A new climate model can predict dengue outbreaks in the Caribbean region

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Changes in climate, such as rain and drought, can affect the risk of mosquito-borne diseases including dengue, chikungunya and Zika. An international team comprising the Barcelona Institute for Global Health

(ISGlobal) has developed a new tool to predict the impact of droughts and extreme rainfall on the risk of dengue outbreaks.

In recent years, the Caribbean region has faced a large number of disease outbreaks transmitted by the Aedes mosquito (dengue, chikungunya and Zika). It is also a region with large drought periods, particularly in years with El Niño events. During these dry seasons, many households store water in open containers, ideal breeding sites for mosquitoes. However, few studies have examined the effects of prolonged drought on dengue transmission.

Now, an international team has developed a statistical model for the Caribbean Institute for Meteorology & Hydrology in order to predict dengue outbreaks in Barbados. The methodology is based on previous studies performed for Brazil and Ecuador. Based on temperature and rainfall data, they built a model that predicted monthly dengue cases between 1999 and 2016. The results, published in *PLOS Medicine*, show that the tool successfully predicted the months with dengue outbreaks. In particular, the optimal conditions for outbreaks were drought periods followed by a combination of hot conditions and intense rainfall four to five months later.

Rachel Lowe, lead author and researcher at ISGlobal and the London School of Hygiene & Tropical Medicine, says, "This is the first statistical model that considers the combined impact of drought and rainfall in disease risk. This is important because climate change is leading to more intense and frequent droughts and hurricanes in the region. This tool is of great value for public health policies since it helps to plan interventions aimed at reducing the risk of dengue and other mosquito-borne diseases."

The model is expected to contribute to an early warning system for the entire Caribbean region to predict possible outbreaks of mosquito-borne

diseases three months in advance.

More information: Rachel Lowe et al, Nonlinear and delayed impacts of climate on dengue risk in Barbados: A modelling study, *PLOS Medicine* (2018). DOI: 10.1371/journal.pmed.1002613