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Malaria Transmission Scenarios in the Brazilian Amazon

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Malaria remains one of the most significant diseases in the peripheral countries of the world's tropical and subtropical regions. In 2022, 131,224 cases were recorded in Brazil, 99% of which were in the country's northern region (Brazil, 2024). This study aimed to analyze the social and environmental determinants of malaria throughout the Brazilian Amazon in 2017-2022 and develop malaria transmission scenarios for 2030, 2040, and 2050. The Annual Parasite Index (API) and social and environmental indicators were calculated and inserted into a spatial database. Land use and land cover variables were included (forest, deforestation, urban area, indigenous lands, mining, hydroelectric dams), climate variables (rainfall, temperature, and humidity), and socioeconomic data (Gross Domestic Product and population growth). We use LuccME-Disease (Angelo, 2015), an open-source modeling platform developed by the Earth System Science Center (CCST) of the National Institute for Space Research (INPE) and implemented in TERRAME (AGUIAR et al., 2011) for spatially explicit models of communicable diseases to elaborate the scenarios. We created three scenarios, optimistic, pessimistic, and intermediate, based on the API rate of reduction for the Brazilian Amazon region and on climate, land use, and cover scenarios (Bezerra, 2022). Preliminary results show a reduction in malaria cases in the Amazon as a whole, with an increase in the disease in municipalities that have seen an increase in deforestation for illegal mining and occupation of indigenous lands.

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