

Grocery Store Accessibility & Health Outcomes in Central NY

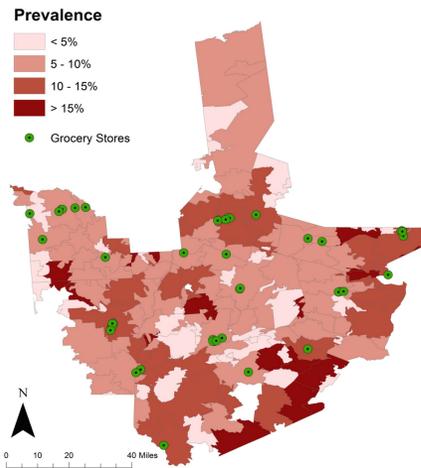
Introduction

“Food Deserts” are areas that lacks access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet. The sparse distribution of grocery stores requires people to travel long distances to access healthful food vendors. More readily available food retailers like convenience stores tend to sell food that is energy-dense, nutrient-poor, with high quantities of sugar, fat, and sodium. Diets high in these foods are associated with poor health outcomes like obesity, cardiovascular disease, and type II diabetes.

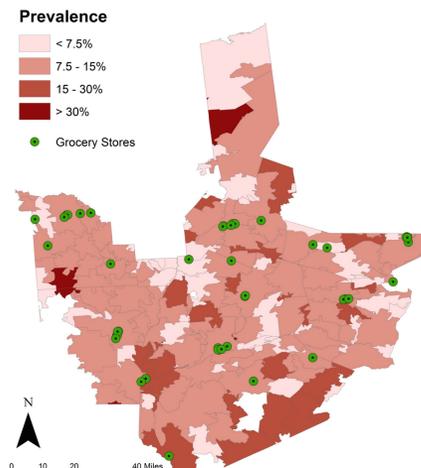
The Bassett Healthcare Network is a health care system that provides services to people living in a 5,600 square-mile region of central New York State, an extremely rural area. To better understand the health needs of people in this area, the Bassett Research Institute conducted a survey in 2009 to monitor the health status of residents living in seven counties (Schoharie, Otsego, Montgomery, Madison, Herkimer, Delaware, and Chenango). The survey included questions asking participants to report body-mass index (BMI) and diagnoses of type II diabetes, heart disease, high blood pressure, and high cholesterol.

Food deserts are a major concern of public health professionals; and changing the built environment to increase access to healthful foods could be one way to improve population health. This project seeks to identify a relationship between grocery store distribution and health status by zip code in the Bassett region, to address the hypothesis that poor health outcomes will be more prevalent in zip codes longer distances from grocery stores.

