treatment and health-related quality of life (HRQoL). The p-value (0.000) shows that this relationship is statistically significant. This suggests that treatment has a positive, though minimal, effect on the quality of life of malaria patients.

Multivariate Regression Analysis

Multivariate regression analysis revealed that socio-demographic factors explained 17.8% of the variance in EQ-5D-5L index scores ($R^2 = 0.178$, $F = 6.069$, $p < 0.001$). Marital status ($p = 0.005$) and family history of disease ($p = 0.004$) were significant predictors of HRQoL, with marital status positively and family history negatively associated with EQ-5D-5L scores. Other socio-demographic factors, including age, education, religion, employment, income, health insurance, other health problems, and treatment type, were not significant (Table VIII).

Table VIII: Multivariate Regression for Patients with Malaria Fever attending General Hospital Ilorin (n=291).

Variables	Coefficients	SE	Beta	T	p-value
Age	972.328	591.570	0.150	1.644	0.101
Marital Status	3150.419	1109.738	0.234	2.839	0.005
Education Status	-98.608	750.891	-0.009	-0.131	0.896
Religion	-1812.853	1138.234	-0.089	-1.593	0.112
Employment Status	17.586	874.108	0.001	0.020	0.984
Monthly Income	-354.788	783.669	-0.032	-0.453	0.651
Family History Disease	-2894.696	990.466	-0.163	-2.923	0.004
Other Health Problems	-21.504	1080.720	-0.001	-0.020	0.984
Health Insurance	-725.213	1306.152	-0.032	-0.555	0.579
Treatment: Medications	89.941	975.802	0.005	0.092	0.927
(Constant)	22042.517	6060.540		3.637	0.000

R=0.422 R-square=0.178, R^2Ad= 0.149, F= 6.069, p-value=0.000

SE: Standard error; t: t-test; p-value: significance; R: multiple correlation; R^2: variance explained; R^2Adj: adjusted R^2; F: overall model significance; $p < 0.05$ indicates statistical significance.

DISCUSSION

The existing information on the use of the EQ-5D-5L scale on malaria patients in Nigeria is limited, despite the ongoing challenges posed by malaria in the country (Jimam, 2020). This study represents an effort in assessing the health-related quality of life (HRQoL) of individuals suffering from malaria in Nigeria using the EQ-5D-5L scale, specifically those attending General Hospital Ilorin, Kwara State. The insights gained from this study hold great potential for understanding how patients perceive the impact of malaria on their HRQoL.

The majority of the study population (62.5%) were females, consistent with reports from Quaresima *et al.* (2021). These reports show that hospital-based studies typically have a higher prevalence of females due to males' preference for self-medication in treating malaria. The study by Ricci F. (2021) also showed that more women tend to have malaria because they tend to be poorer, as 70% of the world's poorest individuals are women, and additionally, malaria has been directly linked to poverty.

The majority age group for malaria infection obtained in the present study (18-24 years) is in agreement with reports from Isiko et al. (2021) and Chacha *et al.* (2024), which show a higher prevalence of malaria in younger age groups. Most of the respondents with tertiary education reported in the present study is consistent with study by Asuquo, A.E. (2014), which reported that 74% of respondents had formal education.

The finding that most respondents earn less than ₦30,000 aligns with previous research (Ricci F., 2012) indicating that poverty hinders the adoption of malaria prevention and treatment measures. This increases the risk of malaria-related illnesses and deaths among low-income households. Moreover, the economic burden of malaria can further exacerbate poverty, as households struggle with treatment costs and lost income due to illness. The same study also showed, using multivariate analysis, that the proportion of children with malaria decreased with increasing socioeconomic status, as classified by PCA ($p < 0.05$). Majority of the respondents being on Arthemeter/ Lumefantrine was as a result of the safety and efficacy of the regimen in uncomplicated malaria proven by studies with (Ngasala *et.al*. 2019).

