Universität Basel

Publication

Bayesian geostatistical modeling of leishmaniasis incidence in Brazil

Leishmaniasis is endemic in 98 countries with an estimated 350 million people at risk and approximately 2 million cases annually. Brazil is one of the most severely affected countries.; We applied Bayesian geostatistical negative binomial models to analyze reported incidence data of cutaneous and visceral leishmaniasis in Brazil covering a 10-year period (2001-2010). Particular emphasis was placed on spatial and temporal patterns. The models were fitted using integrated nested Laplace approximations to perform fast approximate Bayesian inference. Bayesian variable selection was employed to determine the most important climatic, environmental, and socioeconomic predictors of cutaneous and visceral leishmaniasis.; For both types of leishmaniasis, precipitation and socioeconomic proxies were identified as important risk factors. The predicted number of cases in 2010 were 30,189 (standard deviation [SD]: 7,676) for cutaneous leishmaniasis and 4,889 (SD: 288) for visceral leishmaniasis. Our risk maps predicted the highest numbers of infected people in the states of Minas Gerais and Pará for visceral and cutaneous leishmaniasis, respectively.; Our spatially explicit, high-resolution incidence maps identified priority areas where leishmaniasis control efforts should be targeted with the ultimate goal to reduce disease incidence.