

Socioeconomic Inequities Continue to be Drivers of Malaria in India: Mapping Districts between 2019-2023

Avik Kumar Sam¹, Neha Keshri¹, Harish C. Phuleria^{1,2}

¹ *Environmental Science and Engineering Department, Indian Institute of Technology Bombay, Mumbai, India*

² *Inter-Disciplinary Program in Climate Studies, Indian Institute of Technology Bombay, Mumbai, India*

Malaria continues to be a significant contributor to the disease burden in India, bearing a substantial economic and policy mandate. The National Center for Vector-Borne Disease Control Programme (NCVBDC), an umbrella body under the Federal Ministry of Health and Family Welfare, has targeted 2027, two years from now, as the year of achieving zero Indigenous cases. Here, we map the malaria cases across the Indian districts between 2019 and 2023 using a digital dashboard and assess the potential drivers of malaria transmission.

We collated the annual district-wise data on the Annual Parasite (API) and Falciparum Incidence (AFI) from the NCVBDC. Socioeconomic inequities data was obtained from the Demographic and Health Survey, while land-use land-cover and meteorological data were collated from the satellite reanalysis data platforms. We use an ensemble of statistical models to identify the associated covariates responsible for malaria transmission and Getis-Ord Gi* statistics to identify the clusters.

India reported 0.33 million cases in 2019, which reduced to 0.18 million in 2020 when the COVID-19 pandemic occurred. The cases further decreased by 13.3% the following year, but then it again increased in 2022 and 2023 when 0.23 million cases were reported. The *P. falciparum* infested regions are mainly prevalent in Northeastern and Central India, as the districts reported both API and AFI > 10. This is also evident from the spatially clustered hotspots, defined by the significant positive Getis-Ord G* statistics. However, while the clusters in Central India weakened, the districts in Northeast India experienced intensified clustering over the years. The ensemble models suggest that the marginalised socio-economic communities residing in forested regions witnessing high rainfall remain the most vulnerable to Malaria. Our dashboard will help the stakeholders and the general public to gain insights into malaria transition across Indian districts and will aid in better awareness.

Keywords:

Infectious diseases, Big data, Policy, Spatial statistics, Policy, Health co-benefits

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