The mean EQ-5D utility and EQ-VAS scores (0.74 and 67.17) were found to be relatively high. This score was notably higher than the EQ-5D-5L index scores reported for patients with other tropical diseases. For instance, patients with dengue fever had a mean EQ-5D-5L index score of 0.66 (Tran *et al.,* 2017), and those with tuberculosis scored 0.69 (Kittikraisak *et al.,* 2012).

The study identified a total of 113 types health states. Health Status Score indicates the level of problems reported by patients across five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is rated on a scale from 1 to 5, where 1 = no problems, 2 = slight problems, 3 = moderate problems, 4 = severe problems, and 5 = extreme problems or unable to perform. For example, a score of 11111 represents perfect health with no problems in any dimension.

The most prevalent health state was 11111, comprising 30.6% of the respondents, followed by health state 11121, which was reported by 6.5% of the participants. The utility values for these health states were found to be 0.900 and 0.846, respectively. When compared to similar studies conducted in Indonesia, all respondents experienced issues in all domains and none

reported a full health state of 11111 (Makatita *et al.,* 2020).

Regarding the profile of participants across different domains of EQ-5D, the present study reported that the domains with the highest percentage of problems were "Usual Activities" and "Pain/Discomfort" (50.9% and 63.6%, respectively). However, this finding is not entirely consistent with the results of a study conducted by *Jimam et al.,* which reported corresponding percentages of 50.31% and 70.29% for "Usual Activities" and "Pain/Discomfort", respectively.

Study conducted in Indonesia revealed that "Pain/discomfort" (67.8%) and "anxiety/depression" (57.5%) were the two issues with cervical cancer patients that were most frequently reported (Endarti *et al.,* 2015). In type 2 diabetes mellitus, "pain/discomfort" (76.33%) and "usual activities" (48%) were the most often reported issues (Andayani and Endarti, 2018). Similarly, in type 2 diabetes mellitus, "pain/discomfort" (76.33%) and "usual activities" (48%) were the most often reported issues (Endarti *et al.,* 2015; Andayani and Endarti, 2018).

Regarding the mean EQ-5D-5L index score, the study found a score of 0.74 for adult patients with malaria in Ilorin, Nigeria. This score was notably higher than the EQ-5D-5L index scores reported for patients with other tropical diseases. For instance, patients with dengue fever had a mean EQ-5D-5L index score of 0.66 (Tran *et al.,* 2017), and those with tuberculosis scored 0.69 (Kittikraisak *et al.,* 2012). These findings suggest that the HRQoL of adult malaria patients in Ilorin is notably higher compared to other tropical diseases.

Socio-demographic factors such as age, marital status, and malaria severity type were found to significantly impact HRQoL in our study, consistent with previous research by Van Damme-Ostapowicz *et al.* (2020), highlighted the influence of aging on social functioning, particularly in individuals over 50. The study also shows that there is a weak and statistically insignificant relationship between the treatment medication and health-related quality of life. This indicates that HRQOL can be influenced by a wide range of factors such as economic status, mental health and physical state, and not just the treatment medication.

More so, severe malaria prevalence was linked to longer hospitalization periods, exacerbating the decline in patient QoL. This observation corresponds to the study by McCarthy and Coylem (2010), which emphasized the impact of severe malaria on hospitalization length and, subsequently, on the patient QoL. Additionally, the presence of complications in diseases like type 2 diabetes mellitus also led to more frequent issues, as demonstrated in the study by Sakamaki *et al.* (2006).

CONCLUSION

Patients with Malaria fever reported relatively high HRQoL, with a mean EQ-5D-5L utility score of 0.74 and EQ-VAS of 67.17. The most common health states were 11111 (perfect health, 30.6%) and 11121 (6.5%), while Pain/Discomfort (63.6%) and Usual Activities (50.9%) were the most affected domains. Marital status, age, and family history of disease significantly influenced HRQoL, whereas other factors (education, income, employment, religion, health insurance, and treatment type) were not significant. Most patients received Artemether/Lumefantrine, and treatment showed a weak but significant effect on HRQoL. HRQoL in malaria patients is shaped by an interplay of physical health, socioeconomic factors, mental well-being,

and disease severity rather than treatment alone. This underscores the importance of holistic patient management and targeted interventions.

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