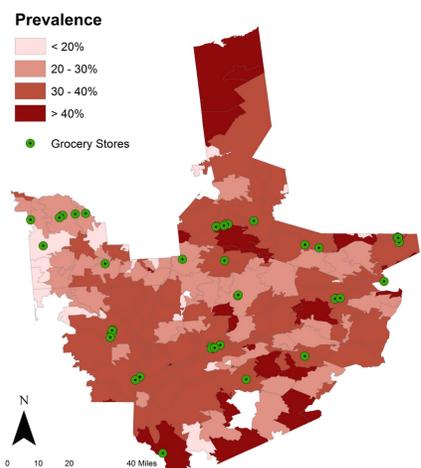
Type II Diabetes



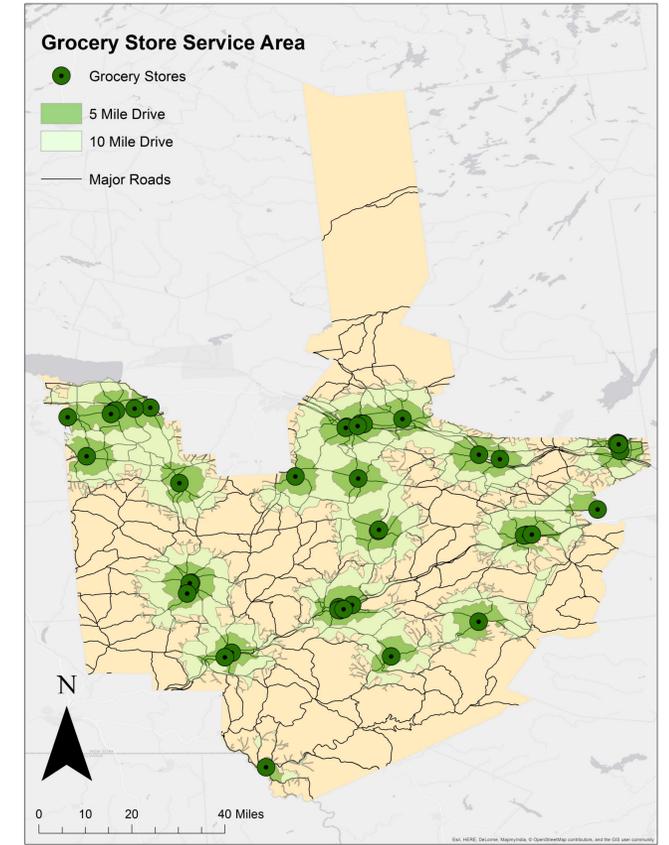
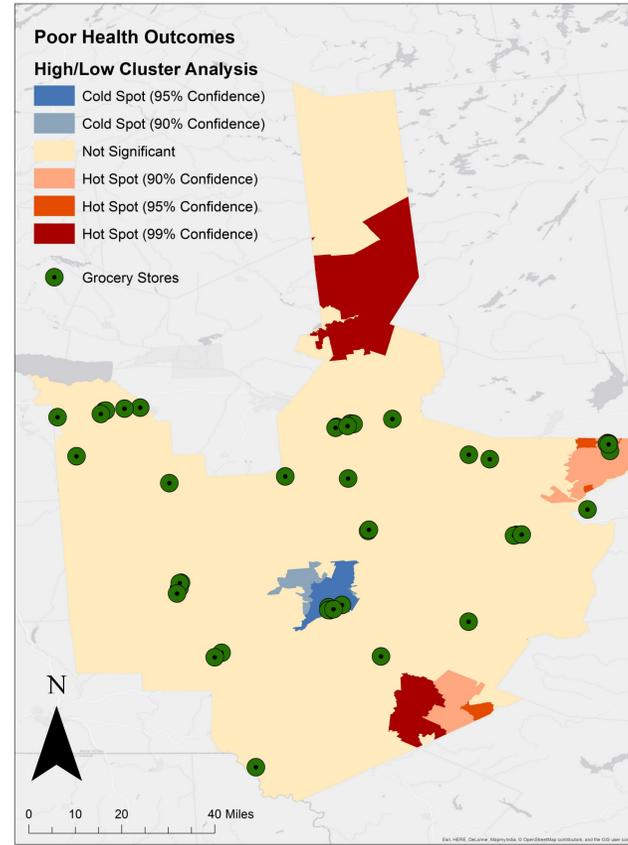
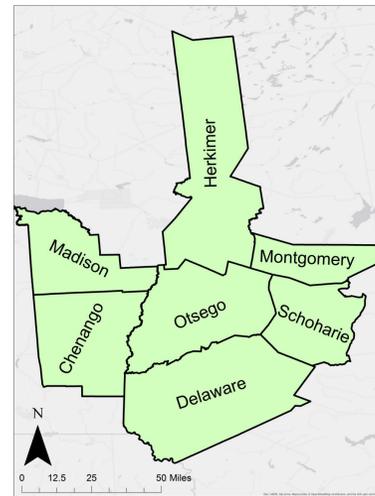
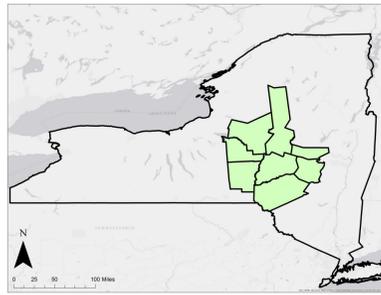
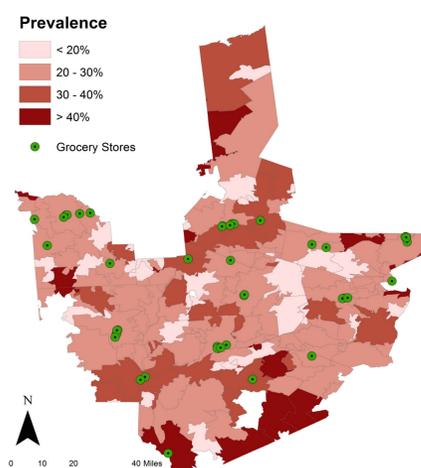
Heart Disease



