Health-Related Quality of Life due to Malaria in the Brazilian Amazon region using EQ-5D-3L

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Abstract: This study aimed to estimate health-related quality of life (HRQoL) losses due to malaria in endemic areas of the Amazon region using the EQ-5D-3L. We collected data from a convenience sample of 1,179 individuals aged 18 or older. To measure the HRQoL loss, we matched individuals from the treatment group (with recent malaria) with those from the control group (without recent malaria) using Propensity Score Matching (PSM) and compared the difference in mean health utility between the groups. The mean utility was 0.69 and 0.83 for the treatment and control groups, respectively, representing a loss of quality of life of approximately 14% for individuals with recent malaria episodes.

Keywords: Malaria, Quality of Life, Amazon, Brazil.

Area: Demography

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INTRODUCTION

Malaria is a mosquito-borne infectious disease caused by protozoa of the genus Plasmodium. Significant progress has been made toward malaria elimination in the last two decades. However, malaria remains a major concern for public health, contributing to increased morbidity and mortality in tropical and subtropical countries. In 2022, an estimated 249 million cases and 608,000 deaths from malaria occurred worldwide. Bolivia, Venezuela, and Brazil account for 73% of the cases in the region of the Americas (World Health Organization, 2023).

The Brazilian Amazon region accounts for 99.5% of the total country's reported malaria cases. Despite a 6.6% reduction in cases between 2021 and 2022, dropping from 140,488 to 131,224, preliminary data from the first half of 2023 indicate an 8.7% increase compared to the previous year. Furthermore, there has been an upward trend in the number of malaria hospitalizations and deaths in the region since 2020 (Ministério da Saúde, 2024). Several factors contribute to the high incidence of malaria cases in the Brazilian Amazon. The environmental features of the region, including high temperatures, humidity, dense vegetation, and low altitude, create favorable conditions for the proliferation of vector mosquitoes (Daza, et al., 2023). The interplay between geoclimatic and socioeconomic factors (i.e., poverty levels and inadequate housing and sanitary conditions) provides minimum or no protection against mosquitoes, thereby increasing the chances of infection (Ueno, et al., 2021; de Oliveira Padilha, et al., 2019). It is worth noting that the border areas of the Brazilian Amazon face intense population mobility that is driven by economic opportunities, particularly in mining activities, or by humanitarian crises, such as the recent one experienced in Venezuela. This migratory flow increases the risk of imported malaria cases and also contributes to the reintroduction of the disease in regions where it was previously under control (Arisco, et al., 2021; Ueno, et al., 2021; de Aguiar Barros, et al., 2022). Additionally, the lack of adequate healthcare infrastructure in indigenous lands and hard-to-reach areas (such as illegal mining zones) hinders early diagnosis and effective treatment (de Aguiar Barros, et al., 2022).

P. falciparum and P. vivax are the most prevalent plasmodium species worldwide. In Brazil, the incidence of P. vivax infections is considerably higher than that of P. falciparum, representing about 85% of autochthonous cases registered in 2022 (Ministério da Saúde, 2024). The time elapsed between mosquito bites and the first symptoms of the disease varies according to the parasite species: at least seven days for P. falciparum and 10 to 30 days for P. vivax. Mild symptoms are more prevalent for P. vivax infections and include fever, headache and chills, while severe symptoms, such as fatigue, confusion, seizures, and difficulty breathing are more common for P. falciparum (World Health Organization, 2023). These symptoms can lead to important Health-Related Quality of Life (HRQoL) loss mainly due to the recurrent episodes usually associated to malaria.

Studies aiming to measure HRQoL loss due to malaria are scarce. The most usual measurement is DALYs (disability-adjusted life years), which assess the epidemiological burden of malaria (Bezerra, et al., 2020; Kyu, et al., 2018). Only a few studies conducted field research to evaluate HRQoL among patients experiencing malaria episodes (Jimam, et al., 2020; Makatita, et al., 2019; Kayiba, et al., 2021; Van Damme-Ostapowicz, et al., 2012). Most of them used the EuroQol (EQ-5D) instrument that defines health status in five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression). There are two versions of EQ-5D instrument, varying according to the levels of severity. This instrument allows to estimate the Quality-Adjusted Life Years (QALY) taking into account societal preferences for health status.

All these studies using EQ-5D found low levels of HRQoL among patients with malaria. However, it is not possible to infer about HRQoL losses due to the lack of control groups.

This study aims to fill this gap using the EQ-5D-3L instrument to measure the loss of quality of life-related to malaria by comparing individuals with and without the disease. To the best of our knowledge, this is the first application of EQ-5D-3L for individuals with malaria in the Brazilian Amazon region.

