



Chapter V

Constructing Geographic Areas for Analysis of Homicide in Small Populations: Testing Herding-Culture- of-Honor Proposition

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Abstract

The rate estimates for rare events like homicide in small populations are very susceptible to data errors, and thus compromise the validity of inferences. This chapter discusses two geographic information systems (GIS)-based methods for constructing geographic areas with sufficiently large base populations to permit reliable estimates of homicide rates to be obtained. One is the spatial order method, and the other is the ISD method (after the Information & Statistics Division of the Health Service in Scotland, where it was devised). Both methods construct new analysis areas

based on spatial proximity of basic units. For demonstration, the methods are applied to testing the herding-culture-of-honor hypothesis proposed by Nisbett and Reaves, and the result shows that the herding-culture-of-honor proposition is merely an artifact of unreliable estimate of homicide rates. The methodology, in general, is applicable to analysis of any rates with small base populations.

Introduction

The study of homicide rates across geographic units and for demographically specific groups often entails analysis of aggregate homicide rates in small populations (Loftin and McDowall, 2000)¹. This presents three serious analytical problems:

- (1) *Sensitivity of Rate Estimates to Data Errors.* Research shows that significant *reporting errors* exist in major U.S. crime data systems including those for homicides. In addition, researchers find it necessary to eliminate some homicide cases because information about certain demographic variables may be missing. This can lead to the *error of missing data*. Homicide rates from small populations can be very sensitive to these data errors.
- (2) *Fairness of Statistical Sampling.* Crime rates, including those for homicide, are usually based on geopolitical entities (for example, county) or predefined arbitrary census units (for example, census tract), which are markedly heterogeneous in population size. An area that has a very large population may thus be equated with one that has a very small population, causing “over-sampling” of sparsely populated areas.
- (3) *Violating Assumptions in Ordinary Least-Squares (OLS) Regressions.* Researchers often use OLS regressions in analysis of homicide rates. The existence of larger errors of prediction for homicide rates based on small populations than for large populations violates the assumption of *homogeneity of error variance* in OLS regressions. As population decreases, one expects to see more and more cases of zero homicide. The increasingly skewed error distribution towards the lower bound of zero violates the assumption of *normal error distribution* in OLS regressions.

Several strategies have been attempted to mitigate or resolve the problem of small population-base rates by criminologists. The first is to use homicide counts

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