

Healthy Food Accessibility

A weighted analysis of food ecology in Somerville, MA

Introduction

This assessment is intended to be an update from a previous assessment of the same name by cartographer John R. Hoopes IV from December 2009 in which the goal was to “spatially analyze several major categories of food sources in Somerville, MA and to determine the accessibility of healthy food of each area of the city using a geographic information system (GIS)”. Somerville, MA is the most densely populated community in New England and one of the most ethnically diverse cities in the nation according to the City of Somerville. Of the many challenges associated with a population of this density, access to food presents many unique opportunities for development. Choices about food are likely to be influenced by several factors, including travel time, food prices, and availability of healthy food at different types of retailers. While food locations can range from grocery stores and farmer’s markets to restaurants and food pantries, not all are open throughout the year or provide the same level of nourishment. A neighborhood may have a convenience store on every corner which carries essentials like bread and milk but might not sell fresh fruits or vegetables and have a plethora of less nutrient dense options. Similarly, some neighborhoods and the populations that live within in them, particularly those which are low income, may face their own unique challenges which can negatively affect their diet, health, and food security (Rhone 2019).

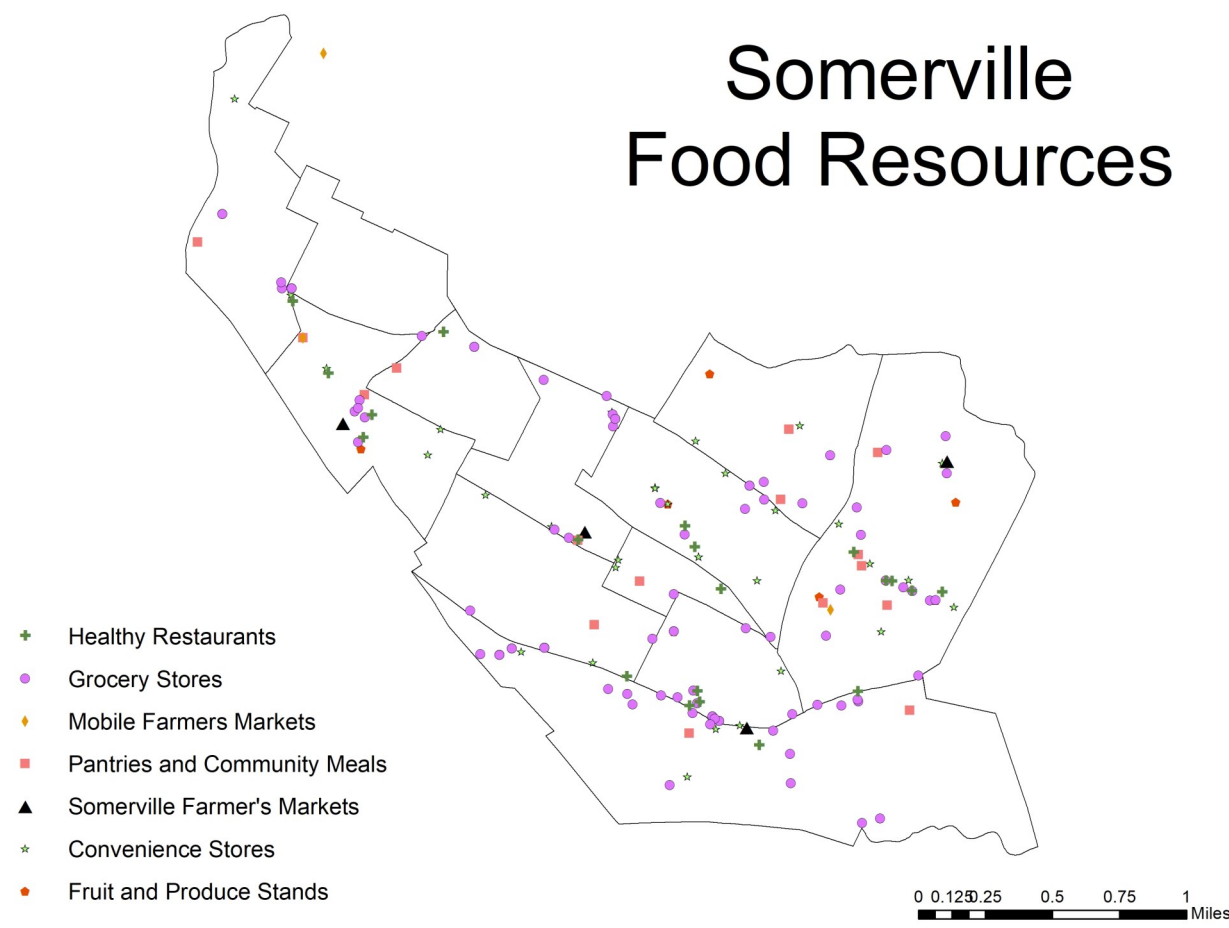
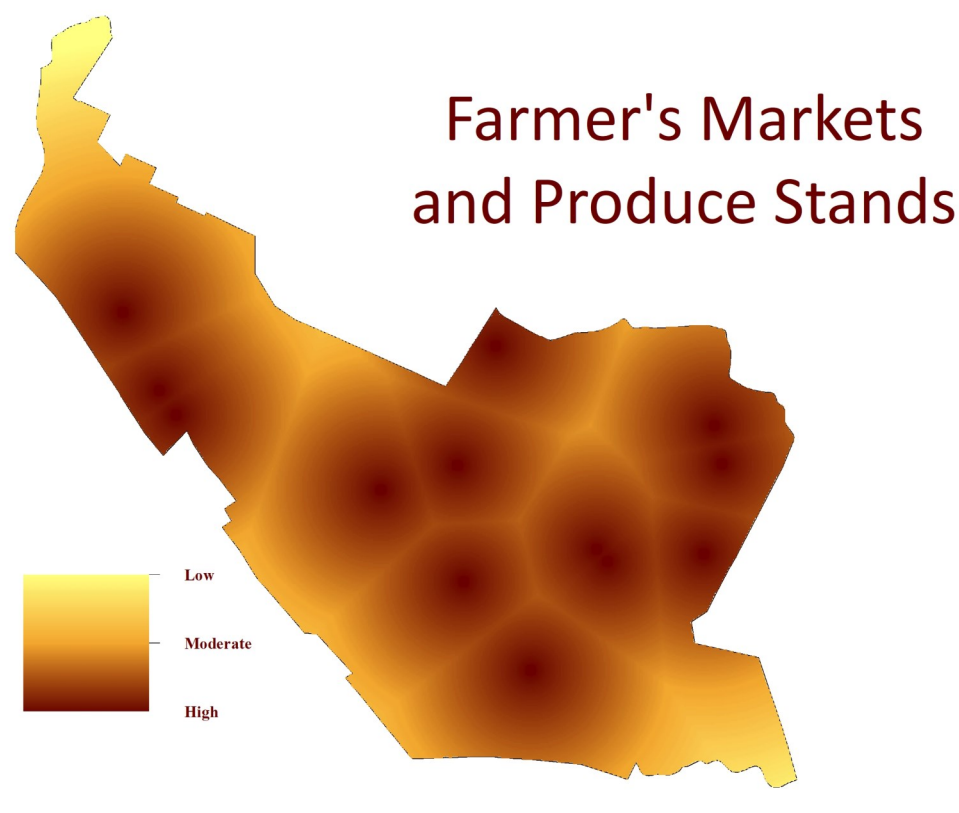
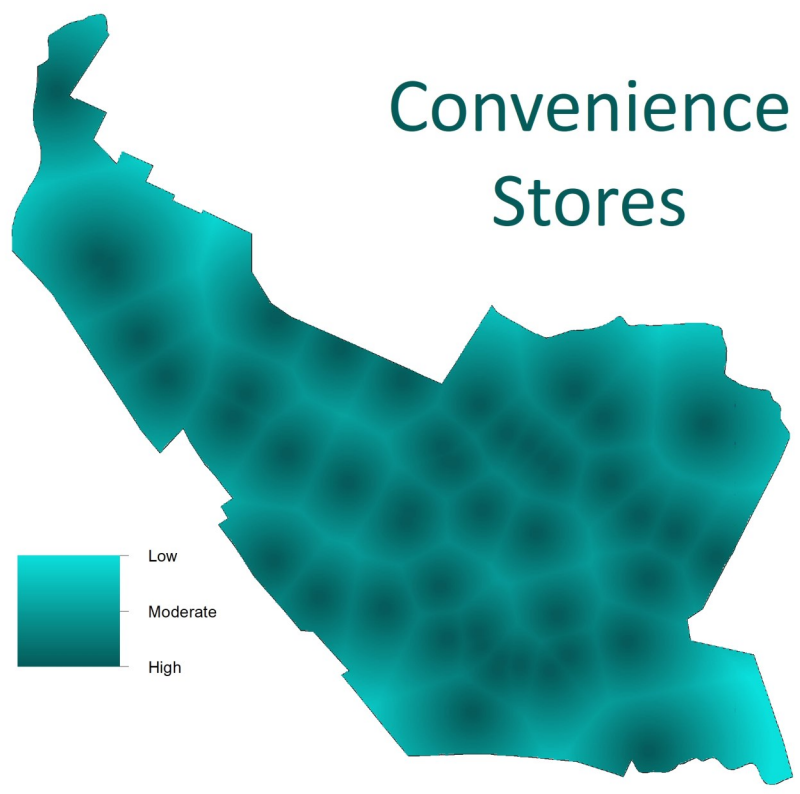
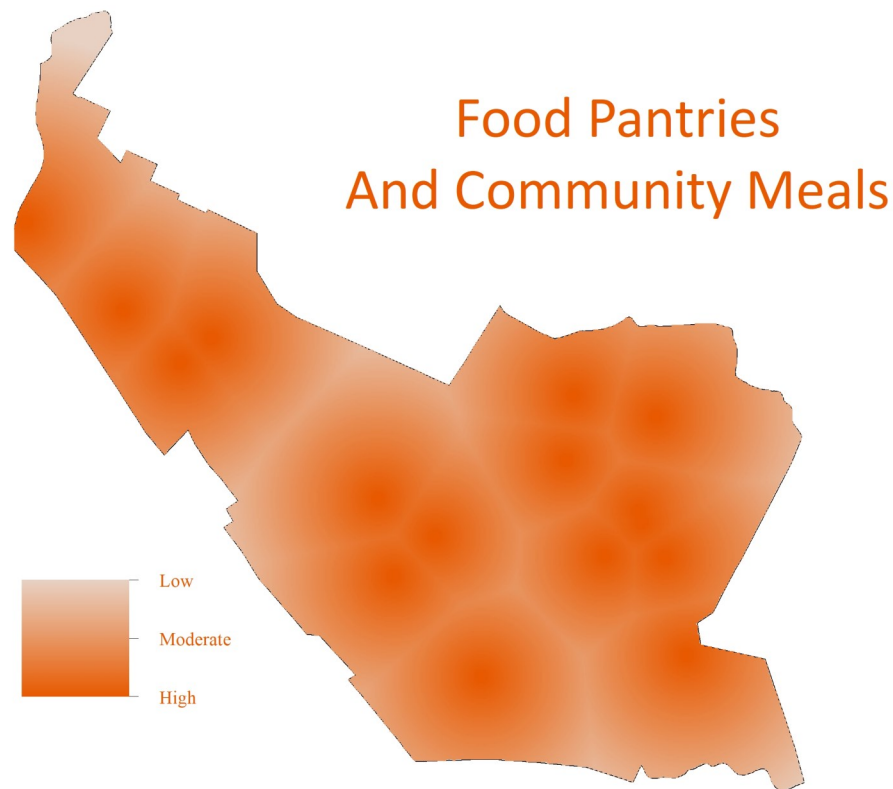
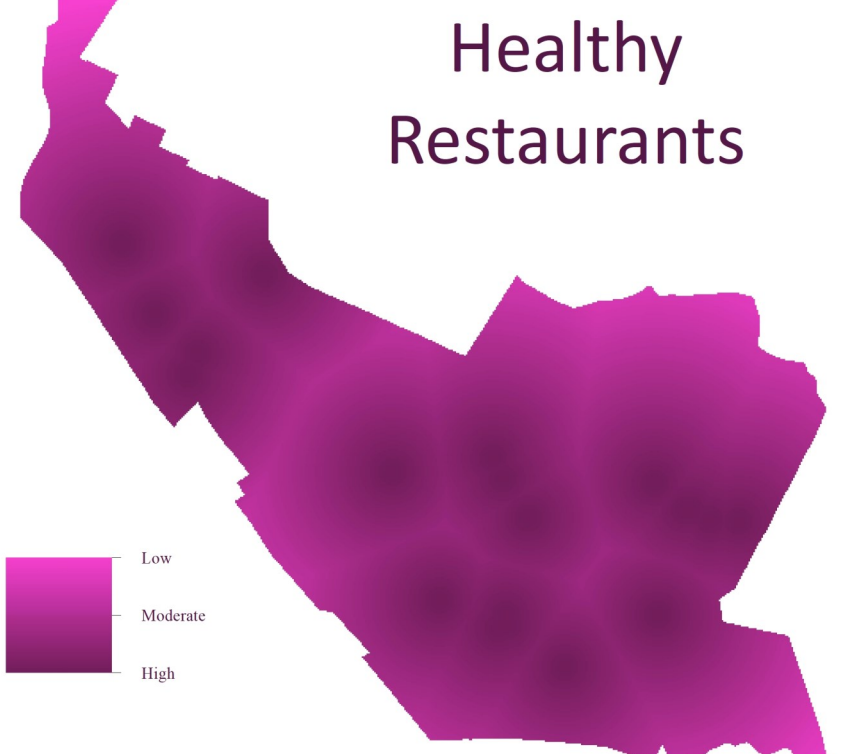


