Lee Mobley: Areas of Research Interest

Areas of research interest include:

- spatially-enabled analysis of variation in: treatment effectiveness, regional healthcare quality, and healthcare outcomes and access;
- combined behavioral and geo-demographic risk assessment in understanding the incidence and prevalence of disease;
- corrections for spatial multiplier effects;
- examining the potential for spatial regression in hierarchical disease modeling.

Some examples of spatial analyses I have done and challenges faced in my current work that would benefit from expert knowledge are summarized below, in three main areas.

1. Spatial Analysis of Survey Data

As a specialist in market economic theory, I have been interested for some time in how market environment – including supply and demand factors, and their interactions – can impact economic outcomes such as costs, prices, and access to care for the poor and uninsured. In the early part of my career as a health economist, I had access to good data on hospitals, and focused a lot of research effort on understanding the supply side of the market. Supply-side market factors include aspects such as provider shortages, provider market power and its impacts on economic outcomes, provider attitudes about managed care, provider acceptance of managed care rates and fees, restrictive hospital admissions practices that distort location of services received, and selective contracting by managed care payers that results in reduced choice of provider among the insured. During that period, I was not able to include any really good, micro-level, demand-side data.

Since moving to RTI, I now have access to very good demand-side data, mostly from Medicare claims files and Medicare surveys – so my recent work has focused more on the elderly. I am now very interested in understanding more about social variation and how it impacts healthcare outcomes. In order to model this, I have found that it is very important to account for variation in the supply-side market environment, which forms part of the context for behavioral health decisions. (The same person may make different choices if placed in a very different market environment!) I have applied spatial cluster analysis to rates of dissatisfaction reported by Medicare beneficiaries who disenrolled from Medicare HMOs for various reasons. The Reasons include: access reasons, cost reasons, limited doctor choice, limited drug coverage, and information problems. These Reasons 'hot spots' cluster in different places – suggesting that specific plan-level and or market-level factors may be causing the observed coincidence of complaints. I have subsequently applied an ad-hoc procedure to analyze the underlying contextual factors – simple t-tests comparing means for variables in hot spots versus other places. Significant differences are found in market factors across the hotspots and other places, which have interesting policy implications. However, I am not confident about this ad-hoc t-test approach for several reasons. First, the survey data are stratified samples, not random, and I can't comprehend how survey design weights might confound the identification of clusters or the t-tests themselves. I don't know how to incorporate the sample design weights into the cluster analysis; this would 'explode' the sample into a nationally-representative sample. The sample design draws the same number of respondents from

each plan, regardless of plan size, so the sample design weights also account for uncertainty related to n/N. Spatial clusters are identified on the unweighted sample data using closest neighbor spatial weights, and results (hotspots) seem robust to whether sparser counties (those with fewer respondents) are included or excluded from the analysis. But while the clusters identified seem robust to this source of spatial heterogeneity in the Reasons rates, I don't know whether I have violated a basic premise of the local spatial autocorrelation methodology by employing it on data that are likely *not* to be stable over time. An assessment by a spatial econometrician of the capabilities and limitations of local spatial autocorrelation tests for analysis of survey data would be very helpful to me.

2. Spatial Interaction Among Individuals

The interaction among individuals, and the impact of peers and local cultural enclaves on personal behavior, is another intriguing area that is very difficult to model. Agent-based simulation models have been used to parameterize cohorts of individuals and to interact them with their geographic environment (1). These models are somewhat unsatisfactory to me, because they do not readily allow assessment of statistical significance or conduction of statistical inference. Thus I have been intrigued by the idea of morphing a spatial econometric model of spillovers so as to account for interactions among people. I believe this would require establishing spatial weights based on economic or cultural similarity variables (to capture peer/culture effects) similar to the 'economic weights' proposed by Case, Rosen, and Hines (2). The problem is that such an approach would introduce spatial heterogeneity that could confound assessment of spillover effects, and the method might also be susceptible to endogeneity bias. However, I think there is some merit in attempting to model inter-personal interaction in a way that accounts for contextual factors, so I think spatial spillover components in hierarchical disease models might be quite useful. If there is anyone out there doing work like this, I would be most interested in seeing it. The closest I've found is work by Michael Oakes (3).

3. Person-Specific Measures of Access Impedance

For some time I have also been intrigued by the challenge posed by attempts to measure access impedance. It seems to me that such measures should be individual-specific. Individual-specific measures would help explain why some women are diagnosed at Stage IV cancer, and others are diagnosed at Stage I, for example. I am most interested in developing impedance measures that combine several factors into a single, individual-specific score. Some limited work I have done using 'map algebra' tempts me to believe that various factors could be summed or aggregated cartographically. This is appealing because it opens the possibility of combining raster-based data layers with vector-based data layers. Ideally, we could create a score for an individual that reflected topographic impedance factors as well as market contextual and cultural/social contextual factors. I think of this hypothetical score as a measure of the true 'economic distance', a measure of the impedance faced by an individual in the production of his or her health.

(1) For example, The Santa Fe Institute has been very involved in using agent-based simulation, and have a few people working on modeling the spread of epidemics: http://www.santafe.edu/sfi/publications/wpabstract/199901004

(2) Case, A. and Rosen, H. and Hines, J., "Budget Spillovers and Fiscal Policy Interdependence: Evidence From the States", Journal of Public Economics, v 52 (1993), pp 285-307.

(3) Michael Oakes' paper entitled " The Mis-Estimation of Neighborhood Effects: Causal Inference in Multilevel Models with Observational Data" will be presented at the American Statistical Association – Health Policy Statistics Section conference (International Conference on Health Policy Research: Methodological Issues in Health Services and Outcomes Research) in Chicago. The paper will be presented in an organized session (Saturday October 18 at 2:15 PM ) entitled *Applications of Spatial Econometrics to Healthcare*.