

Statement for Research Workshop on Spatial Analysis of Health Risk Perception

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I am a geographer who for the past decade has worked on problems of small-area analysis of spatial patterns of disease. I am intrigued by the idea that the dominant theories and methods in this area presuppose that measures of disease risk have been made for small areas whereas health risks rarely, if ever, coincide with the areas for which these measures are made. Thus I start with a concern for this fundamental spatial disconnect and I ask why the literature that measures health risks has developed in this way. I also ask whether it should be a source of concern that we frequently define health risk for small areas when we have evidence that “real” risk is spatially distributed so differently. I think, for example, that it would be interesting to make simulated data for a region in which hypothetical spatial patterns of increased health risk are applied to a population and then make measures of “health risk” based on small areas following traditional approaches. I suspect that a series of realistic simulations would show many cases where measures of health risk are substantially less than they ought to be because of the spatial disconnect between the areas for which measurements are made and the areas where the real risk is elevated. There is, of course, some recognition of this problem in the literature, but I do not see much research designed to deal with the problem. For examples of excellent Monte Carlo simulations of disease patterns, I am impressed with the work of Gelman and Price (1999).

The difference can be seen in the otherwise excellent system for analysis of health risk in the UK described by Aylin et al. (1999), which is area based and one of my current research projects—supported by CDC—which is point-based. An interesting discussion of the problem in general is found in Wakefield and Elliott (1999). In our project we are attempting to develop a GIS-based, rural health surveillance system for evaluating environmental health risks in a typical Iowa county. In this and other projects I am engaged in, I am concerned that contemporary standards for geocoding disease incidences in relation to exposures to potential health risks are not adequate to test reasonable hypotheses without incurring high likelihoods of falsely rejecting hypotheses that are true. I am just beginning a three-year project to evaluate standards for geocoding prostate cancer cases and to determine standards for determining whether methods used are adequate for the purposes used.

My broader research interest is in finding methods to identify robust spatial patterns in measures of the cancer burden. I am working with others here at Iowa on developing “A GIS-based workbench to interpret cancer maps”—a project supported by a grant from the National Cancer Institute. As the title implies, the idea is that through Monte Carlo simulations in which individuals or groups of individuals have computed probabilities of having a given level of cancer burden (for example, the probability that a person with colorectal cancer will be at late-stage when their cancer is first diagnosed), we develop expected spatial patterns consistent with the models that produced the probabilities. We then search for patterns in the differences between expected and observed spatial patterns of the disease burden. We argue that policies or intervention strategies to improve health

outcomes and reduce health risks can be geographically tailored to these observed differences. The purpose of the workbench ultimately is to provide a computational system of analysis for people in regions who are designing more effective cancer control and prevention programs to tailor their interventions to spatial characteristics of the disease burden after adjusting for spatial variations in covariates that affect the disease burden. There are many problems to be investigated and solved before this will be a reality. I am working with colleagues in epidemiology and health administration at Iowa who are working on statistical analyses to account for the influence of covariates in contributing to the cancer burden. One aspect of their research in our project is to link individual records of the diagnosis and progression of breast and colorectal cancer with records of treatment from their health insurance records and Medicare records.

References cited

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