LA County Restaurant Inspection Scores and Community Health Status

Victoria Yin

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Introduction

Los Angeles County provides openly available data on all restaurant and market inspections over the past 5 years. Facilities are subject to inspection 1 to 3 times a year, and made public within 1 week of inspection date. The frequency in which restaurants and food markets are inspected depends on the public health risk associated with the food products served or prepared and on the facility's history of inspection grades. Inspectors deduct points based on violations and health risks, which is turned into a score out of 100. In addition, Los Angeles County data from 2018 on population health is publicly available. Health outcomes data, such as proportion with diabetes, obesity, or depression, are provided for 87 cities within Los Angeles County.

Objective

I am interested in exploring restaurant inspection ratings in LA County. I have a few questions, with the main one being: Are restaurant inspection ratings associated with community health status? Secondary questions include: What are the "safest" and most "dangerous" cities in LA County for eating restaurant food?

Methods

Reading in and wrangling the data

I used 2 data sets which I merged together for this project. Both are available at data.lacounty.gov to download as CSV (and in my GitHub data folder, LACinspections.csv and LAChealth.csv). The first is a dataset of all LA County restaurant inspections over the past 5 years. I added LA County community health data from 2018 to see if there were any relationships between public health outcomes and local restaurant hygiene. These datasets were merged by city name. City names were briefly inspected to ensure matching would be feasible. As Los Angeles had many sub-cities for which there was health data, I only included the "City of Los Angeles" data to represent the local public health outcomes for any restaurant with city listed as Los Angeles. Only restaurants in cities with health data

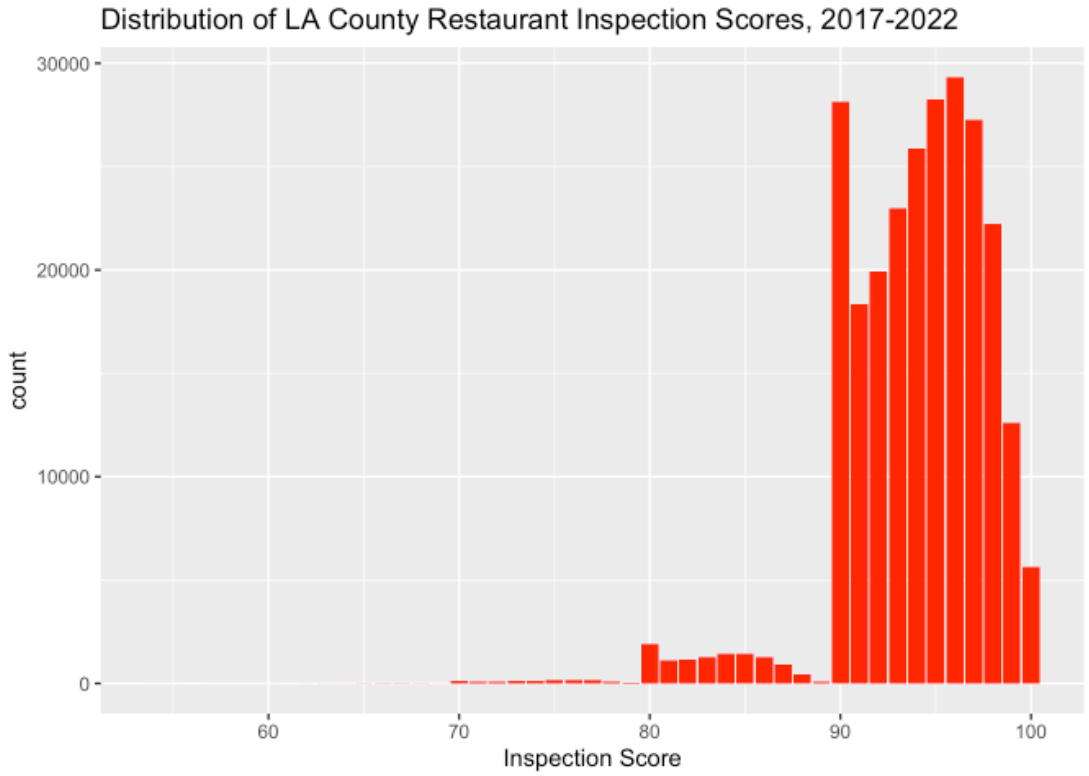
were included in this analysis. Average restaurant inspection scores within a city were calculated and compared to its proportion with Diabetes, Obesity, or Depression.

In addition, I used the package "tidygeocoder" to retrieve latitude and longitude data from the restaurant addresses of the subset of chain restaurants I chose to study. The data set used for that analysis can be found here. This step took hours to perform, so the data set is uploaded to GitHub for your convenience. Geocoding all restaurants in the data set was not feasible (crashed every time).

Latitude and longitude data for each chain restaurant was used to compare geospatial distribution of Restaurant Inspection Scores with the geospatial distribution of proportion with diabetes, obesity, or depression in that town's zip code. R package "tidycensus" was utilized to create maps with town borders through zip code information.

