

Title: Impact of climate change on vector-borne diseases: Exploring hotspots, recent trends and future outlooks in Bangladesh

Author: Md. Jannatul Naeem Jibon, S.M. Ridwana Prodhan Ruku, Abu Reza Md Towfiqul Islam, Md. Nuruzzaman Khan, Javed Mallick, A.B.M. Mainul Bari, Venkatramanan Senapathi

Abstract: Climate change is a significant risk multiplier and profoundly influences the transmission dynamics, geographical distribution, and resurgence of vector-borne diseases (VBDs). Bangladesh has a noticeable rise in VBDs attributed to climate change. Despite the severity of this issue, the interconnections between climate change and VBDs in Bangladesh have yet to be thoroughly explored. To address this research gap, our review meticulously examined existing literature on the relationship between climate change and VBDs in Bangladesh. Using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach, we identified 3849 records from SCOPUS, Web of Science, and Google Scholar databases. Ultimately, 22 research articles meeting specific criteria were included. We identified that the literature on the subject matter of this study is non-contemporaneous, with 68% of studies investing datasets before 2014, despite studies on climate change and dengue nexus having increased recently. We pinpointed Dhaka and Chittagong Hill Tracts as the dengue and malaria research hotspots, respectively. We highlighted that the 2023 dengue outbreak illustrates a possible shift in dengue-endemic areas in Bangladesh. Moreover, dengue cases surged by 317% in 2023 compared to 2019 records, with a corresponding 607% increase in mortality compared to 2022. A weak connection was observed between dengue incidents and climate drivers, including the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). However, no compelling evidence supported an association between malaria cases, and Sea Surface Temperature (SST) in the Bay of Bengal, along with the NINO3 phenomenon. We observed minimal microclimatic and non-climatic data inclusion in selected studies. Our review holds implications for policymakers, urging the prioritization of mitigation measures such as year-round surveillance and early warning systems. Ultimately, it calls for resource allocation to empower researchers in advancing the understanding of VBD dynamics amidst changing climates.

Keywords: Climate change, Vector-borne diseases (VBDs), Bangladesh, Dengue, Malaria, Transmission dynamics, Geographical distribution, El Niño Southern Oscillation (ENSO).

DOI: <https://doi.org/10.1016/j.actatropica.2024.107373>