

A Geographical Information System can be an extremely powerful tool in the analysis of peoples' accessibility to different resources (Pearce *et al.* 2006). Somerville, MA is the most densely populated community in New England and one of the most ethnically diverse cities in the nation (City of Somerville). Providing for a population of this density and diversity poses a myriad



of challenges. Somerville's food ecology is affected by several grocery stores and many farmer's markets, community gardens, WIC distribution sites, convenience stores and other food sources around the city. With a GIS assessment of these resources we can shed light on residents' level of access to healthy food and hopefully enable elected officials to make more informed policy decisions regarding this issue of immense importance to human health and well-being.

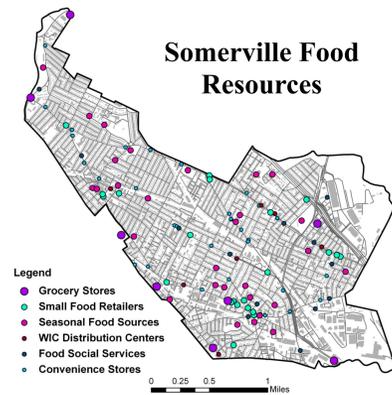


Healthy Food Accessibility in Somerville

A weighted analysis of food ecology in Somerville, Massachusetts

Introduction

In order to determine if an area has adequate access to food, the myriad of factors affecting its accessibility must be considered. Though even defining the term 'adequate access' is a subject of great debate (O'Neill, pg 1), the main consideration in these assessments involves the location of food vendors.



A spatial representation of different food resources in Somerville, MA. Symbols were sized according to the weighting system devised in the food accessibility analysis performed.

This assessment intends 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). Sources such as grocery stores, small food retailers, WIC distribution sites, seasonal food sources (community gardens, farmer's markets, etc.), food social services and convenience stores will be considered in their impact on the availability of healthier food options.

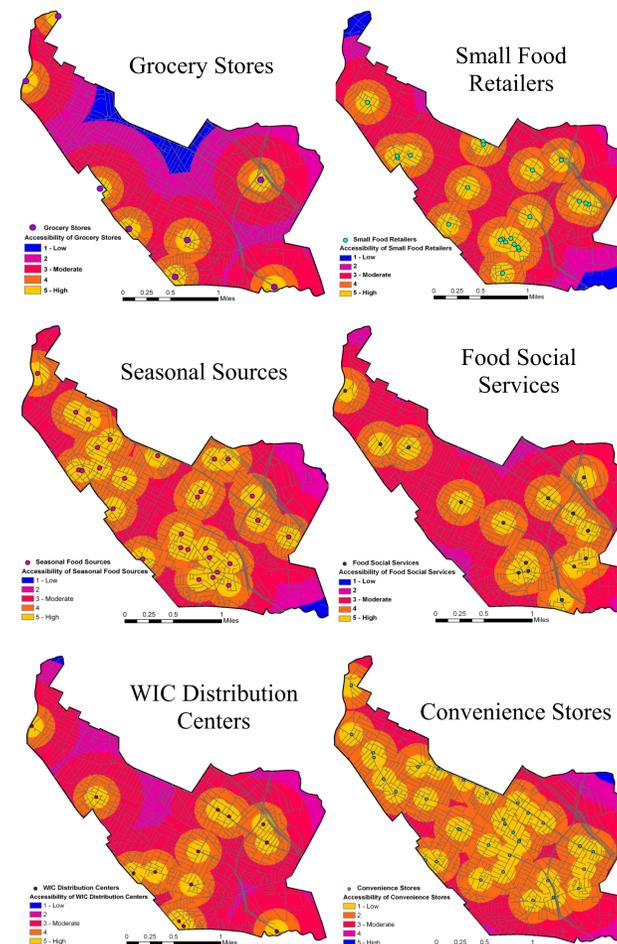
Methodology

The method of analysis of this project involved incorporating several layers representing accessibility of food resources (using an "Accessibility Index" devised based on distance to food resources) into a map showing a weighted ranking of the healthy food accessibility for the entire city of Somerville. This map was created using a weighting system designed to consider the relative frequency of food purchase and the availability of healthy options at each source, assigning higher weights to sources more often frequented and with healthier options (Donkin *et al.* 1999).

