World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:9, No:01, 2015

Bayesian Locally Approach for Spatial Modeling of Visceral Leishmaniasis Infection in Northern and Central Tunisia

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Abstract : This paper develops a Local Generalized Linear Spatial Model (LGLSM) to describe the spatial variation of Visceral Leishmaniasis (VL) infection risk in northern and central Tunisia. The response from each region is a number of affected children less than five years of age recorded from 1996 through 2006 from Tunisian pediatric departments and treated as a poison county level data. The model includes climatic factors, namely averages of annual rainfall, extreme values of low temperatures in winter and high temperatures in summer to characterize the climate of each region according to each continentality index, the pluviometric quotient of Emberger (Q2) to characterize bioclimatic regions and component for residual extra-poison variation. The statistical results show the progressive increase in the number of affected children in regions with high continentality index and low mean yearly rainfull. On the other hand, an increase in pluviometric quotient of Emberger contributed to a significant increase in VL incidence rate. When compared with the original GLSM, Bayesian locally modeling is improvement and gives a better approximation of the Tunisian VL risk estimation. According to the Bayesian approach inference, we use vague priors for all parameters model and Markov Chain Monte Carlo method.

Keywords : generalized linear spatial model, local model, extra-poisson variation, continentality index, visceral leishmaniasis, Tunisia
Conference Title : ICSEM 2015 : International Conference on Statistics, Econometrics and Mathematics
Conference Location : Paris, France
Conference Dates : January 23-24, 2015