METHODS

STUDY DESIGN AND DATA COLLECTION

A field research was conducted in nine municipalities covering five states of the Brazilian Amazon region using a convenience sample selection method (Figure 1). Municipalities were selected based on the incidence of the disease, as measured by the Annual Parasite Index (API) in 2019, and geographical accessibility conditions. Indigenous and gold mine areas were excluded. The selected municipalities are predominantly small, except for Cruzeiro do Sul – with an estimated population exceeding 90,000 inhabitants – and relatively underserved areas (Instituto Brasileiro de Geografia e Estatística, 2024).

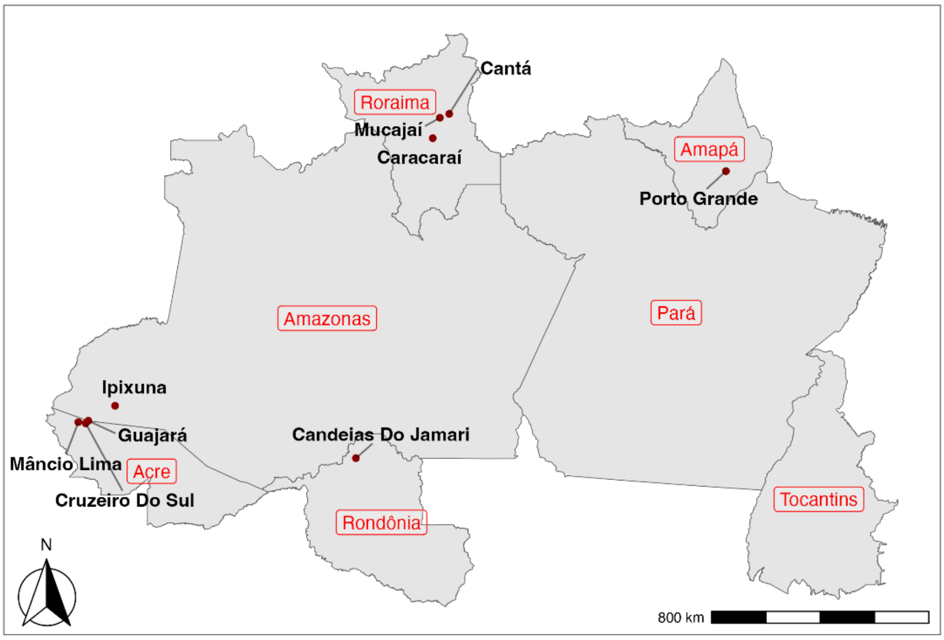

Figure 1 – Municipalities in the study sample

Household face-to-face interviews were conducted in April-May 2022 by an independent external company. Interviewers were trained and supervised by the researchers, who also performed data collection quality control. The inclusion criterion for households in the study was the presence of at least one resident with a malaria episode between January 2019 and April 2022. To measure health-related quality of life losses due to malaria it is required to compare individuals experiencing malaria (treatment group) with those without the disease (control group). As it is difficult to find individuals with malaria during the field research, we defined as treated group individuals with a recent malaria episode, up to three months before the questionnaire application. Control group comprised individuals without a recent malaria episode. In each household, only one individual over 18 years old was selected. The sample selection was made from a list of eligible residents compiled during the interview, following pre-established quotas for sex and age.

The instrument used to measure health-related quality of life (HRQoL) was the EQ-5D-3L, developed by the EuroQol Group. It is widely used for measuring HRQoL in adults and validated for use in Brazil (Santos et al., 2015). The EQ-5D-3L questionnaire comprises five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression), each with three severity levels (no problems (1), some problems (2), and severe problems (3)). The combination of dimensions/levels generates 243 unique health states. Health states are represented by a sequence of five digits corresponding to the severity level in each dimension. For example, 11111 represents the full health state defined as having no problems in any dimension while 33333 represents the worst health state with extreme problems on all five dimensions. The EQ-5D also includes a visual analog scale (EQ-VAS), where the individuals self-assess their health status on a scale ranging from 0 to 100, corresponding to the worst and best imaginable health condition, respectively. In addition to the EQ-5D instrument, interviewers also collected information on sex, age, household characteristics, self-reported general health status, and the presence of pre-existing conditions, including diabetes, hypertension, arthritis, respiratory problems, dengue, yellow fever, and COVID-19.

This study is part of the "The Economic Cost of Malaria in Brazil" grant, funded by the Bill and Melinda Gates Foundation and the National Council for Scientific and Technological Development (CNPq). The project was approved by the Research Ethics Committee of the Federal University of Minas Gerais (Protocol #44774921.1.0000.5149), and the use of the instrument was approved by the EuroQol Group (ID #404310). All participants signed a consent term authorizing their participation in the field survey.

DATA ANALYSIS

To measure the HRQoL loss due to malaria, we paired individuals from the treatment group (with recent malaria) with those from the control group (without recent malaria) using the Propensity Score Matching (PSM) and compared the difference in mean health utility between the groups. The utility associated with each EQ-5D-3L health state was obtained from EQ-5D index values estimated by Andrade et al. (2013) for the population of Minas Gerais.

