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*Geostatistical Model for Spatially Aggregated Disease Incidence Data*

Clinical data on the locations of syphilis cases in North Carolina are modelled with the aim of finding areas of abnormally high risk. Inference is complicated by uncertainty of case locations due to the aggregation in the population reporting census regions. A model is introduced consisting of a continuous random spatial surface with aggregated responses and fixed covariate effects. The process is modelled on a fine lattice and Bayesian inference is performed using Markov Chain Monte Carlo with data augmentation. Simulations studies are carried out to compare with the Besag-York-Mollié model and a model assuming the exact locations are known.