
During the recent past, we and others (especially Anselin 1995) have developed a number of instruments that have been used for spatial pattern analysis. In shorthand, these have been referred to as \( I, G, O, H, \) and \( AMOEBA \). \( I \) and \( G \) represent families of both global and local autocorrelation statistics. The \( I \) statistics measure spatial co-variances and the \( G \) statistics are based upon local means. These have been used for a wide variety of purposes, particularly including the spatial study of disease distributions. \( O \) is a local statistic that takes into consideration global autocorrelation while \( H \) is a local statistic that concentrates on the local heteroscedasticity of underlying spatial distributions. Finally, \( AMOEBA \) is an algorithm that uses these statistics as measures of spatial autocorrelation in order to find irregularly shaped clusters of such things as disease patterns. We propose the further use and expansion of these topics in order to study the time-based transmission of diseases, in particular, Ebola as it has occurred.
and is continuing to occur in West Africa (Liberia, Sierra Leone, and Guinea). Our data and analysis focus on the 14 official districts of Sierra Leone.

Our work has been of use to analysts and health practitioners for the study of other diseases such as measles and dengue fever. In both cases, and in the case of Ebola, a crucial element is finding or collecting reliable information for analysis. We are fortunate in being able to use extract data from the database compiled initially by Caitlin Rivers, a Ph.D. student at Virginia Tech, from daily reports of the Sierra Leone Ministry of Health and Sanitation; the Ministry continues to issue these reports. As expected, the task of data collection, storage, and manipulation, presents time-consuming problems that must be solved before spatial statistical analysis can begin. We would like to share with participants our experiences in this area of research. We go about this study by finding descriptive probability models that indicate theoretical directions for the explanatory phases of the endeavor. For example, a best fit Gompertz curve describes the total time-based cumulative distribution of confirmed cases of Ebola in Sierra Leone and provides estimates of the total size of the epidemic. This approach enables us to examine the value of both regional and national analyses in seeking to understand the pattern of disease transmission.

This is followed by a study of the evolution of the outbreak in each of Sierra Leone’s districts. This calls for adapting our $O$ and $H$ statistics together with AMOEBA type algorithms to describe the local spatial autocorrelation and heterogeneity of confirmed Ebola cases over time. The approach is novel in that new clustering and heterogeneity aspects of the disease can be accounted for by lending themselves to explanatory models. We hope to learn more about the spatial transmission of the disease even as steps are taken to mollify its effect on local populations. We attempt, once again, to show the importance of space-based thinking for the solution of complex socio-health problems.
Bibliography