Figure 1: A spatial representation of the different food sources in Somerville, MA

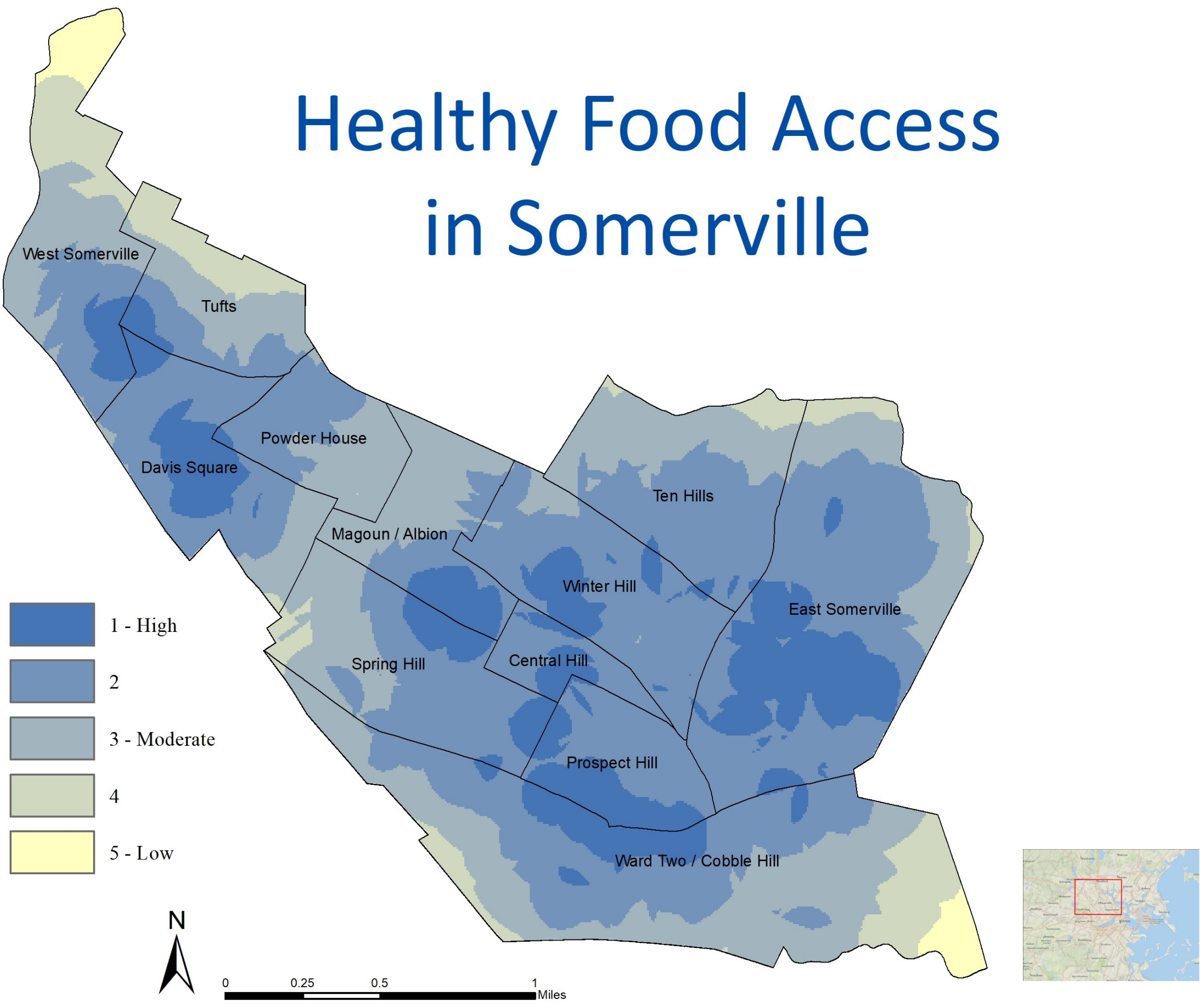
Data

Several Food Source layers are the same as the previous assessment including Grocery Stores, Farmer’s Markets, Vegetable/Produce Stands, Convenience Stores, and Social Services, and were updated to reflect the most recently available data. New sources for this updated assessment include a Healthy Restaurants stand-alone category and Community Meals, which is joined with Food Pantries. To create each of the individual layers, several methods of research were used to gather data and addresses which were then geo-located and mapped. As an example, Shape Up Somerville, a non-profit committed to building healthy and equitable communities in Somerville has issued a Healthy Restaurant guide for healthy eating in Somerville. After gathering the information for each restaurant including addresses, those addresses were cross referenced for latitude and longitude coordinates, input into an Excel file, and uploaded into ArcMap GIS software for mapping. This was the process for creating all layers, from various data sources, with the exception of the Farmer’s Markets layer which accessed on the MassGIS website. All of these sources will be considered for their impact on the availability of healthier food options in the City of Somerville.



Right: These six maps were created to show the accessibility of each area of Somerville to different food sources. Each layer is based in Euclidian Distance, and has a range of low, moderate, and high accessibility.

Healthy Food Access in Somerville



Methodology

Each of the individual points representing food source locations were analyzed using Euclidian Distance, showing the distance of accessibility for each point on a scale of high to low accessibility for each layer, and are included at the bottom of the poster. Each layer was then combined using a weighting system designed to consider the relative frequency of healthy food options at each source, assigning higher weights to layers assumed to be visited more frequently and with greater availability of healthy options (Donkin). The design of the weighting system was intentional, in that careful consideration was given to each food source in determining its weight in the final analysis. While the layer Healthy Restaurants might be an overall great source for healthy food options, in terms of accessibility, it was decided that the average citizen did not regularly frequent restaurants for the majority of meals consumed on a weekly basis. A breakdown of the weighting system can be seen in *Table 1*.

