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Misclassification bias in geographic epidemiology

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Geographic epidemiology is concerned with the investigation of spatially referenced data to discover spatial patterns in the health status of populations. In this context it is generally assumed that a perfect diagnostic test is used to classify individuals as positive or negative hence health status is measured without error. In this work the effect of an imperfect diagnostic test on spatial patterns of disease in regional count data is investigated by example. Specifically the misclassification effect on the semivariogram, Moran's I statistic and the spatial scan test are evaluated for the situation of West Nile virus infections among dead birds sampled from the 30 public health units of southern Ontario in 2005. It is concluded that under large sample conditions no serious spatial bias is introduced by use of an imperfect diagnostic test as long as the imperfection itself is spatially unbiased.