PSM is used to minimize sample selection bias in observational studies. The method assigns a probability of exposure to the disease to each individual in the sample – the propensity score (PS) – while controlling for observed characteristics. In this way, pairs of individuals from the treatment and control groups with similar propensity scores are formed, and the average difference between them is subsequently estimated. We estimated the propensity score through a logistic regression model. The explanatory variables include observable characteristics that hypothetically influence the malaria exposure and HRQoL. The observable characteristics were sex, age, local of residence (urban/rural), socioeconomic status, and dummies for the presence of pre-existing conditions. The matching technique for pairing individuals with similar propensity scores was Nearest Neighbor Matching without replacement.

In order to assess the socioeconomic status of the participant's household, a socioeconomic index was estimated using Multiple Joint Correspondence Analysis (MCA), according to the presence of household assets. The first principal component explained 49.1% of the variability between households. The indicator was normalized from 0 to 100, corresponding to the lowest and highest socioeconomic levels, respectively.

Frequencies were used to characterize the sample and analyze the components of the EQ-5D instrument. The Pearson chi-square test was employed to compare differences between proportions with a significance level of 95% ($p < 0.05$). Analyses were performed using R version 4.3.3 statistical software. The packages utilized for data analysis were tidyverse 2.0.0, MatchIt 4.5.5 for Propensity Score Matching, and ca 0.71_1 for Multiple Joint Correspondence Analysis.

RESULTS

In total, 1,179 individuals were interviewed. Both sexes were distributed similarly in the sample (49.96% of female and 50.04% of male). Ages ranged from 18 to 88 years, with the mean and median both equal to 40 years. The age composition indicates the higher share of a younger individuals, with 88.8% aged between 18 and 59 years, and 10.2% aged 60 years or older. Men were the majority at both the base and the top of the age pyramid (Figure 2). The socioeconomic index had a mean score of 49.49 and a standard deviation of 12.5. Regarding self-perceived health, 9.16% rated their health as very good or good, 35.62% as fair, and 40.88% as poor or very poor. Among the surveyed individuals 97.3% reported having experienced at least one episode of malaria during their lifetime, with a conditional average of 10.73 episodes.

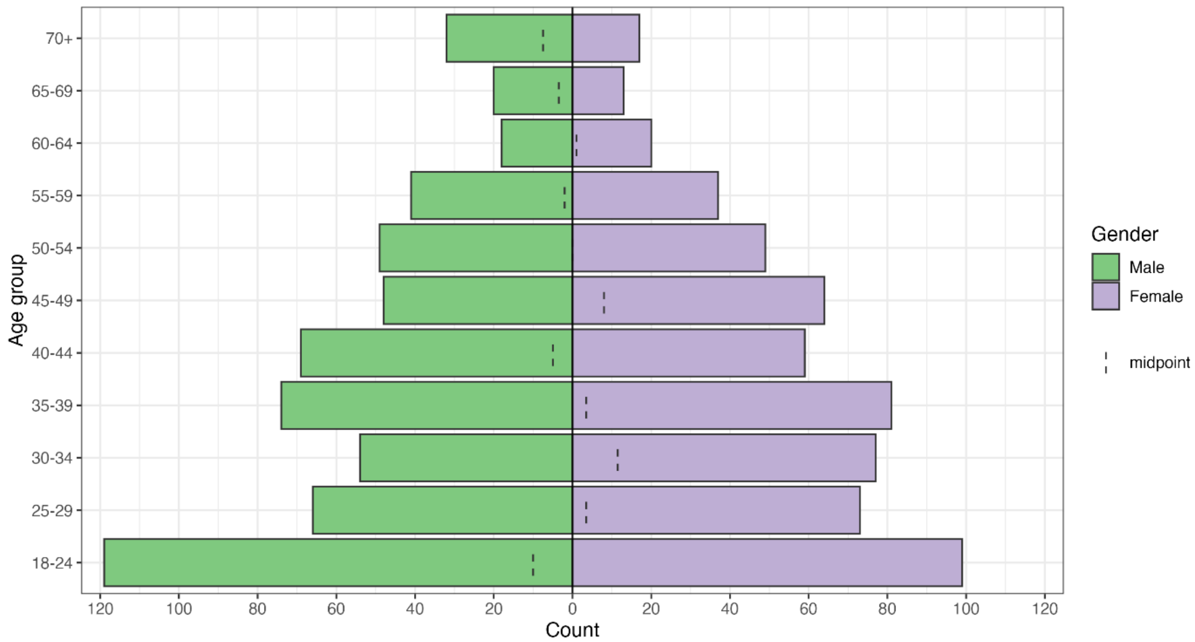

Figure 2 – Demographic distribution of the population

Matching Results

We conducted a propensity score matching to minimize selection bias among individuals allocated to the treatment and control groups and to mitigate confounding factors in the HRQoL loss estimates. Among the 1,179 interviewed individuals, 500 were in the treatment group, and 679 in the control group. The baseline characteristics of individuals in the control and treatment groups are described in Table 1. Before matching, the groups differed in terms of sex (P=0.000), age (P=0.001), presence of arthritis (P=0.002) and respiratory problems (P=0.007). After propensity score matching, the 500 individuals in the treatment group were matched with 500 individuals in the control group, and all observable characteristics were appropriately balanced.

