The purpose of this map is to explore potential spatial relations between CHVs and areas of different poverty rates in Boston. More specifically, is there a relationship between food safety violations and poverty rates within 400m of FSEs? This distance is based on a study using a national household survey.1 If this model suggests such spatial relations between CHVs and areas of different poverty rates, it could help prioritize inspection areas to improve FSE food safety and potentially help prevent foodborne illness in Boston.

The CDC reports that about 68% of foodborne disease outbreaks happen in restaurants.2 Prior studies suggest an association between foodborne illness and areas of low socioeconomic status. One particular study used the GIS overlay analysis to explore poverty rate and critical health violations (CHV) outcomes in Philadelphia. CHV at food service establishments (FSE) was used as a proxy for foodborne illness. The study found that “[r]etail facilities in higher poverty areas had a greater number of facilities with at least one CHV violation, and had more frequent inspections than facilities in lower poverty areas.”3

The purpose of this map is to explore potential spatial relations between CHVs and areas of varying poverty rates in Boston, and to determine if there is a relationship between food safety violations and poverty rates within 400m of FSEs? This distance is based on a study using a national household survey.4 If this model suggests such spatial relations between CHVs and areas of different poverty rates, it could help prioritize inspection areas to improve FSE food safety and potentially help prevent foodborne illness in Boston.

Introduction

The U.S. Census Bureau invites about one in 38 householders each year to participate in ACS. Its purpose is to gather information for stakeholders to learn about and make decisions for the community. Poverty status of individuals is collected at the blockgroup level, and those data are from the most recent five-year estimates from 2010 to 2014. A total of 1986 unique FSEs have latitudes and longitudes in the dataset. Three out of four FSEs have latitudes and longitudes in the dataset.

Datasets & Methodology

2016 inspection outcomes of Boston food service establishments (FSE):
Certified inspectors examine FSEs, which include “restaurants, donut shops, retail food stores, and any other establishments that offers food to the public.” Restaurants are inspected at least twice a year while the rest of FSEs are inspected at least once a year.4 There are three violation levels. Level Three, or critical health violation (CHV), indicates serious potential to cause food contamination, illness or environmental health hazard.” Level One means non-CHV, which “does not seriously affect public health.” Data from 01/01/16 to 11/11/16 were studied.

Violations are considered using spatial join, while the Philadelphia study used census tract data and joined one census tract to one FSE, but failed to consider FSEs that are near multiple census tracts. This result of no spatial relations could mean that FSE food safety status may be independent of whether the FSE locates in low or high poverty areas. Since health inspections are subjective by nature, this result could also suggest that Boston inspectors may be evaluating FSEs fairly, no matter FSE locates in low or high poverty areas. One major limitation of the study is that many other factors could contribute to violation outcomes. Some examples include FSE types (quick service vs. table service), FSE sizes, and other location characteristics besides poverty rate. Including other factors could help improve future model to further explore food safety violations. Another limitation is that the study only utilized the inspection data from 2016. Considering inspection outcomes from previous years could provide more insights into food safety violations. Moreover, while poverty rate helps distinguish areas of different poverty level, rate does not account for the actual population counts. Future model should consider the counts of potential customers who could be both commuters or nearby residents to better prioritize inspections.

Reference & Data Sources

Discussion & Conclusion

This study result is different from that of the prior study in Philadelphia. This study is an improvement since the ACS dataset is at the blockgroup level, and that FSE proximity is considered using spatial join, while the Philadelphia study used census tract data and joined one census tract to one FSE, but failed to consider FSEs that are near multiple census tracts. This result of no spatial relations could mean that FSE food safety status may be independent of whether the FSE locates in low or high poverty areas. Since health inspections are subjective by nature, this result could also suggest that Boston inspectors may be evaluating FSEs fairly, no matter FSE locates in low or high poverty areas. One major limitation of the study is that many other factors could contribute to violation outcomes. Some examples include FSE types (quick service vs. table service), FSE sizes, and other location characteristics besides poverty rate. Including other factors could help improve future model to further explore food safety violations. Another limitation is that the study only utilized the inspection data from 2016. Considering inspection outcomes from previous years could provide more insights into food safety violations. Moreover, while poverty rate helps distinguish areas of different poverty level, rate does not account for the actual population counts. Future model should consider the counts of potential customers who could be both commuters or nearby residents to better prioritize inspections.

For all three outcome variables, both the maps and scatter plots do not indicate identifiable patterns between food safety violations and the mean poverty rates that are within 400m of each FSE.

*For the maps, poverty rates and the three outcomes are classified by quintiles.