Comparing and contrasting locations to serve a higher number of low income households

**CONCEPTUAL DECISION-MAKING MODEL**

Food retail locations that are located within 1/4 mile (400 meters) of walkable roads of low income households, are able to provide healthy food options across the full diet, that may help alleviate food insecurity in this vulnerable population. By identifying areas where food retail locations are not within 1/4 miles (400 meters) of vulnerable low income households, construction of a supermarket may be proposed.

**S P A T I A L  M E C H A N I S M**

The walkable roads described in the conceptual decision making model includes major roads and minor streets and roads, which are used as proxies for sidewalks assuming that all roads and streets have sidewalks.

The 400 meters definition of walkability was obtained and adapted from “Walking the Network: A Novel Methodology for Measuring Walkability Using Distance to Destinations Along a Network. Although the distances were derived from the author’s own assumptions and may be deemed arbitrary, they were useful in his analysis, and has even been useful and adapted in the “Massachusetts Food Access Index” in lot to create a composite food access index score for distance of travel.

The objectives of this project are: to evaluate the existing food retail locations in Boston, MA; identify areas that do not have food retail locations within 400 meters of low income households and propose locations for supermarket construction to compare and contrast which location will serve or benefit a higher number of low income households.

**O B J E C T I V E S**

Food retail locations

- Existing food retailers represent supermarkets, convenience stores, meat, fish, seafood, fruit and vegetable markets; when grouped together, this way, factors important for food security such as quality or variety of these food sources are lost. It is plausible that there is an overestimation or underestimation of the number of food sources. This may include under counted businesses as supermarkets includes unverified businesses as well.

- Only major roads, minor roads and streets are displayed to represent these sidewalks, which may be an acceptable use of data for the purpose of this research. Roads and streets are used as a proxy for sidewalks, and it assumes that all roads and streets have sidewalks. The level of detail of sidewalks is not necessary and roads and streets are enough to model walkability in this study.

- Using block groups for household income may not be able to identify where these specific households live in this area near the buffer, but this detail is not necessary because the interest is to get a rough estimate of households that will be benefited in this large study frame when a new location is added.

**G R A N U L A R I T Y  O F  D A T A S E T S**

- Existing food retailers represent supermarkets, convenience stores, meat, fish, seafood, fruit and vegetable markets; when grouped together, this way, factors important for food security such as quality or variety of these food sources are lost. It is plausible that there is an overestimation or underestimation of the number of food sources. This may include under counted businesses as well.

- Many major roads, minor roads and streets are displayed to represent these sidewalks, which may be an acceptable use of data for the purpose of this analysis. Roads and streets are used as a proxy for sidewalks, and it assumes that all roads and streets have sidewalks. The level of detail of sidewalks is not necessary and roads and streets are enough to model walkability in this study.

- Using block groups for household income may not be able to identify where these specific households live in this area near the buffer, but this detail is not necessary because the interest is to get a rough estimate of households that will be benefited in this large study frame when a new location is added.

**R E S U L T S**

Location of supermarkets

From visual examination of Figure 2 along with mapping population density (map not shown), potential locations for supermarkets were proposed.

Supermarket 1 was placed where 2013 ACS block group data showed a high population density of approximately 40-100 households per hectare without an existing food retailer nearby. Supermarket 2 and 3 were placed near a moderate population density of approximately 20-40 households per hectare.

**D I S C U S S I O N**

Best location in terms of number of low income households served

Figure 5 shows proposed location of supermarket 3, which 2013 ACS block group data estimates to benefit a total of 8,352 low income households, compared to the estimated 7,442 households with only the current existing food retailers. Using these datasets, the supermarket location would have benefited an additional 910 low income households. Figure 3 and 4 show proposed location of supermarket 1 and supermarket 2, which benefit approximately 7,878 and 7,729 households, respectively. Supermarket 1 would benefit an additional 436 low income households, while supermarket would benefit only 287. Therefore, by using these methods and model, I am able to pinpoint where supermarkets may be needed and the number of low income households benefited to decide which location will be best for supermarket construction.

Granularity and Improvements

The model itself is not perfect but may be useful in exploring and proposing supermarket locations using existing and available data about food retailers and income. There is overestimation in the number of households benefited by using block groups as some of the block groups that are within the 450 meter buffers also capture households outside the buffer because they are part of that block group. Additionally, although the area of interest is the purple frame, the large study frame in included to be able to capture the reality that every food retailer is outside the study of interest, people in households within the study of interest would go to that retailer as well. Because the model tries to get a rough estimate on the number of households benefited by the placement of a supermarket before and after, detailed data at the block level was not deemed necessary, but for further work, block level data may be able to give a more accurate number of households benefited as blocks will be confined more precisely within the buffers. Low income households in this model were defined as a household having an income less than 19,999, which is the poverty line in Massachusetts for a household of 3. Therefore this model is not taking in consideration number of people living in these households, as the main interest is A number of households and not residents in the households served.

Future work

1. Assigning weights to food retailers as not all retailers are created equally, convenience stores do not provide same level of quality of foods as a large supermarket could in terms of fruits and vegetables. 2) Use poverty status instead of household income to calculate low income households including those below poverty status instead of income to calculate low income households. 3) Look more in depth in these areas proposed if it is feasible to build a supermarket.