Table 1 – Covariate balance in the unmatched and matched samples

Variables	Before matching			After matching		
	Control	Treatment	P-value	Control	Treatment	P-value
Female	0.545	0.438	0.000	0.472	0.438	0.281
Age	41.689	38.728	0.001	39.968	38.728	0.187
Socioeconomic Index	41.092	39.683	0.057	40.249	39.683	0.473
Urban	0.300	0.324	0.390	0.296	0.324	0.339
Covid	0.361	0.354	0.809	0.354	0.354	1000
Diabetes	0.091	0.082	0.573	0.084	0.082	0.909
Hypertension	0.237	0.218	0.439	0.224	0.218	0.819
Arthritis	0.144	0.088	0.002	0.080	0.088	0.649
Breathing problems	0.135	0.086	0.007	0.080	0.086	0.731
Dengue fever	0.066	0.096	0.068	0.072	0.096	0.731
Yellow fever	0.046	0.026	0.067	0.028	0.026	0.846
Number of observations	679	500		500	500	

Figure 3 shows the density of estimated propensity scores for the treatment and control groups to check for the existence of enough overlap between the distributions. The graphs indicate that there was overlap in all propensity score intervals. It was possible to find a match for each individual in the treatment group within the control group in each of the intervals.

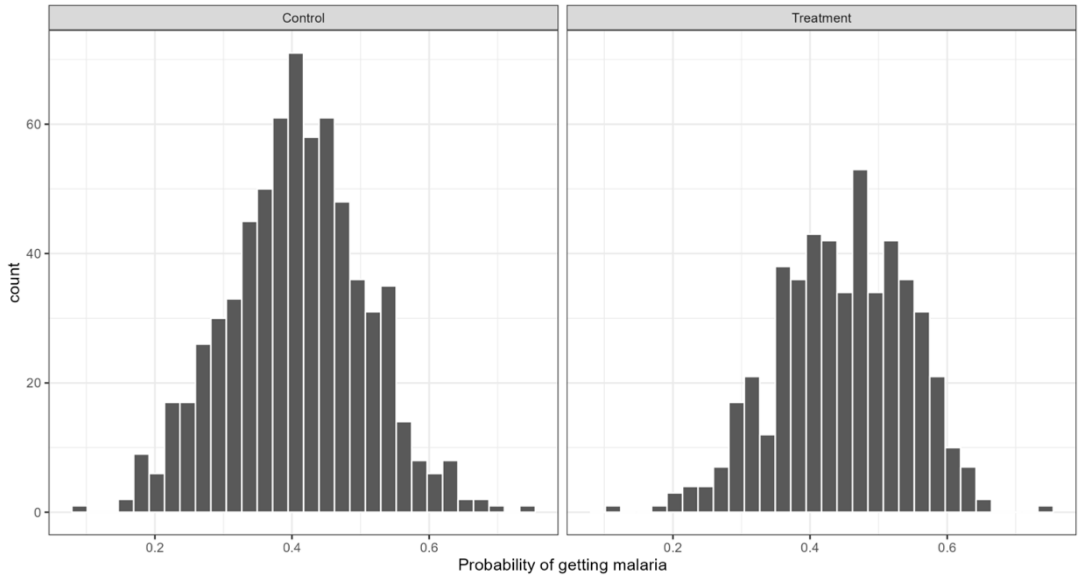

Figure 3 – Histograms of the estimated propensity scores by treatment status

EQ-5D Descriptive System and EAV scores

Figure 4 displays the frequencies for each dimension of the descriptive system of the EQ-5D-3L for individuals in the matched treatment and control groups. In comparison to individuals in the treatment group, those in the control group reported better health conditions. The percentage of individuals reporting the absence of problems was higher for individuals in the control group in all five health dimensions. Meanwhile, the percentage of individuals reporting moderate or severe problems was higher among individuals in the treatment group in almost all dimensions. "Pain and discomfort" and "anxiety and depression" were the most reported issues by individuals in both groups. In the treatment group, 28% of individuals reported severe problems in the "pain and discomfort" dimension, and 15.8% in the "anxiety and depression" dimension. In the control group, 11.8% of individuals reported severe problems in the "pain and discomfort" dimension, and 8.6% in the "anxiety and depression" dimension. The health profiles presented in Figure 3 reveal a population already experiencing poor health states, which are further exacerbated by the presence of malaria.

