

S1 Table. Socioeconomic and demographic characteristics of individuals that experienced the last episode of malaria in each surveyed household, Brazilian Amazon, 2022.

Variable	Mean (SD)	Median (Q1–Q3)	Min – Max
Age (years)	37.8 (17.1)	37 (25 – 50)	1 – 97
Number of residents in the household	3.9 (2.1)	4 (2 – 5)	1 – 16
Socioeconomic index	40.9 (12.4)	40.5 (33.1 – 47.4)	0 – 100
Variable	Category	n (%)	
Age range	0-4	9 (0.8%)	
	5-9	29 (2.6%)	
	10-14	41 (3.6%)	
	15-19	84 (7.4%)	
	20-24	118 (10.4%)	
	25-29	125 (11.1%)	
	30-34	117 (10.3%)	
	35-39	120 (10.6%)	
	40-44	102 (9.0%)	
	45-49	93 (8.2%)	
	50-54	91 (8.1%)	
	55-59	80 (7.1%)	
	60-64	42 (3.7%)	
	65-69	30 (2.7%)	
	70-74	29 (2.6%)	
	75-79	10 (0.9%)	
	80-84	9 (0.8%)	
	85+	2 (0.2%)	
Sex	Men	546 (48%)	
	Women	585 (52%)	
Zone	Rural	771 (68%)	
	Urban	360 (32%)	
Household received disease control agents visit	Yes	791 (70%)	
	No	340 (30%)	

S2 Table. Sources of data used in the estimation of the economic burden of malaria.

Data source	Reference/Webpage
National System of Notifiable Diseases (SINAN) - Brazil's national system for recording and monitoring notifiable diseases. It supports epidemiological surveillance by collecting case-level data reported by health services across the country	Ministério da Saúde. Sistema de Informações de Agravos de Notificação – SINAN. 2019. https://www.gov.br/saude/pt-br/composicao/svsa/sistemas-de-informacao/sinan
Malaria Epidemiological Surveillance Information System (SIVEP-Malaria) - National system for compulsory notification of malaria cases, managed by the Ministry of Health.	Ministério da Saúde. SIVEP-Malária – Sistema de Informação de Vigilância Epidemiológica da Malária. Brasília: Secretaria de Vigilância em Saúde. https://portalweb04.saude.gov.br/sivep_malaria/
Mortality Information System (SIM) - Brazil's official database for recording and monitoring deaths, managed by the Ministry of Health	Brazilian Ministry of Health. Sistema de Informações sobre Mortalidade – SIM. https://www.gov.br/saude/pt-br/composicao/svsa/sistemas-de-informacao/sim
2017–2018 Household Budget Survey (POF) - A nationally representative survey conducted by IBGE. It collects detailed information on household income, consumption patterns, and expenditures over a specified reference period.	Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa de Orçamentos Familiares – POF 2017-2018. https://www.ibge.gov.br/estatisticas/sociais/saude/24786-pesquisa-de-orcamentos-familiares-2.html
2019 Continuous National Household Sample Survey (PNADC) - Conducted by IBGE. Main ongoing survey to monitor labor market trends and socioeconomic indicators.	IBGE. Pesquisa Nacional por Amostra de Domicílios Contínua – PNAD Contínua. https://www.ibge.gov.br/estatisticas/sociais/trabalho/17270-pnad-continua.html?edicao=27258
2022 Population Census - Conducted every ten years by the IBGE, is the most comprehensive demographic and socioeconomic survey in the country.	IBGE. Censo Demográfico 2022: População e domicílios. Rio de Janeiro: IBGE, 2022. https://www.ibge.gov.br/estatisticas/sociais/saude/22827-censo-demografico-2022.html
Complete life tables for Brazil – 2019: Brief analysis of mortality evolution in Brazil	IBGE (2024). Tábuas completas de mortalidade para o Brasil – 2019: Breve análise da evolução da mortalidade no Brasil. https://www.ibge.gov.br
Brazilian National Agency for Petroleum, Natural Gas, and Biofuels (ANP) - Provides a publicly available data on fuel prices, production, distribution, and consumption across Brazil.	https://www.gov.br/anp/pt-br/centrais-de-conteudo/paineis-dinamicos-da-anp
National Federation of Motor Vehicle Dealers and Distributors (FENABRAVE) - A comprehensive repository of Brazilian new-vehicle registration data, including monthly statistics on retail sales of cars, motorcycles, trucks, buses, and light commercial vehicles.	https://www.fenabrave.org.br/portalv2
Brazilian Labeling Program (PBE), coordinated by INMETRO (National Institute of Metrology, Quality and Technology) - Provides consumer-facing efficiency labels for products—including appliances, vehicles, and buildings.	https://dados.gov.br/dados/conjuntos-dados/programa-brasileiro-de-etiquetagem-pbe
Brazilian Higher Education Census, Ministry of Education - The official and most comprehensive source of data on higher education in Brazil. It collects detailed information on all undergraduate and graduate programs offered by public and private institutions.	2020: https://download.inep.gov.br/educacao_superior/censo_superior/documentos/2020/Apresentacao_Censo da Educacao Superior 2019.pdf 2021: https://download.inep.gov.br/publicacoes/institucionais/estatisticas_e_indicadores/notas_estatisticas_censo da educacao superior 2020.pdf 2022: https://download.inep.gov.br/publicacoes/institucionais/estatisticas_e_indicadores/resumo tecnico censo da educacao superior 2021.pdf 2023: https://download.inep.gov.br/publicacoes/institucionais/estatisticas_e_indicadores/resumo tecnico censo educacao superior 2022.pdf
Brazilian Map of Higher Education 2019-2022 - Compiles data relevant to understanding Brazil's higher education landscape. A publication from the Semesp Institute.	2022: https://www.semesp.org.br/wp-content/uploads/2022/07/mapa-do-ensino-superior-2022-06-30.pdf 2021: https://s1.static.brasilecola.uol.com.br/vestibular/2022/03/mapa-ensino-superior-semesp.pdf 2020: https://www.semesp.org.br/wp-content/uploads/2020/04/Mapa-do-Ensino-Superior-2020-Instituto-Semesp.pdf 2019: https://www.semesp.org.br/wp-content/uploads/2019/06/Semesp_Mapa_2019_Web.pdf

