

Climate and vector-borne disease: investigating drivers of dengue emergence in Córdoba, Argentina

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Dengue fever is a viral disease transmitted by the mosquito species *Aedes aegypti*. Dengue is endemic to many tropical and subtropical regions of the world; however, outbreaks have been occurring in more temperate regions in the last two decades. In the temperate city of Córdoba, Argentina, the first dengue outbreak on record occurred in 2009 and in the decade since, dengue transmission has been reported every year, with three other large outbreaks occurring in 2013, 2015, and 2016. This emergence of dengue is likely to have a number of drivers including increases in travel between Córdoba and dengue-endemic regions as well as changes in temperature and precipitation patterns caused by global climate change. Temperature and/or precipitation are known to impact various parts of the dengue transmission cycle, including mosquito development and survival and the incubation period of the virus in the mosquito host. In this work, we expand a classic vector-host epidemiological ordinary differential equations model to include time-varying impacts of temperature and precipitation. With this model, we explore the recent outbreaks of dengue in Córdoba to investigate the potential role of changes in climate patterns in the emergence of dengue in the city. We discuss the potential implications of our results for mosquito control and dengue mitigation strategies in Córdoba and other temperate cities, including U.S. cities where dengue emergence may be possible.

*Mini-Symposium: Advancing Methods in Epidemiology