

INFERENCE FOR EXTREMES IN DISEASE MAPPING

by

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ABSTRACT

Hierarchical probability models for disease-incidence rate data can be used to obtain the joint posterior distribution for the entire vector of small-area disease-incidence rates while taking into account the spatial nature of the data. Summarizing the posterior distribution by a vector of posterior means or medians, as would be suggested by componentwise squared-error or absolute-value loss functions, will tend to underestimate the extremes in the distribution of underlying rates. However identifying regions with unusually high disease-incidence rates is an important part of investigating possible causes of the disease. An alternative loss function is proposed for estimating the extreme region and its disease-incidence rate. A posterior predictive approach is used to address the importance of covariate information and to determine whether the extreme regions correspond to unusual "hot spots," regions with incidence rates beyond what would be expected due to the statistical variation inherent in the fitted model.