Average public expenditure on tertiary students from OECD estimates	Organisation for Economic Co-operation and Development. Education at a Glance 2024. Country notes: Brazil. Paris: OECD Publishing, 2024. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/09/education-at-a-glance-2024-country-notes_532eb29d/brazil_c4677b6a/eea51596-en.pdf
Fund for maintenance and Development of Basic Education and valorization of education professionals (FUNDEB) - It contains detailed financial and administrative data on public education funding in Brazil.	https://www.gov.br/fnde/pt-br/acao-a-informacao/acoes-e-programas/financiamento/fundeb/consultas
Extended National Consumer Price Index (IPCA) - Brazil's official inflation indicator, calculated monthly by the Brazilian Institute of Geography and Statistics (IBGE).	https://www.ibge.gov.br/estatisticas/economicas/precos-e-custos/9256-indice-nacional-de-precos-ao-consumidor-amplo.html
Uber Trips - Kaggle Datasets is an open platform where users can publish, share, and explore datasets for machine learning, data science, and analytics projects. It includes data from diverse domains such as health, finance, environment, and social sciences.	Kaggle dataset platform (https://www.kaggle.com/)
2012 National Boat Survey - A comprehensive study, including a household Boating Participant Survey and a monthly Trip Survey that profiled about 30,000 boat-owning households and 17,000 recreational participants, logged over 80,000 boating trips.	U.S. Coast Guard. (2013). 2012 National Recreational Boating Survey: Report. Washington, DC: U.S. Department of Homeland Security. Retrieved from https://www.uscgboating.org/assets/1/AssetManager/2012survey%20report.pdf
Bus and taxi fare	Online data on average fares in Amazon's state capitals. See S1 File

S3 Table. Distribution of median household expenses.

Cost Component	Count	Mean	Median	Std. Dev.	Proportion
Prevention	612	63.88	52.76	36.5	54.11
Direct medical costs					
Exams	12	8.59	8.59	0.00	1.06
Medical appointments	12	24.77	23.26	4.96	1.06
Medicine	273	86.42	42.90	209.60	24.14
Hospitalization medicine	12	381.60	97.82	790.56	1.06
Direct non-medical costs					
Transportation					
Bus	27	7.91	6.54	3.68	2.39
Own vehicle	393	28.42	12.71	75.39	34.75
Taxi	37	106.12	72.95	107.14	3.27
Uber	9	105.38	85.59	53.91	0.8
Lift	106	31.32	14.80	39.20	9.37
Boat	26	98.76	31.80	119.24	2.3
Food and lodging	49	114.58	67.10	118.41	4.33
Indirect costs					
Transportation					
By foot	272	4.84	2.11	7.45	24.05
Bus	25	29.99	18.77	33.37	2.21
Own vehicle	392	9.61	3.90	27.64	34.66
Taxi	37	4.24	3.17	4.11	3.27
Uber	8	13.18	7.92	12.23	0.71
Lift	106	19.64	8.95	24.99	9.37
Boat	26	18.98	7.33	34.55	2.3
SUS	303	5.10	2.32	7.73	26.79
Absenteeism					
Main work	526	822.19	353.02	1704.09	46.51
Agriculture	295	102.98	1.61	177.98	26.08
Husbandry	89	126.00	2.01	261.53	7.87
Fishing	172	50.55	0.30	154.41	15.21
Extractivism	45	71.05	0.60	318.23	3.98
Mining	31	532.92	516.24	485.25	2.74
Commerce	51	304.47	251.50	253.68	4.51
Housework	29	185.79	126.51	159.58	2.56
Caregiver	50	224.82	99.68	261.61	4.42
Elementary + High school education	22	195.41	173.15	121.45	7.96
Tertiary education	22	497.79	475.70	228.37	1.95
Intangible Costs (HRQoL loss)	1131	163.55	109.51	216.11	100

