

THE IMPACT OF CLIMATE CHANGE ON DENGUE TRANSMISSION IN NICARAGUA

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Background/Aims: In 2007, 918,495 cases of dengue and dengue hemorrhagic fever occurred in Latin America (Barclay 2008). Climate change is projected to alter the transmission of dengue through changes in temperature and precipitation, which affect biological factors and human ecology. A sustained decline in precipitation could lead subsistence farmers to migrate to urban areas, where dengue can become hyperendemic due to poor living conditions and unsafe water storage (Campbell-Lendrum and Corvalán 2007). This study compared the incidence of dengue in Nicaragua under climate change and non-climate change scenarios using mathematical models.

Methods: The study used a deterministic Susceptible, Infectious, Recovered (SIR) compartmental model to compare dengue incidence projections over the next 100 years with and without climate change. Climate change was parameterized as a temperature increase of two degrees Celsius over 100 years and a decline in precipitation, resulting in urbanization. Incidence projections were compared between non-climate change, climate change, and intervention scenarios, which included 1) controlling mosquito population growth; 2) reducing the effective contact rate between mosquitoes and urban residents; 3) promoting sustainable agricultural practices (thus reducing urbanization); and 4) increasing mosquito mortality through vector control programs.

Results: The projected number of symptomatic dengue cases over the next 100 years (from 2010 to 2110) under the climate change scenario was 91% higher than under the non-climate change scenario. This increase was reduced to 89, 86, 44, and 27% by applying interventions one through four above, respectively.

Conclusion: Climate change mitigation will require strengthening public health infrastructure to address biological and socioeconomic determinants of infection. Future research should identify interdisciplinary interventions employing optimal combinations of strategies to reduce dengue transmission in the face of climate change.

References:

- Barclay, E. (2008). "Is climate change affecting dengue in the Americas?" *The Lancet* **371**(9617): 973-974.
Campbell-Lendrum, D. and C. Corvalán (2007). "Climate Change and Developing-Country Cities: Implications For Environmental Health and Equity." *Journal of Urban Health* **84**(0): 109-117.