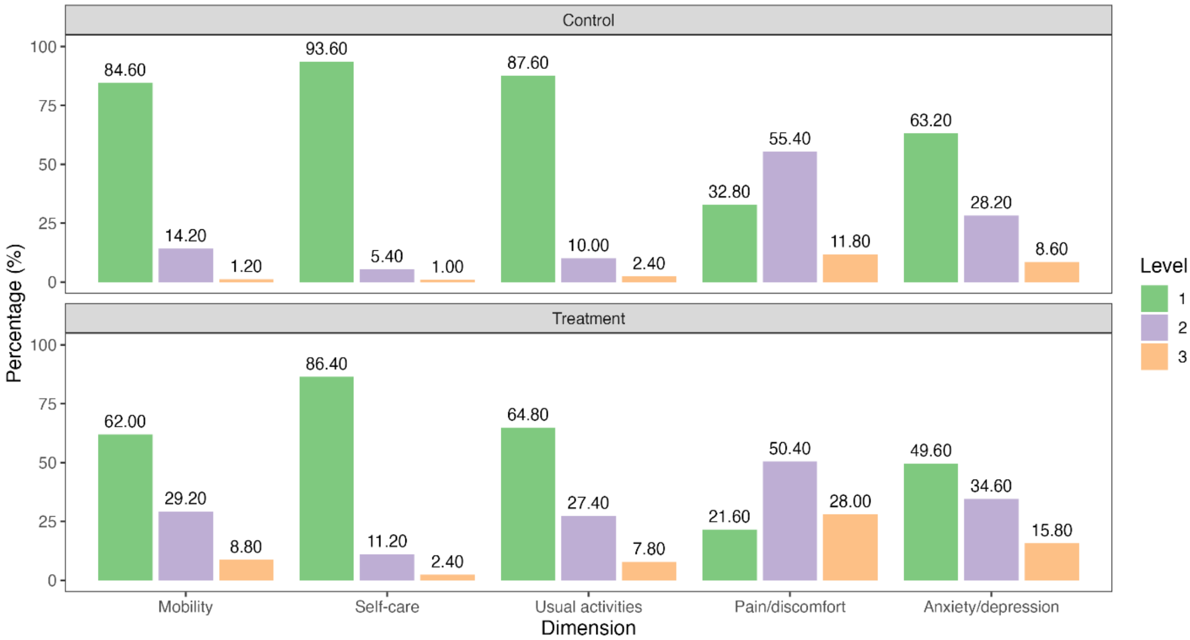

Figure 4 – Frequency of individuals in each dimension and level of the EQ-5D-3L scale for treatment and control groups

Figure 5 illustrates the cumulative distribution for the health status scores reported by individuals in the treatment and control groups on the EQ-VAS. The score ranges from 0 to 100, representing the worst and best imaginable health status, respectively. The curve for individuals in the treatment group is above the curve for individuals in the control group, indicating that the frequency of individuals reporting the worst health states is higher among those in the treatment group.

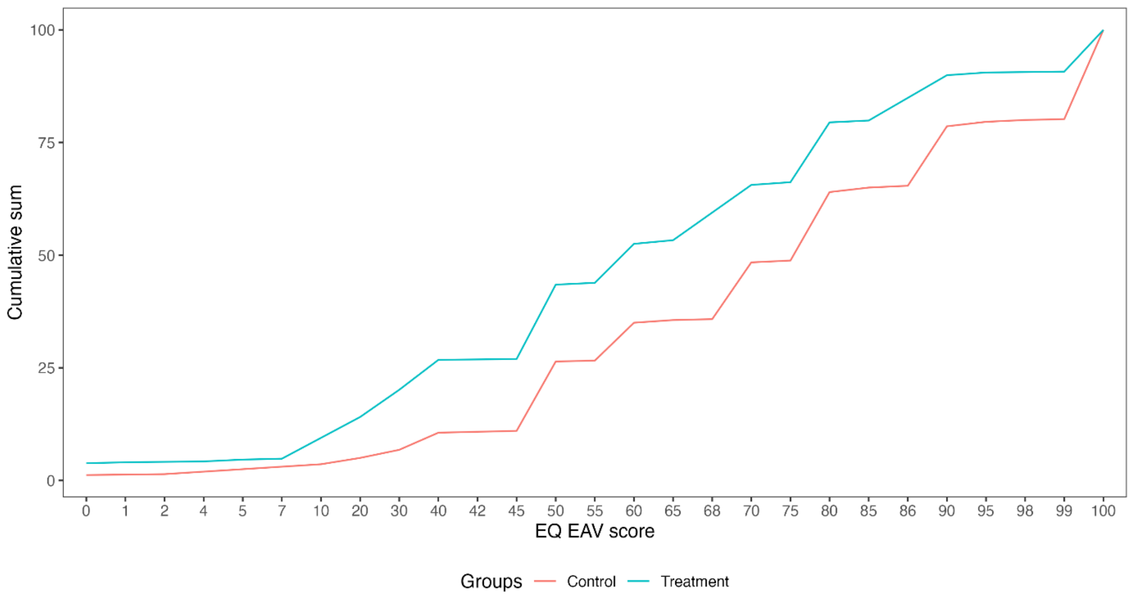

Figure 5 – Cumulative distribution of VAS scores for treatment and control groups