Table 1: Weighting system of Somerville food resources

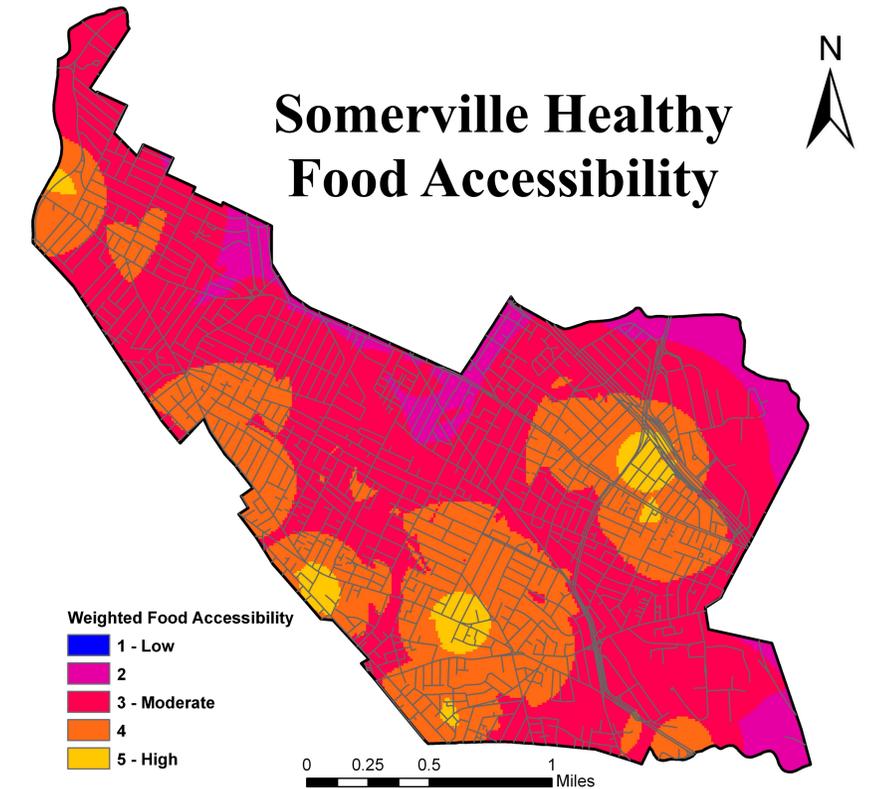
Source	Weight
Grocery stores	45%
Small Food Retail	15%
Seasonal food options	15%
WIC distribution sites	10%
Food social services	10%
Convenience stores	5%

This table depicts the weighting system used for the final analysis. It was qualitatively created, designed to incorporate the frequency of purchase and availability of healthy options. The values add up to 100%. This system was estimated, a more quantitatively devised system would be required for more accurate results.

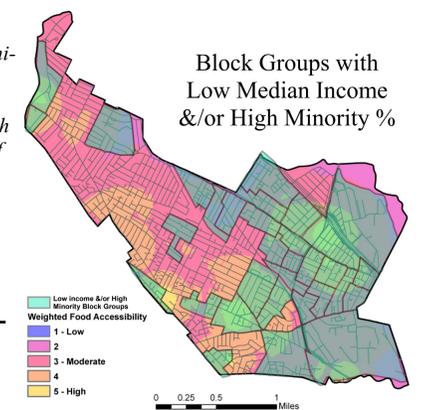


These six maps were created to show the accessibility of each area of Somerville to different food sources. Each layer shows an score based on the Accessibility Index, with 5 being the closest (<660 ft) and representing the highest accessibility to that food source and 1 being the farthest (>3960 ft) and representing the lowest food accessibility.

The accessibilities found in the maps above were combined using the weighting system to produce the final map, "Somerville Healthy Food Accessibility," top right.



At right: Census block groups in Somerville with populations of low median income and/or high minority proportion from SF3 of the 2000 US Census. It was laid over the weighted analysis to depict the potential for the study of populations with different characteristics and their accessibility of healthy food options.



Conclusions

It was found that areas along the northeastern edge of Somerville had the lowest healthy food access according to the Accessibility Index. Furthermore, it was found that the populations assessed appeared to have no correlation with healthy food availability. However, this project successfully demonstrated the technique of weighted analysis and serves as a stepping stone for more complex and accurate analyses of Somerville food ecology.

Data Source: MassGIS, City of Somerville, and US Census 2000. Food source data compiled (Fall 2009) by Anna Pierson, ShapeUp Somerville Intern and Tufts BA '10.

Projection: MA State Plane Mainland NAD 1983 (Feet)
Works Cited:
 City of Somerville. "About Somerville." *City of Somerville*. 2008. Accessed 12/16/09. <<http://www.somervillema.gov/AboutSomerville.cfm>>
 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.
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 Pearce, J. K. Witten and P. Bartie. "Neighborhoods and health: a GIS approach to measuring community resource accessibility." *Journal of Epidemiology and Community Health* 60 (2005): 389-395.

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