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Spatio-temporal patterns of dengue incidence and their associated factors, Brazil, 2000-2018

Dengue is a neglected tropical disease. This arbovirus is an important public health problem and has a great economic impact, especially in emerging countries. Globally, the incidence of dengue has expanded abruptly in recent decades, potentially associated with climatic factors. Here, we study the spatio-temporal dynamics of dengue incidence in Brazil, which has experienced severe and extensive epidemics over the past years. We use an ecological design and carry out spatio-temporal mapping of the disease distribution; we also investigate the effect of important risk factors for dengue incidence, including climate, environmental and socio-economic variables. All data are obtained from freely accessible sources, such as: Notifiable Diseases Information System – SINAN (Dengue cases), Brazilian Institute of Geography and Statistics - IBGE (demographic and socioeconomic information), and Global climate and weather data – WolrdClim (climate variables). Then, under different scenarios of changes in greenhouse gas emission, we predict the dengue incidence over the entire Brazil. We consider 19 years, from January 2000 to December 2018 and the spatial unit of analysis is micro region (set of municipalities with similar specificities, regarding the organization of space; there are 558 in Brazil). Using the R language and INLA package, we quantify the risks of dengue incidence associated with the covariates of interest, by building hierarchical models, within a Bayesian framework, taking into account latent spatio-temporal patterns. Preliminary analyses show evidence of an association between dengue dynamics and drought index, precipitation, temperature, urban infrastructure, biome, Normalized Difference Vegetation Index (NDVI), deprivation and elevation. In addition, there is a residual spatio-temporal dependence, in which distinct temporal patterns and unequal distribution of dengue incidence risk are observed through the Brazilian microregions. Understanding the spatial and temporal patterns and the factors associated with dengue is important for its surveillance and control.

Audience Take Away Notes

- Understand the importance of studying the Spatio-temporal dynamics of dengue incidence in the past years, in order to inform surveillance and control measures for future scenarios
- Understand the Spatio-temporal patterns of the disease in Brazil, a continental country
- Understand the relationship between climatic and socio-environmental factors and dengue incidence in Brazil

Biography

MSc Patricia Marques Moralejo Bermudi is a PhD student at the School of Public Health at the University of Sao Paulo, Brazil (FAPESP: 2020/12371-7). Currently she is undertaking a research internship at the School of Public Health at Imperial College London, England (FAPESP: 2021/11721-7). She completed her master's and undergraduate degree in Public Health at University of Sao Paulo. She has taught two short courses and has 10 scientific articles published, two scientific articles accepted for publication and one book chapter published.