HRQoL Loss due to malaria

The HRQoL loss due to malaria was estimated by comparing the mean EQ-5D utilities for individuals in the treatment and control groups. In total, 97 health states were identified, with the best health state 11111 occurring 240 times and the worst health state 33333 occurring 4 times (Supplementary material). Figure 6 shows the cumulative distribution of health states in descending order of utility for individuals in the treatment and control groups. The mean utility was 0.69 and 0.83 for the treatment and control groups, respectively, representing a HRQoL loss of about 14% for individuals experiencing recent malaria episodes.

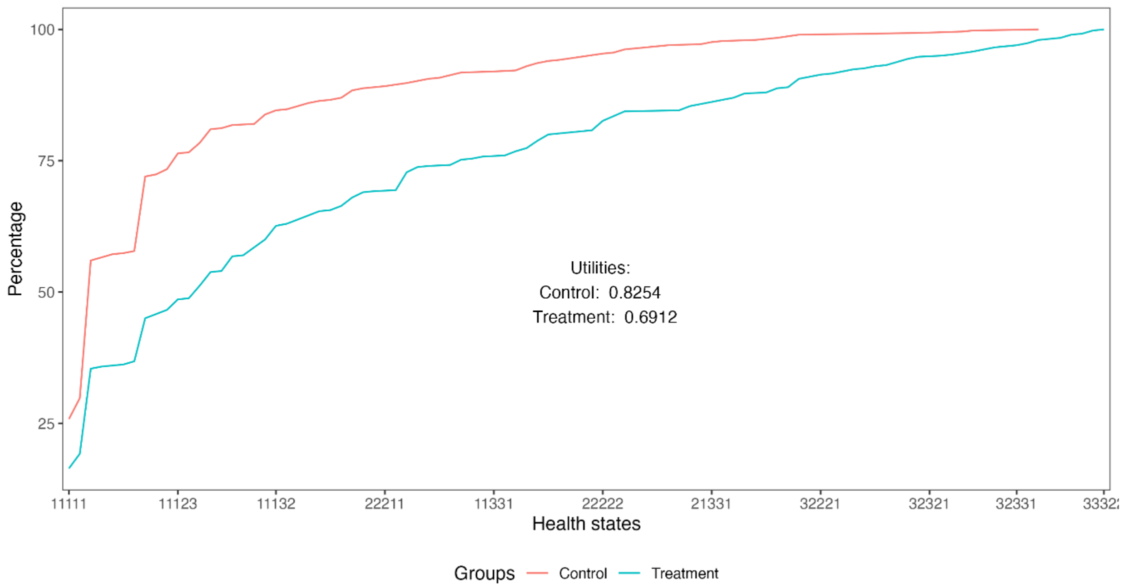

Figure 6 – Cumulative distribution of EQ-5D-3L health state for treatment and control groups

DISCUSSION

This study assessed the HRQoL loss due to malaria for the population living in endemic areas of the Brazilian Amazon. A total of 1,179 individuals were interviewed in nine municipalities of five states of the region (Roraima, Amazonas, Amapá, Rondônia, and Acre). The mean EQ-5D score was 0.83 for the control group and 0.69 for the treatment group, indicating a loss of about 14% for individuals with recent malaria episodes. Additionally, the frequency of individuals at the highest severity levels across all five dimensions of the EQ-5D-3L was higher in the treatment group than in the control group. Pain/discomfort was the most reported dimension, followed by anxiety/depression and usual activities. This score is comparable to the EQ-5D-5L scores associated with severe chronic diseases. A meta-analysis using a fixed-effect model indicates that HRQoL for malaria is similar to that of multiple sclerosis (0.67) and lower than that of chronic kidney disease, chronic obstructive pulmonary disease, and cardiovascular disease (0.76) (Zhou, et al., 2021).

HRQoL measures overall health and captures various aspects of individuals' physical and mental health. Both generic and disease-specific instruments can be used to estimate HRQoL. Generic instruments are typically applied to diverse populations and health conditions, covering broader dimensions such as physical health, emotional well-being, and social aspects. Disease-specific instruments assess quality of life related to specific interventions, conditions or groups of patients. Usually, they focus on specific issues related to a condition, such as symptoms and functional limitations. This study used the generic instrument EQ-5D-3L, developed by the EuroQol Group. EQ-5D-3L is one of the instruments most applied in cost-effectiveness analysis and it is officially recommended by the National Institute for Health and Care Excellence (National Institute for Health and Care Excellence (NICE), 2024). It is widely used due to its simplicity, quick administration, and broad applicability, allowing comparison with other groups and interventions. In Brazil, the Ministry of Health guidelines recommend using EQ-5D-3L in economic evaluation studies (Brasil, 2023). Since 2013, the value set of EQ-5D social preferences has been available for Brazil (Santos, et al., 2016; Andrade, et al., 2013).

