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Links between weather variability and Dengue outbreaks in Sao Paulo, Brazil

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Mosquito-borne diseases are among the most dangerous threats for all people living in tropical areas. Previous research has shown that the highest incidence of mosquito-borne diseases is associated with a particular type of weather (usually wet and hot) as mosquitos' activity and development are highly dependent on meteorological conditions. However, short-term associations (on the scale of days up to a few weeks) have been less understood.

In this study, we collected weekly data on the incidence of Dengue on a municipality level in the state of Sao Paulo, Brazil, 2016–2022, and matched it with ERA5-based weather variables (ambient temperature, relative humidity, wind speed and precipitation). We employed a multilevel meta-regression analysis to i) analyse the links between Dengue incidence and weather variability in, and ii) develop a model to predict a Dengue fever outbreak based on actual weather conditions and socioeconomic variables.

Our preliminary results suggest a significant association of a Dengue outbreak with above-average daily mean temperature and humidity, heavy rainfalls, and calm conditions in previous 2-6 weeks. Further analysis is needed to identify spatial differences in these patterns based on socioeconomic conditions.