Using the Healthy Food Availability Index to Explore Corner Stores in Baltimore, MD

Background
Within the city of Baltimore, Maryland there is a wide range of access to food. Most Americans do the majority of their food shopping at supermarkets, however many other types of food retail outlets can be found throughout the city such as corner stores, pharmacies, discount stores, and small, non-chain grocers. The Center for a Livable Future (CLF) at Johns Hopkins University inventoried each food retail outlet in Baltimore to quantify the types and quality of food available.

Baltimore is home to 55 Community Statistical Areas (CSAs), clusters of neighborhoods defined by the City’s Planning Department using recognizable neighborhoods. The Baltimore Health Department acknowledges wide variability in major health outcomes between CSAs, including a 20 year gap between CSAs with the longest and shortest life expectancies.

The Healthy Food Availability Index
The Healthy Food Availability Index (HFAI) is a numerical value that evaluates individual food stores as well as enabling comparison between stores. Food stores surveyed in the HFAI included supermarkets, small groceries, corner stores, convenience stores, and other outlets that provide food, excluding restaurants. It was adapted from the Nutrition Environment Measures Survey in Stores (NEMS-S) tool, which was developed by researchers at the Rollins School of Public Health at Emory University. The HFAI score a store receives reflects the price and quality of items as well as the presence of healthier options for a market basket of common foods.

Methods
Data sources
Data from CLF included the 2012 HFAI and locations of farmers markets and urban farms. Data from the Baltimore City Health Department’s 2011 Neighborhood Health Profiles was used to show relationships between HFAI scores and other demographic and health outcomes. The City Health Department measures the rate of avertable deaths, described as ‘deaths that could have been avoided if all Baltimore communities had the same opportunity at health.’

The Neighborhood Health Profiles’ measurement of population density was also used.

The mapping process
To make the Baltimore Health Department data useable in ArcGIS, they were joined with a file showing all CSAs in Baltimore. A spatial join was used to calculate an average HFAI score for each CSA. HFAI scores were also separated into five groups and overlaid with available data such as the rates of avertable deaths. HFAI scores for all stores as well as corner stores alone were used. It should be noted that supermarkets were scored differently from other types of stores, therefore the range of HFAI values is larger when all stores are included than in maps showing only corner stores. A density analysis was performed for all store types throughout the city, as well as only corner stores with a score of 13.5 or greater. These corner stores with healthy options were also used in a buffer analysis and overlaid with population density to show the population living within a half-mile radius of all corner stores and those with healthy options. Finally, urban farms and farmers markets were overlaid with CSAs’ average HFAI scores.

Key Findings
• About 83% of Baltimore residents live within ½ mile of a corner store. Over 50% live within ½ mile of a corner store that offers healthy options.
• Corner stores are prevalent in areas with high population density and high rates of avertable deaths. Areas with a large population represent an economic opportunity for store owners.
• The majority of corner stores scored between 5 - 11 out of 21.5 on the HFAI.
• Farmers markets and urban farms were outside the scope of the HFAI survey and may represent additional opportunities to purchase healthy food.

Results
Out of the 806 food stores surveyed, about 38% were corner stores. The map showing ½ mile buffers around all corner stores illustrates that the majority of Baltimore residents have access to a corner store, and that corner stores are most prevalent in high population density areas. 83% of the population lives within ½ mile of a corner store, and 59% of the population lives within ½ mile of a corner store that scored in the upper quartile, or at least 13.5. The chart below shows the distribution of scores for corner stores.

As the upper-left choropleth map and density raster maps show, corner stores are found throughout the city but are most prevalent in areas that also have high rates of avertable deaths. Comparing the maps that depict avertable deaths and population density shows that there is overlap between areas with higher rates of avertable deaths and areas that have higher population density.

Discussion
As the large map shows, stores with the entire range of HFAI scores are distributed across CSAs with the entire range of avertable deaths. In addition to depicting opportunities for accessing healthy food beyond the scope of the HFAI survey, the bottom right map shows that the majority of CSAs have an average HFAI score in a middle range, although it is important to keep in mind that residents of a given CSA don’t necessarily shop within those same boundaries. When corner stores are examined separately, it is possible to see that they are distributed throughout the majority of Baltimore. Density analysis showed that they are more prevalent in the center of the city, where there is also high population density and above average rates of avertable deaths. Corner stores scoring 13.5 or greater have lower coverage, but they are still located within ½ mile of over 50% of Baltimore residents.

Corner stores with healthy options exist, although this analysis does not show exactly what each store offers, and the options available in each store will vary. These maps show that because corner stores are so prevalent and are located in areas with high population densities and large health disparities, there could be an opportunity for them to have a positive impact on the health of their neighborhoods if they offer healthy options at affordable prices. A limitation of this analysis is that it cannot determine causality between the presence of corner stores and the rates of avertable deaths; these maps can only show where they overlap. Future analysis could examine other types of food stores such as discount outlets, pharmacies, or convenience stores in a similar manner.

Resources
2. Correspondence with The Center for a Livable Future

Liana Przygocki, December 2013

Projected coordinate system: NAD 1983 State Plane Maryland Feet