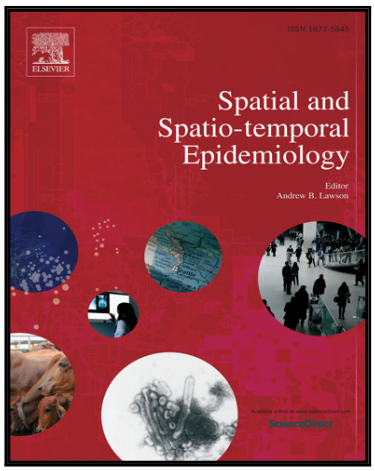

The spread of mosquito-borne viruses in modern times: a spatio-temporal analysis of dengue and chikungunya

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Title

The spread of mosquito-borne viruses in modern times: a spatio-temporal analysis of dengue and chikungunya

Authors

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Abstract

Since the 1970s, mosquito-borne pathogens have spread to previously disease-free areas, as well as causing increased illness in endemic areas. In particular, dengue and chikungunya viruses, transmitted primarily by *Aedes aegypti* and secondarily by *Aedes albopictus* mosquitoes, represent a threat for up to a third of the world's population, and are a growing public health concern.

In this study, we assess the spatial and temporal factors related to the occurrences of historic dengue and chikungunya outbreaks in 76 nations focused geographically on the Indian Ocean, with outbreak data from 1959 to 2009. First, we describe the historical spatial and temporal patterns of outbreaks of dengue and chikungunya in the focal nations. Second, we use a boosted regression tree approach to assess the statistical relationships of nations' concurrent outbreak occurrences and annual occurrences with their spatial proximity to prior infections and climatic and socio-economic characteristics.

We demonstrate that higher population density and shorter distances among nations with outbreaks are the dominant factors that characterize both dengue and chikungunya outbreaks. In conclusion, our