Previous studies using the EQ-5D have also found lower levels of HRQoL among patients experiencing episodes of malaria, with the most affected domains being pain/discomfort and usual activities. Makatita et al. (2019) applied the EQ-5D-5L to a sample of 110 malaria patients from Primary Health Care Centers in Indonesia, finding a mean score of 0.49 for all patients. Scores ranged from 0.349 for those with severe malaria to 0.571 for mild cases. Kayiba et al. (2021) used the EQ-5D-3L to estimate the economic burden of uncomplicated malaria in the Democratic Republic of the Congo, surveying 1,080 patients and finding a mean EQ-5D index score of 0.62, with the majority reporting moderate or severe problems. Jimam et al. (2020) assessed the validity of the EQ-5D-5L to measure HRQoL in cases of uncomplicated malaria in Nigeria, reporting good instrument performance with a mean utility score of 0.74. One limitation of these three studies is the lack of control groups, making it difficult to infer HRQoL losses specifically attributable to malaria. To the best of our knowledge this paper is the first to estimate HRQoL losses for population that have experienced malaria episodes.

The mean EQ-5D score found for the control group in this study (0.83) is lower than previous findings for Brazil: 0.89 for the urban population of Minas Gerais (Andrade, et al., 2013) and 0.88 for the metropolitan region of Manaus (Silva, et al., 2017). In this study, the sampled municipalities are located in endemic areas of the Brazilian Amazon Region, typically characterized by greater socioeconomic vulnerability, difficulty in accessing healthcare services, and poor sanitary conditions. In this context, malaria episodes can exacerbate health status vulnerabilities in addition to other infectious diseases that are still common in the region, such as yellow fever, hepatitis, dengue, leishmaniasis, leprosy, tuberculosis (Aguilar, et al., 2007), and intestinal infections (Vasconcelos, et al., 2023). Among the interviewed individuals in this study, 8% reported having had a dengue episode in the last 12 months, and around 4% reported having had yellow fever.

The majority of surveyed individuals have experienced at least one episode of malaria in their lifetime (97.3% of respondents), with 90.24% reporting multiple episodes, yielding a conditional mean of 10.73. These data underscore the high prevalence of malaria reinfection in the region. Individual prevention measures, such as mosquito nets, repellents, and clothing to protect arms and legs, can significantly reduce the chances of contact with vector mosquitoes (Vezenegho, et al., 2016; da Silva Ferreira Lima, et al., 2023). Furthermore, medication adherence reduces the risks of complications and reinfection (Dinelly, et al., 2021). However, there is evidence showing low levels of individuals adherence to preventive measures, such as the use of long-lasting insecticidal nets, and interruption treatment as symptoms improve (Sousa, et al., 2019; Dinelly, et al., 2021; Almeida & Vieira, 2016). Adherence to anti-malarial treatment is related to socioeconomic conditions, healthcare access (self-medication access, monitoring treatment by healthcare agents), knowledge about the disease and drug administration (treatment duration, presence of symptoms and side effects) (Pereira, et al., 2011). Empirical evidence for the Brazilian Amazon has shown that non-adherence varies from 30 to 40% depending on the drug treatment and method to measure adherence (Santos, et al., 2022).

The main limitation of this study regards sample design. The field survey was conducted using a convenience sample in which municipalities choice based on the Annual Parasite Index (API) and accessibility conditions. Illegal mining areas and indigenous communities were not included in the sample due to security and logistical reasons. As these areas are characterized by the higher levels of malaria incidence and poor socioeconomic conditions and healthcare access, the HRQoL due to malaria can be underestimated. Another limitation is the retrospective assessment of health status experienced during the last malaria episode. However, as a relatively short interval for recent malaria episodes was considered (up to three months before questionnaire administration), memory effects can be minimized. Furthermore, malaria's high prevalence and recurrence in the Amazon region may influence individuals' perception of disease risk. Frequent exposure to malaria can lead to familiarity with the disease, resulting in an underestimation of its impact on quality of life.

This is the first study to measure malaria-related quality of life loss for the population in endemic areas of the Amazon region. The results show an important HRQoL loss due to malaria. These findings emphasize the importance of effective malaria prevention and treatment strategies, especially in areas like the Amazon, where unfavorable socioeconomic conditions and a challenging epidemiological context exacerbate the disease's impacts. Continued investments in malaria control programs and improvements in access to health services are essential to mitigate the negative impacts of this disease on the quality of life of affected populations.

