Relationship between food accessibility, income, and obesity per neighborhood in Boston

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Introduction

With the known health benefits, many cities, restaurants and families are embracing natural and fresh foods. Boston in particular is adopting and diving into the farm-to-table culture. Boston is comprised of multiple neighborhoods. Some neighborhoods being more underdeveloped than others, have less access to food sources that offer unprocessed and non-GMO options. Even if these options are made available, families may not have the income to maintain a healthy lifestyle. Thus, making it much easier to purchase certain groceries out of convenience vs. nutrition facts.

Project Goals

Our project seeks to explore the relationship between food accessibility, obesity, and income in Boston neighborhoods. We believe that we will find that a smaller income and a lack of nearby food sources in a neighborhood will correlate to a higher obesity percentage. In order to do this, we created a method to score each neighborhood based on how accessible their food sources are, and then we used this information to attempt to determine a correlation.

Data

- **Food Datasets:** We created one combined dataset of all the food sources available in Boston from three datasets: Farmers Markets in Boston and Cornerstores in Boston (Source: data.cityofboston.gov) and Supermarkets in Boston (Source: Boston Redevelopment Authority Research Division).
- **Obesity in Massachusetts Dataset**: Dataset that includes the population with a BMI of 30 or higher over the age of 20. (Source: synthpopviewer)
- **Income Information per Neighborhood Dataset**: Dataset that contains the median household income per neighborhood. (Source: city-data.com)
- **Master Address Dataset:** This dataset contains all of the addresses in the neighborhoods. We extracted the residential addresses and their geographic coordinates from the source to create this dataset. (Source: data.cityofboston.gov)

Food Accessibility Score Per Neighborhood

In order to calculate a food accessibility score for each neighborhood we looked at three important factors to compute scaled z-scores:

- The average number of food sources in the neighborhood within walking distance (< 1.0 km) of a residence.
- The average distance to the closest food source per residence calculated from all the food sources available
- The average quality of the food source within walking distance

Neighborhood	Average # of Food Sources	Average Distance to Closest Food Source	Quality of Food Sources	Score
Roslindale	2.84	0.48	0.24	43.50
West End	4.00	0.29	0.42	74.65
East Boston	6.83	0.23	0.19	76.14
Roxbury	4.26	0.38	0.13	48.52
North End	4.86	0.15	0.46	90.73
Dorchester	7.14	0.37	0.10	61.93
Allston/Brighton	4.26	0.38	0.11	46.78
Hyde Park	2.82	0.57	0.12	28.20
South Boston	4.55	0.36	0.20	56.93
Mission Hill	2.86	0.23	0.62	87.91
Charlestown	5.70	0.28	0.40	83.44
Mattapan	4.16	0.42	0.19	49.59
Back Bay	4.12	0.30	0.62	90.34
Fenway/Kenmore	7.76	0.20	0.36	95.94
South End	7.88	0.19	0.34	94.98
Jamaica Plain	4.70	0.45	0.29	58.97
West Roxbury	0.95	1.05	0.26	0.00
Financial District/Downtown	8.50	0.23	0.39	100.00
Beacon Hill	1.00	0.30	0.33	50.89
Bay Village	2.00	0.19	0.33	63.05

Conclusion/Future Work

Based on data characterizing Boston's neighborhoods, we can conclude that there is a slight relationship between income and food accessibility on incidence of obesity. This resonates with research being done that frame obesity as a social problem, and one that can thus be fixed by improving the overall economic outlook of a neighborhood, as well as increasing food accessibility to better quality food source. However, though the results looks promising, our sample size of 20 neighborhoods is too small to really allow us to make any meaningful conclusions about the relationship between food accessibility, income, and obesity. In the future, we would look to extend this method of analysis to more cities and their neighborhoods.

Statistical Analysis

We calculated the correlation coefficients between the food accessibility score, the income, and % obesity per neighborhood. These values can be seen in the table below.

There is a relatively strong negative correlation between obesity and income, as well as between the food accessibility score and obesity. This suggests that a lower income and low food accessibility score correlate with a high obesity percentage. However, there doesn't seem to be any correlation between the food accessibility score and the income.

	Food Score	Income	Obesity
Food Score	1.0	0.034	-0.466
Income	0.034	1.0	-0.543
Obesity	-0.466	-0.543	1.0

Score Visualization of Boston