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Predicting the Suitability of Mosquito-Borne Disease Transmission under Climate Change

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Introduction

The majorities of the world's vector-borne diseases are carried by mosquitoes and affect people everywhere. More than half of the world's population is currently at risk from vector-borne diseases, which account for approximately 17% of all infectious diseases. Children living in the world's poorest communities, where living conditions are poor, immunity is low, and malnourishment is common, are the most at risk. These diseases can also result in permanent disability, pain, disfigurement, stigma, social exclusion, loss of earnings, high medical costs, and death, despite the fact that death is the most serious outcome. This impedes economic growth and puts children at risk. Risk monitoring is essential for supporting decision-making regarding resource allocation and prioritization, despite the fact that these diseases have control, prevention, and treatment options. This is the aim of initiatives like the Malaria Atlas Project, which investigates novel approaches to mapping the current distribution of malaria for the purposes of planning, control, and prevention. However, as climate change progresses, it is anticipated that these diseases' distributions will shift.

Description

Based on the most recent projections from climate models, this study uses a unified mechanistic model to estimate the number of months during which malaria, Zika virus, and dengue fever could spread globally today and by 2050 under two climate change scenarios. The two selected future shared socioeconomic pathway (SSP) scenarios, SSP1-2.6 and SSP5-8.5, fall within the range of plausible global warming projections used in the most recent Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

In order to support climate change mitigation strategies and disease prevention and control, it is essential to make use of the most recent CMIP6 projections for an up-to-date, comprehensive view of the impact of potential differences in climate change trajectories on vulnerable populations. Future decision-making, planning, and reporting for a wide range of stakeholders in a variety of environmental and geopolitical contexts, such as UNICEF's Children's Climate Risk Index [1-3], can be made more efficiently and effectively by combining a single metric for the three major diseases spread by mosquitoes. The main findings are that the geographical and temporal suitability of dengue fever and Zika virus transmission will increase under the highest-emissions global warming scenario, with the latter finding greater significance. Malaria exhibits a distinct pattern, with both climate change scenarios decreasing the overall temporal and geographical suitability for transmission. However, transmission suitability for concentrated areas in Central Africa will rise significantly in either scenario. Because they have never been exposed to malaria, some of these populations lack immunity. As global warming accelerates, especially in the worst-case scenario, the geographic coverage of endemic transmission suitableness for Zika virus and dengue fever is currently much greater than that for malaria. Under both climate change scenarios, dengue fever and Zika virus are anticipated to experience much smaller reductions in the temporal and geographic extent of transmission suitability than malaria. This does not mean that malaria is becoming less of a threat because the consequences are still severe, especially for children, who are more likely than adults to die from malaria and die from dengue or Zika [4,5].

Conclusion

However, taking into account these three major diseases together demonstrates the possibility of shifting resources toward newly affected and more severely affected regions for malaria prevention and control, as well as putting dengue fever and Zika virus prevention and control at the top of the priority list for the most severely affected tropical regions. Prioritizing interventions is difficult due to the widespread risk of dengue fever and the Zika virus, but appropriate actions are necessary to safeguard global health now and in the future. insecticides, which can make mosquitoes more resistant and have negative effects on the environment; removing breeding grounds for mosquitoes; campaigns to educate the public about how to avoid being bitten by mosquitoes; and the widespread use of insecticide-treated nets are current interventions.

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None.

Conflict of Interest

Authors declare no conflict of interest.

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