S4 Table. Total malaria expenditure from the public health system and household perspectives by cost components, excluding mortality, 2019 (PPP-USD 2024 million)

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S5 Table. Total malaria and percentage expenditures from the public health system and household perspectives, disaggregated by cost components, 2019 (PPP-USD 2024 million)

Cost components	Rondônia	Acre	Amazonas	Roraima	Pará	Amapá	Tocantins	Maranhão	Mato Grosso	Amazon Region
TOTAL MALARIA EXPENDITURE										
SUS Expenses										
Illness/treatment										
Drugs	0.02	0.02	0.07	0.03	0.04	0.01	0.00	0.00	0.00	0.19
Doctor appointments	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.07
Diagnostic tests	0.13	0.26	1.21	0.23	0.36	0.09	0.00	0.05	0.01	2.34
Inpatient care	0.08	0.03	0.04	0.11	0.05	0.02	0.00	0.01	0.02	0.35
Control and Preventive Actions										
Insecticide/Bed nets	0.06	0.63	2.00	0.21	0.01	0.38	0.00	0.13	0.01	3.43
Blood screening	0.05	0.02	0.09	0.02	0.15	0.02	0.02	0.13	0.05	0.55
Surveillance	12.16	3.55	36.49	10.67	20.56	9.79	2.28	9.75	5.64	110.90
Human Resources										
Agents/Microscopists	0.75	0.60	7.35	1.19	2.25	0.56	0.07	0.86	0.14	13.77
Household Expenses										
Prevention	0.13	0.63	1.14	0.76	0.44	0.31	0.00	0.00	0.00	3.41
Direct medical costs										
Drugs	0.08	0.09	0.44	0.16	0.22	0.07	0.00	0.00	0.01	1.08
Doctor appointments	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Exams	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Direct non-medical costs										
Transportation (patient and caregiver)	0.07	0.08	0.38	0.13	0.19	0.06	0.00	0.00	0.01	0.93
Food and lodging (caregiver)	0.02	0.02	0.11	0.04	0.06	0.02	0.00	0.00	0.00	0.28
Indirect costs										
Work absenteeism main work	1.16	1.33	6.34	2.27	3.23	1.05	0.00	0.06	0.18	15.62
Work absenteeism secondary work	0.21	0.24	1.14	0.41	0.58	0.19	0.00	0.01	0.03	2.79
School absenteeism	0.16	0.19	0.89	0.32	0.45	0.15	0.00	0.01	0.02	2.19
Caregiver absenteeism	0.03	0.04	0.18	0.06	0.09	0.03	0.00	0.00	0.00	0.43
Opportunity cost of travel time (patient and caregiver)	0.03	0.03	0.16	0.06	0.08	0.03	0.00	0.00	0.00	0.39
Intangible Costs										
Loss of health-related quality of life	0.77	0.89	4.23	1.51	2.16	0.70	0.00	0.04	0.12	10.42
Mortality Costs										
Premature mortality	0.12	0.38	3.11	4.74	2.06	0.98	0.00	0.24	1.08	12.71
Total	16.03	9.03	65.40	22.93	33.00	14.45	2.39	11.30	7.35	181.88

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S6 Table. Total malaria expenditures from the public health system and household perspectives, disaggregated by cost components, 2019, per capita (PPP-USD 2024)