High Blood Pressure



High Cholesterol

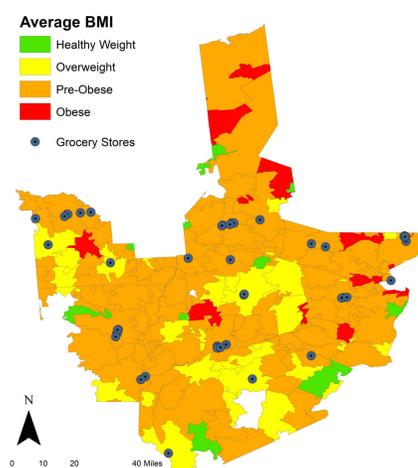


Methodology

A list of chain grocery stores and their location was obtained using Reference USA; the stores were geocoded using latitude and longitude in ArcMap. To assess driving accessibility, the network analyst tool was used to generate five-mile and a ten-mile service areas.

Data from the Upstate Health and Wellness Survey of 2009 was provided by the Bassett Research Institute. Given well-supported correlations with diet and nutrition, BMI, type II diabetes, heart disease (HD), high blood pressure (high BP), and high cholesterol were examined as poor health outcomes of interest. The data were summarized by zip code using ArcGIS. Percent of residents reporting poor health outcomes was calculated for each zip code. Average BMI was calculated by zip code and grouped into the World Health Organization BMI classification categories: healthy weight (<25), overweight (25-27.5), pre-obese (27.5-30), and obese (≥ 30). A “poor health outcomes” score was calculated by aggregating the outcomes per person (BMI > 30, type II diabetes, HD, high BP, and high cholesterol) with a score ranging from 0-5. Average poor health outcome score was calculated for each zip code, and High/Low Cluster Analysis (Getis-Ord General G) was used to assess spatial autocorrelation in ArcMap.

Body Mass Index



Results & Conclusions

A large area of the Bassett Healthcare Region is not within a 10-mile drive of a grocery store. 19% of zip codes are completely outside of the calculated grocery store service area (See table 1). High/Low Cluster Analysis showed that hot spots for poor health outcomes (areas with statistically higher reporting than the surrounding area) clustered farther from grocery stores, with the exception of the cluster in western Montgomery county. Cold spots (Areas with statistically lower reporting than the surrounding area) were detected in areas with multiple grocery stores present.

One major limitation of this study was coarse evaluation spatial units (zip codes); a smaller spatial unit would allow for more nuanced results. Additionally, choosing which grocery stores to include in the analysis was rather crude for the purpose of this project; identifying healthful food retailers is more rigorously done by cross combining lists and site visits [1]. Despite these limitations, these data suggest that increasing the number of grocery stores in this region could help alleviate poor health status of central New York residents, and call for continued research to determine the extent to which this solution could be effective.

Service Area	# Zip Codes	% of Total Zip Codes
½ Mile Walk	32	16%
5 Mile Drive	59	29%
10 Mile Drive	76	38%
Outside Service Area	39	19%

Table 1: Number of zip codes in each grocery store service area. Total zip codes surveyed = 206.

References & Sources

Cartographer & Class: Abigail S. Ryland, GIS 101: Introduction to Geographic Information Systems, Spring 2016, Tufts University

Data Sources: Bassett Research Institute, Cooperstown NY: Upstate Health and Wellness Survey, 2009, Reference USA, Tufts GIS Lab Shared Data Drive.

References: [1] Hosler, A. S., & Dharssi, A. (2010). Identifying retail food stores to evaluate the food environment. *American Journal of Preventive Medicine*, 39(1), 41-44.

Projection: WGS_84_UTM_Zone_18N