The Price of Convenience

Do Socioeconomic Factors Affect the Placement of Fast-Food Restaurants in Florida?

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Introduction & Methods

According to the Center for Disease Control and Prevention (CDC), an estimated 84.8 million American adults consume fast-food every day. While data continues to spread regarding the negative benefits of fast-food consumption, expenditures on the industry continue to rise along with its consumption.

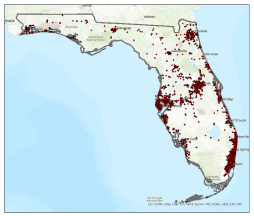
Some common factors driving consumers to eat out more include rising income, development of large households, and the rapid expansion of fast-food services. On the other hand, conventional thinking says that lower income households would consume more fast-food because it is cheap. So what is the true strategy behind the placement of fast food restaurants?

Using GIS techniques, I will show correlations between the aforementioned factors and fast food locations. I will be utilizing census tract-based data about fast-food locations and socioeconomic factors. With this data, I will perform statistical analysis to determine if there is any correlation between these variables and the locations of fast food restaurants.

Sources

Census Tract data was obtained from the CDC's Agency for Toxic Substances and Disease Registry (ATSDR). The data is known as the Prevention Social Vulnerability Index (SVI), which is used to help public health officials and emergency response planners identify and map communities that will likely need support for a hazardous event. Some of the social factors include unemployment, minority status, disability, and income. In this case, the 2018 census was used.

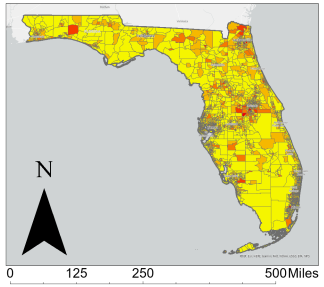
For restaurant data, I created a list of Florida's 10 most popular fast food restaurants. I then downloaded corresponding data on their locations from Points of Interest Factory (POI-factory.com), which is a community-driven website where users contribute to location databases. This data is then downloaded as a CSV file with latitude and longitude for each entry. The restaurants included are: McDonald's, Wendy's, Burger King, Chick-Fil-A, Checker's, Arby's, Chipotle, KFC, Sonic, Taco Bell, and Zaxby's. Below is a map of all 3,102 restaurant locations in Florida.



CDC's SVI: https://www.atsdr.cdc.gov/placeandhealth/svi/
Points of Interest Factory: http://www.poi-factory.com/

GIS Analysis

Census Tract Fast Food Locations



To the left is a choropleth map depicting Florida census tracts and their corresponding number of fast food locations. There is nothing too surprising about this map; areas of high population such as those near Miami, Jacksonville, Tampa, Tallahassee, and Orlando tend to have a greater number of fast food restaurants. One interesting data point is Census Tract 9503.02 in Walton County, which is the only red tract in the northwestern part of Florida. This tract only contains about 5,000 residents but has 6 fast food locations.

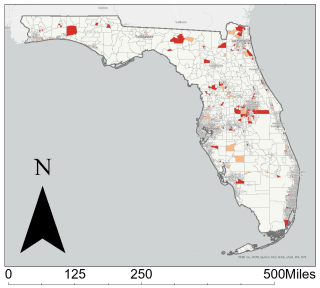
Overall, there isn't much use in analyzing every census tract since there are several without any fast food locations. Therefore, it would be more accurate to analyze the differences between tracts with few and great numbers of locations.

As stated earlier, trying to find trends in the data of every single census tract would be very difficult. To put this into perspective, I regressed the number of fast food locations against more than 20 different socioeconomic factors, and the highest R-squared value I found among them was 0.21.

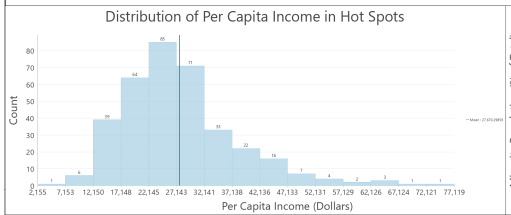
To the right is a map containing "hot spots" of census tracts containing clusters of fast food locations. Using these hot spots, I was able to compare them with census tracts not considered hot spots. This allowed me to obtain more reasonable results that demonstrated socioeconomic differences between tracts with low and high numbers of fast food restaurants.

The two most important factors relating to fast food locations in hot spots were per capita income and minority population. Below are charts summarizing the data I found relating the two factors to fast food locations.

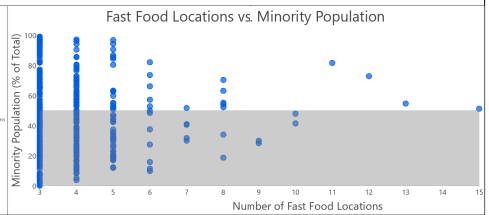
Statistically Significant Census Tracts Based on Number of Fast Food Locations



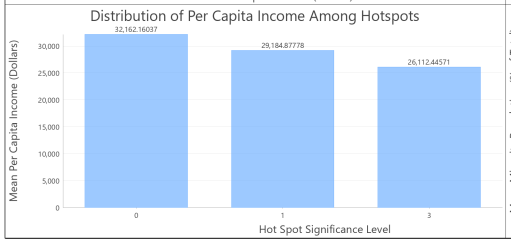
Distribution of Per Capita Income in Hot Spots



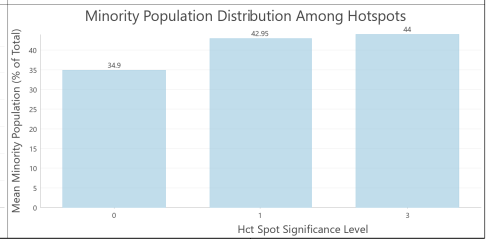
Fast Food Locations vs. Minority Population



Distribution of Per Capita Income Among Hotspots



Minority Population Distribution Among Hotspots

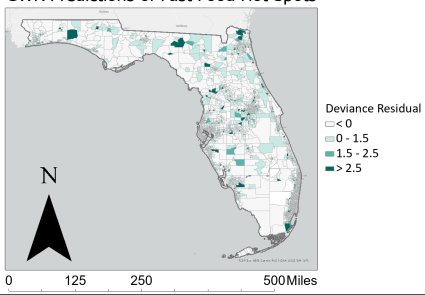


Observations

Although the regression of fast food locations against all individual factors didn't yield any statistically significant results, census tracts with a considerable number of fast food restaurants do seem to almost exclusively contain a minority-majority and lower incomes. Using Geographically Weighted Regression, I predicted fast food hot spots based on per capita income and minority population data from every census tract, even those which were not hot spots.

Below is a GWR map containing the predictions of fast food hot spots. Areas with deviance residuals of more than 1.5 seem to match very closely with the previous hot spot map. Additionally, GWR predicted several more hot spots, albeit with lesser significance.

GWR Predictions of Fast Food Hot Spots



Conclusions

While statistical analysis wasn't able to pinpoint any single outstanding social factor affecting fast food restaurant locations, it is at least clear that they are more prevalent in areas with lower socioeconomic statuses.

From this analysis, it is at least somewhat clear that fast food restaurants are geographically associated with low-income areas that contain significant minority populations. Two explanations for this could be either cheaper food options or some other underlying factor influencing minority-driven fast food locations. This underlying mechanism should continue to be explored in future studies.

With the prevalence of unhealthy eating habits affecting countless individuals in the United States, efforts could be done focusing on neighborhoods with a high concentration of racial/ethnic minorities in addition to low-income areas to address imbalances in fast food access.