Cost components	Rondônia	Acre	Amazonas	Roraima	Pará	Amapá	Tocantins	Maranhão	Mato Grosso	Amazon Region
Total malaria expenditure										
SUS Expenses										
Illness/treatment										
Drugs	0.01	0.02	0.02	0.05	0.01	0.02	0.00	0.00	0.00	0.01
Doctor appointments	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Diagnostic tests	0.08	0.31	0.31	0.37	0.04	0.12	0.00	0.01	0.00	0.08
Inpatient care	0.05	0.03	0.01	0.17	0.01	0.03	0.00	0.00	0.00	0.01
Control and Preventive Actions										
Insecticide/Bed nets	0.04	0.76	0.51	0.34	0.00	0.52	0.00	0.02	0.00	0.12
Blood screening	0.03	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.01	0.02
Surveillance	7.73	4.30	9.29	17.13	2.54	13.43	1.52	1.44	1.55	4.01
Human Resources										
Agents/Microscopists	0.48	0.72	1.87	1.91	0.28	0.77	0.04	0.13	0.04	0.50
Household Expenses										
Prevention	0.08	0.77	0.29	1.22	0.05	0.42	0.00	0.00	0.00	0.12
Direct medical costs										
Drugs	0.05	0.11	0.11	0.25	0.03	0.10	0.00	0.00	0.00	0.04
Doctor appointments	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Exams	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Direct non-medical costs										
Transportation (patient and caregiver)	0.04	0.10	0.10	0.22	0.02	0.09	0.00	0.00	0.00	0.03
Food and lodging (caregiver)	0.01	0.03	0.03	0.06	0.01	0.03	0.00	0.00	0.00	0.01
Indirect costs										
Work absenteeism main work	0.74	1.61	1.61	3.64	0.40	1.43	0.00	0.01	0.05	0.56
Work absenteeism secondary work	0.13	0.29	0.29	0.65	0.07	0.26	0.00	0.00	0.01	0.10
School absenteeism	0.10	0.23	0.23	0.51	0.06	0.20	0.00	0.00	0.01	0.08
Caregiver absenteeism	0.02	0.04	0.04	0.10	0.01	0.04	0.00	0.00	0.00	0.02
Opportunity cost of travel time (patient/caregiver)	0.02	0.04	0.04	0.09	0.01	0.04	0.00	0.00	0.00	0.01
Intangible Costs										
Loss of health-related quality of life	0.49	1.07	1.08	2.43	0.27	0.96	0.00	0.01	0.03	0.38
Mortality Costs										
Premature mortality	0.07	0.47	0.79	7.61	0.26	1.34	0.00	0.04	0.30	0.46
Total	10.19	10.95	16.64	36.81	4.08	19.81	1.59	1.67	2.02	6.57
Population	1572676	824448	3929369	622859	8088090	729353	1506137	6760732	3635989	27669653

S7 Table. Total malaria expenditures from the public health system and household perspectives, disaggregated by cost components, 2019, per notification (PPP-USD 2024)

Cost components	Rondônia	Acre	Amazonas	Roraima	Pará	Amapá	Tocantins	Maranhão	Mato Grosso	Amazon Region
SUS Expenses										
Illness/treatment										
Drugs	0.20	0.09	0.09	0.19	0.18	0.22	0.07	0.04	0.29	0.13
Doctor appointments	0.03	0.12	0.05	0.03	0.01	0.07	0.00	0.00	0.00	0.05
Diagnostic tests	1.55	1.60	1.64	1.54	1.59	1.52	1.84	1.67	1.55	1.61
Inpatient care	0.98	0.17	0.05	0.71	0.24	0.34	1.45	0.18	1.75	0.24
Control and Preventive Actions										
Insecticide/Bed nets	0.73	3.88	2.70	1.43	0.05	6.68	4.85	4.17	1.36	2.36
Blood screening	0.58	0.11	0.12	0.13	0.66	0.41	22.20	4.18	5.57	0.38
Surveillance	142.68	22.00	49.45	70.89	91.51	173.06	2347.87	321.18	590.26	76.11
Human Resources										
Agents/Microscopists	8.81	3.70	9.96	7.91	10.03	9.90	68.96	28.43	14.69	9.45
Household Expenses										
Prevention	1.51	3.93	1.55	5.04	1.95	5.43	0.00	0.00	0.00	2.34
Direct medical costs										
Drugs	0.94	0.57	0.60	1.05	1.00	1.28	0.22	0.14	1.29	0.74
Doctor appointments	0.02	0.01	0.01	0.02	0.02	0.03	0.00	0.00	0.03	0.02
Exams	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01
Direct non-medical costs										
Transportation (patient and caregiver)	0.81	0.49	0.51	0.90	0.85	1.10	0.19	0.12	1.11	0.64
Food and lodging (caregiver)	0.24	0.15	0.15	0.27	0.25	0.33	0.06	0.04	0.33	0.19
Indirect costs										
Work absenteeism main work	13.61	8.24	8.59	15.07	14.38	18.47	3.17	2.02	18.62	10.72
Work absenteeism secondary work	2.44	1.47	1.54	2.70	2.57	3.30	0.57	0.36	3.33	1.92
School absenteeism	1.91	1.16	1.21	2.11	2.02	2.59	0.44	0.28	2.61	1.50
Caregiver absenteeism	0.38	0.23	0.24	0.42	0.40	0.51	0.09	0.06	0.52	0.30
Opportunity cost of travel time (patient and caregiver)	0.34	0.20	0.21	0.37	0.35	0.46	0.08	0.05	0.46	0.26
Intangible Costs										
Loss of health-related quality of life	9.08	5.49	5.73	10.05	9.59	12.32	2.11	1.34	12.42	7.15
Mortality Costs										
Premature mortality	1.37	2.38	4.21	31.51	9.19	17.25	0.00	8.02	113.06	8.73
Total	188.18	56.01	88.61	152.35	146.87	255.28	2454.17	372.26	769.26	124.82
Notifications	85200	161179	738025	150506	224712	56591	973	30363	9550	1457099