Results

In the final map, we see that areas with lowest health food accessibility are on the fringes of the city boundary, whereas highest accessibility is concentrated in pockets throughout. We also see that a large portion of the area of the city shows moderate to moderate-high accessibility, representing several neighborhoods with opportunities for improvement. Given the personal opinions of the author, this analysis was successful in demonstrating the tools and techniques available for showing areas of potential concern related to health food accessibility in the city of Somerville. Using this analysis as a jumping off point will hopefully be useful for any city official who has a vested interest in the relationship between food accessibility, city planning, health outcomes, and informed policy decision-making. Examples of food accessibility development could benefit from this analysis could include locations for new food pantry and community meal sites, neighborhoods currently underserve by farmer’s markets, and location opportunities for healthy restaurant expansion.

Table 1: This table depicts the weighting system used for the final analysis. It was qualitatively created, designed to weight each food source based on availability of healthy options, year-round availability, and frequency of use with the values totaling 100%. This system was based on inferences; a more quantitatively devised system would be required for more accurate results (2009 Report).

Source	Weight
Grocery Stores	25%
Farmer’s Markets and Produce Stands	25%
Convenience Stores	15%
Food Pantries and Community Meals	20%
Healthy Restaurants	15%
Total	100%

Discussion and Limitations

Many parameters are open to interpretation based on individual preferences and data not included in this analysis. For example, this analysis did not include census data for populations that could be used to determine spatial density in different locations throughout the city. In other words, it is not certain how many people live in each neighborhood or areas within each neighborhood, and it is possible that an area with low accessibility has little to no residents living there. Furthermore, the weighting system for each Food Source is based entirely on the discretion of the author. In determining the weight for the Convenience Stores layer, for example, a small representative sample was conducted by the author in which seven of the 61 convenience stores, or 11.5%, were visited in person in order to determine available healthy food options. All seven of the stores visited contained some level of healthy food options, including fresh produce (fruits and vegetables), low sodium snacks, and frozen foods. While the survey was not entirely random (the seven stores chosen were the seven closest to the author’s home), it was done in an effort to provide meaning behind the chosen weight in the overall analysis. In conclusion, a much more robust and quantitative analysis would be necessary in order to make more substantive claims.



Picture 1: Opening day at the Somerville Winter Farmer's Market. Arts at the Armory. December 2019.

Data Sources: MassGIS, City of Somerville; US Census 2010; Food Source Data gathered from Shape Up Somerville and compiled by Andrew May
Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001
Works Cited:
2009 Map "Healthy Food Accessibility in Somerville: A weighted analysis of food ecology in Somerville, MA"; <https://expexplorer.it.tufts.edu/posterform/media/pdf/a3d3810f-a661-4611-91eb-74be752eb391.pdf>
Community meals by location: <http://somervillefoodsecurity.org/find-food-in-somerville/community-meals-by-location/>
Converting addresses to Lat/Long coordinates: <https://www.gps-coordinates.net/>
Donkin, Angela, Elizabeth Dowler, Simon Stevenson and Sheila Turner. "Mapping access to food in a deprived area: the development of price and availability indices." Public Health Nutrition 3.1 (1999): 31-38.
"Opening Day at the Somerville Winter Farmers Market." Boston Calendar. , Somerville Winter Market., 7 Dec. 2019, www.thebostoncalendar.com/events/opening-day-at-the-somerville-winter-farmers-market

Somerville Food Resource Guide: <https://somervillehub.org/sites/default/files/Food-Resource-Guide-English-2018.pdf>
Farmer's market data: <https://docs.digital.mass.gov/dataset/massgis-data-farmers-markets>
Food Pantries by Location: somervillefoodsecurity.org/food-pantries-by-location/
Shape up Somerville healthy restaurants: <https://www.somervillema.gov/sites/default/files/shape-up-approved-menu-restaurant-guide.pdf>
Rhone, Alana. "Food Access." United States Department of Agriculture. Economic Research Service., 20 Aug. 2019, www.ers.usda.gov/topics/food-choices-health/food-access/

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December 12, 2019