Chapter IV

The Application of Spatial Analysis to the Public Health Understanding of Alcohol and Alcohol-Related Problems

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This chapter describes research that uses spatial modeling to address pressing issues related to a public health understanding of alcohol problems and violence. First, we introduce the language of spatial analysis used in prevention work and discuss the details of spatial research that result in useful public health information, particularly in regard to alcohol-related problems. Issues such as geo-mapping, variable selection, and area definition are discussed in regard to community level occurrence of such problems.

We then discuss the general context for understanding the geographic relationship between alcohol outlet density and violent crime. Finally, we
give a specific example of an analysis focusing on alcohol outlets and violence. This work is related to the major goal of studying the community geography of alcohol problems by mapping the alcohol environment, relating these features of the environment to the spatial distribution of problem events, and analyzing the statistical associations between these measures and drinking behaviors.

INTRODUCTION

The application of spatial methods to prevention issues in public health is a potentially powerful approach that is quite complex in terms of data demands and implementation. Further, spatial analysis in public health may be considered suspect as a result of the possibility of ecological bias (that is from only having information about total exposure and outcomes while individual exposures and outcomes are unknown). Nevertheless, spatial analysis addresses an often forgotten or misunderstood aspect of public health, the dynamics of people in places. Usually epidemiologists examine individual effects of exposures on illness and only include larger, community-based information as a variable in a multivariate model. The implication of such research is that the individual is the only unit of analysis that is important for helping understand public health problems. At this point in time, however, with advances in computer technology, there are ways to more coherently contextualize the manner in which the individual exists within a larger framework that is composed of both the human community and the physical reality of the environment (streets with intersections, dense vs. sparse neighborhoods, high or low densities of liquor stores or restaurants, etc.).

This broader context of the unit of analysis in public health research is actually an honored part of the history of modern public health and epidemiology. John Snow developed an extensive spatial map delineating water sources for London (Snow, 1855). This clearly displayed a possible testable hypothesis for the characteristic spread of cholera at the time (i.e., the differential use of specific water suppliers). Indeed, at the dawn of modern epidemiological/public health research, spatial analysis was, as a matter of course, naturalistically employed. This promising beginning, however, did not evolve into standard practice in epidemiology, as a more medicalized perspective rose to dominance.

Although it is not difficult to explain why the history of public health in the previous century has mostly concentrated on the medicalized/individualized sense of exposure and disease, the demands of public health can no longer allow us to use such an outmoded approach. The dynamics of human behavior have been treated in a too simple manner, excluding the physical/ecological structure in which