S8 Table. Sensitivity analysis – work absenteeism (4 days)

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S9 Table. Sensitivity analysis – IPA 2015-2019

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S10 Table. Sensitivity analysis – mortality 2015-2019

Cost components	Rondônia	Acre	Amazonas	Roraima	Pará	Amapá	Tocantins	Maranhão	Mato Grosso	Amazon Region
Mortality Costs										
Total malaria expenditure	16.68	11.04	65.65	19.83	32.82	15.38	2.39	11.30	6.27	181.35
Household Expenses	3.43	5.93	18.37	7.37	9.39	4.50	0.01	0.38	0.39	49.76
Mortality Costs (deaths in 2015)	0.76	2.39	3.36	1.65	1.88	1.91	0.00	0.24	0.00	12.19
Total malaria expenditure	17.81	9.74	66.26	18.53	31.71	14.98	2.39	11.06	6.59	179.08
Household Expenses	4.56	4.64	18.98	6.06	8.28	4.10	0.01	0.13	0.71	47.48
Mortality Costs (deaths in 2016)	1.90	1.10	3.97	0.34	0.77	1.51	0.00	0.00	0.32	9.91
Total malaria expenditure	17.03	10.59	67.45	20.56	33.05	14.66	2.39	12.84	6.27	184.84
Household Expenses	3.78	5.48	20.17	8.10	9.62	3.78	0.01	1.91	0.39	53.24
Mortality Costs (deaths in 2017)	1.12	1.95	5.16	2.38	2.11	1.19	0.00	1.78	0.00	15.68
Total malaria expenditure	16.84	8.64	71.86	22.68	33.07	14.61	2.39	11.54	7.26	188.89
Household Expenses	3.59	3.54	24.58	10.21	9.64	3.73	0.01	0.61	1.38	57.29
Mortality Costs (deaths in 2018)	0.93	0.00	9.57	4.49	2.13	1.14	0.00	0.48	0.99	19.72
Total malaria expenditure	16.03	9.03	65.40	22.93	33.00	14.45	2.39	11.30	7.35	181.88
Household Expenses	2.78	3.92	18.12	10.46	9.57	3.57	0.01	0.38	1.47	50.28
Mortality Costs (deaths in 2019)	0.12	0.38	3.11	4.74	2.06	0.98	0.00	0.24	1.08	12.71
Total malaria expenditure	16.88	9.81	67.32	20.91	32.73	14.81	2.39	11.61	6.75	183.21
Household Expenses	3.63	4.70	20.05	8.44	9.30	3.94	0.01	0.68	0.87	51.61
Average Mortality Costs (deaths 2015-2019)	0.96	1.17	5.03	2.72	1.79	1.34	0.00	0.55	0.48	14.04
Percentage of the total expenditure										
2015	4.57	21.69	5.11	8.31	5.73	12.41	0.00	2.15	0.00	6.72
2016	10.66	11.30	5.99	1.85	2.44	10.06	0.00	0.00	4.89	5.54
2017	6.56	18.38	7.65	11.55	6.38	8.12	0.00	13.86	0.00	8.48
2018	5.50	0.00	13.31	19.80	6.44	7.81	0.00	4.15	13.67	10.44
2019	0.73	4.26	4.75	20.68	6.26	6.76	0.00	2.15	14.70	6.99
Average 2015-2019	5.71	11.88	7.47	13.01	5.47	9.07	0.00	4.73	7.10	7.67

