

Fast Food Density Effects on Educational Outcomes

Fast Food Friends: jcai8, mshinkar, shong41, spyon

May 15, 2023

Abstract

Due to its convenience and taste, fast food is a popular meal choice in the United States. However, fast foods often negatively impact one's physical health, increasing the risk for cardiovascular disease, obesity, and hypertension. Assuming that proximity to more fast food restaurant locations is indicative of increased fast food consumption, we were curious to find if increased accessibility of fast food also influenced one's academic performance. Thus, we chose to study fast food restaurant location density in California and standardized testing scores of high schools grouped by zip codes.

Hypothesis

Our basic hypothesis is that there exists a negative correlation between the number of fast food restaurants within a zip code and the academic test scores of high school students within that zip code. The motivation for this hypothesis is based on socioeconomic factors since the presence of numerous fast food restaurants in a given area might also indicate lower socioeconomic status. This is because lower-income areas may have fewer options for affordable, healthy food. Lower socioeconomic status has been linked to lower academic achievement due to a variety of factors including less access to educational resources.

Data

For our project, we needed data on both education statistics and number of fast food restaurants per zip code. The data on number of fast food restaurants per zip code were pulled from a [downloadable csv file online](#). We used the top five most common chains within California for our analysis: McDonald's, Jack in the Box, Carl's Jr, Taco Bell, and Burger King. The education statistics data was pulled from the California Department of Education. The data was filtered to get data for high school standardized test scores; the tests scores for high schools in each zip code were averaged to get a single value representing the educational level of a zip code.

Methods

Claim 1

There is no correlation between the number of fast food restaurants within a zip code and the academic test scores of high school students within that zip code where the number of fast food restaurants is normalized by the population of that county. We chose to find the pearson's correlation coefficient between test scores and number of fast food restaurants in order to support this claim. The pearson's correlation coefficient value was -0.065 with a p-value of 0.11 , which supports the claim that there is no correlation.

Claim 2

Fast food chains within a location do not have more of an influence on the standardized test scores of high school students within that zip code than other fast food chains. To support this claim we used PCA for dimensionality reduction and used it for regression. This gave us an R-squared value of 0 , which supports our claim that there is no correlation between specific fast food restaurants and the test scores of a zip code.

Discussion

Unfortunately we were unable to conclude our initial beliefs about the data; as the density of fast food restaurants in a given area increases, the academic performance of high school students within that area does not seem to change. For all three of our hypotheses, the correlation between our datasets were essentially negligible and our results showed that there exists essentially no relationship between the number of fast food restaurants in a given zip code and the average standardized test scores of high school students within that zip code. The Pearson's coefficient was near zero for both regressions, further suggesting that there exists no relationships between our variables. However, for all three of our analyses, they all resulted in correlation less than 0 , suggesting that there could potentially be an inverse relationship between our two variables. Educational outcomes are complex by nature and are affected by numerous factors, implying that more complicated models than the one demonstrated here are needed to have any predictive power whatsoever. Intuitively, we can conclude that the fast food restaurants present in a zip code have fairly little direct effect on the students' test scores in that region.

Possible causes for the lack of a strong correlation between our variables can include not taking into account the total area that each zip code covers (the proximity of the population to their local fast food restaurants is a potential factor that was not taken into consideration) and the imbalance across the counts of fast food restaurants (there were a lot more zip codes that had 2 to 5 fast food restaurants than zip codes that had greater than 6 fast food restaurants).

Many socioeconomic factors play a role in educational outcomes. Further studies can take into consideration these other factors (familial income, race, educational status, etc) when considering the relationship between proximity to fast food restaurants and educational outcomes.