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SUPPLEMENTARY MATERIAL

Table A1 – Health state of HRQOL malaria patients measured with EQ-5D-3L

Control				Treatment			
Health State	**Health utility**	**Frequency**	**Percent**	**Health State**	**Health utility**	**Frequency**	**Percent**
11121	0.879	180	26.51	11111	1.00	82	16.40
11111	1000	158	23.27	11121	0.88	81	16.20
11122	0.817	93	13.70	11122	0.82	41	8.20
11112	0.884	26	3.83	21222	0.59	17	3.40
11131	0.746	19	2.80	21122	0.69	15	3.00
11123	0.765	17	2.50	11112	0.88	14	2.80
21121	0.751	15	2.21	11222	0.72	14	2.80
21122	0.689	15	2.21	11131	0.75	13	2.60
11133	0.632	10	1.47	11132	0.68	13	2.60
22222	0.472	9	1.33	21121	0.75	12	2.40
11113	0.832	8	1.18	11123	0.77	10	2.00
21132	0.556	7	1.03	21232	0.46	9	1.80
21232	0.461	7	1.03	22222	0.47	9	1.80
22221	0.534	7	1.03	11133	0.63	8	1.60
11132	0.684	6	0.88	11221	0.78	8	1.60
11221	0.783	6	0.88	21221	0.66	8	1.60
21221	0.655	6	0.88	22233	0.29	8	1.60
21222	0.594	6	0.88	21231	0.52	7	1.40
11222	0.722	5	0.74	21133	0.51	6	1.20
11223	0.670	5	0.74	21233	0.41	6	1.20
22233	0.288	5	0.74	11232	0.59	5	1.00
21123	0.638	4	0.59	21131	0.62	5	1.00
21231	0.522	4	0.59	21132	0.56	5	1.00
22232	0.339	4	0.59	11231	0.65	4	0.80
21111	0.818	3	0.44	11233	0.54	4	0.80
21131	0.618	3	0.44	21123	0.64	4	0.80
21233	0.409	3	0.44	22223	0.42	4	0.80
22122	0.568	3	0.44	22232	0.34	4	0.80
22211	0.601	3	0.44	31221	0.38	4	0.80
11212	0.789	2	0.29	21111	0.82	3	0.60
11231	0.650	2	0.29	22221	0.53	3	0.60
11232	0.589	2	0.29	22333	0.18	3	0.60
12122	0.696	2	0.29	31232	0.19	3	0.60
21133	0.505	2	0.29	31332	0.08	3	0.60
21331	0.413	2	0.29	32332	-0.05	3	0.60
21332	0.351	2	0.29	32333	-0.10	3	0.60
22132	0.435	2	0.29	33333	-0.22	3	0.60
11233	0.537	1	0.15	11211	0.85	2	0.40
11321	0.674	1	0.15	11321	0.67	2	0.40
11331	0.541	1	0.15	21223	0.54	2	0.40
12111	0.825	1	0.15	22231	0.40	2	0.40
12112	0.763	1	0.15	22332	0.23	2	0.40

12121	0.757	1	0.15	23333	0.05	2	0.40
12123	0.644	1	0.15	31133	0.23	2	0.40
12132	0.563	1	0.15	31312	0.28	2	0.40
12232	0.467	1	0.15	31322	0.21	2	0.40
13321	0.427	1	0.15	31323	0.16	2	0.40
21211	0.723	1	0.15	32221	0.26	2	0.40
21223	0.542	1	0.15	32232	0.06	2	0.40
21322	0.484	1	0.15	32233	0.01	2	0.40
21323	0.433	1	0.15	11113	0.83	1	0.20
22223	0.421	1	0.15	11322	0.61	1	0.20
22231	0.401	1	0.15	11323	0.56	1	0.20
23121	0.504	1	0.15	11332	0.48	1	0.20
23122	0.442	1	0.15	11333	0.43	1	0.20
23333	0.053	1	0.15	12111	0.83	1	0.20
31122	0.414	1	0.15	12121	0.76	1	0.20
31233	0.134	1	0.15	12123	0.64	1	0.20
31322	0.209	1	0.15	12222	0.60	1	0.20
31332	0.076	1	0.15	21211	0.72	1	0.20
32321	0.149	1	0.15	21321	0.55	1	0.20
33311	0.091	1	0.15	21322	0.48	1	0.20
33333	-0.223	1	0.15	21333	0.30	1	0.20
				22111	0.70	1	0.20
				22122	0.57	1	0.20
				22212	0.54	1	0.20
				23121	0.50	1	0.20
				23232	0.21	1	0.20
				23323	0.19	1	0.20
				31121	0.48	1	0.20
				31131	0.34	1	0.20
				31231	0.25	1	0.20
				31233	0.13	1	0.20
				31333	0.02	1	0.20
				32133	0.11	1	0.20
				32331	0.02	1	0.20
				33232	-0.06	1	0.20
				33233	-0.11	1	0.20
				33322	-0.04	1	0.20
				33332	-0.17	1	0.20