Initial Data Exploration

Data were explored utilizing R package "ggplot2" to create a histogram of scores. Implausibly low scores were deleted (score less than 50, of which there was 1 value with score 3). Average scores within cities were computed and compared. Restaurant chains were identified through tokenizing words as bigrams, and looking to see most common chain restaurants. The following set of 9 chains were selected: McDonald's, Jack in the Box, Starbucks, El Pollo Loco, Panda Express, Taco Bell, Del Taco, In N Out, Panera Bread. This subset of restaurants was utilized to explore geospatial distributions of restaurant inspection scores within LA county.



Interestingly, there appears to be a peak at 90, which corresponds to the lowest possible score to achieve an A rating. There is also a local mode of 80, which corresponds to the lowest possible score to achieve a B rating. This may hint at bias involved in the inspection grading process.

Results

Restaurant Inspection Scores by City

In total, there were 252773 inspections of 39423 restaurants in 66 cities within LA County.

Of the 252773 inspections included in the analysis, the average grade was 93.94 with a standard deviation of 3.87. The highest score was a perfect score, 100 whereas the lowest score was 54.

See website for interactive table of Average Restaurant Inspection Score by City in comparison with its proportion with diabetes, obesity, or depression.

Of the 66 cities included in this analysis, Long Beach had the highest average city inspection score, however there was only 2 inspections in that city. Cities with low number of inspections have biased average scores. The city with the worst average score was Monterey Park.

Scatterplots with linear regression lines are available for viewing on the website. These graphs compare average restaurant inspection score by city with the city's proportion with diabetes, obesity, or depression.

Restaurant Inspection Score vs Diabetes

There does not appear to be a linear relationship between restaurant inspection score and proportion with diabetes in a city. The points are randomly scattered around the linear regression line.

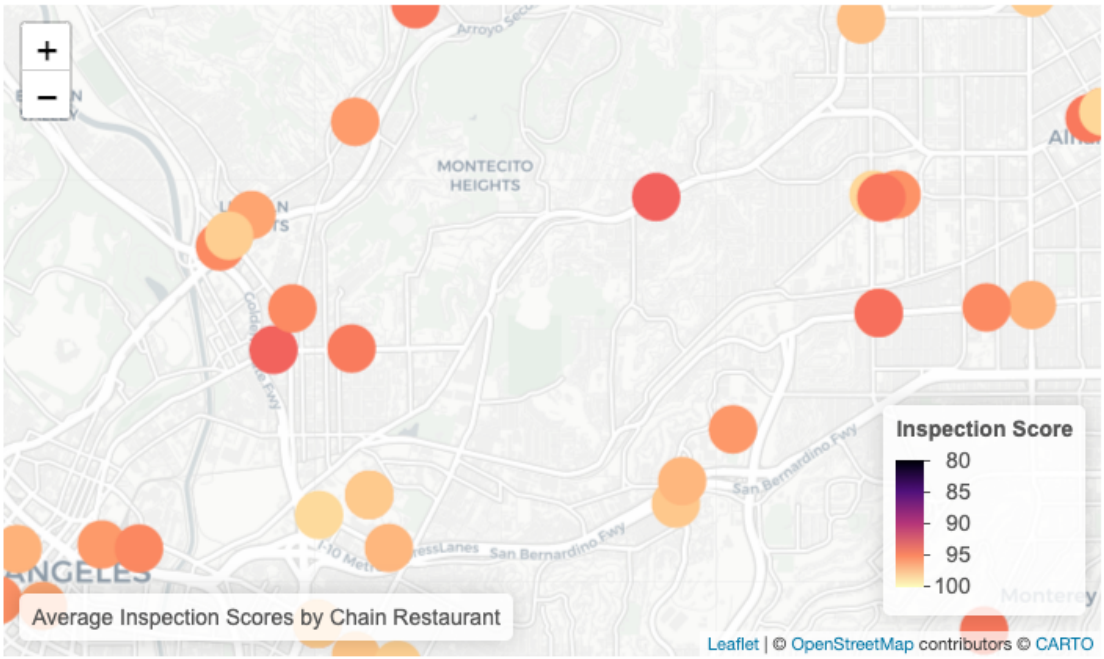
Restaurant Inspection Score vs Obesity

There may be a weak positive correlation between a city's average inspection score and the proportion of its population with obesity. Many coastal cities, like Manhattan Beach and Calabasas, as well as San Gabriel Valley Cities, like Arcadia and San Gabriel, have low proportion obesity, however this does not correlate well with their average restaurant inspection scores.

Restaurant Inspection Score vs Depression

Many coastal cities had an exceptionally high proportion with depression (see Beverly Hills, 0.1924). There appears to be a slight positive linear relationship between restaurant inspection scores and proportion with depression.

Additional Maps



On my website, the first interactive map displays restaurant inspection scores across LA county (chain restaurants only). Using this map, I saw that the chain restaurants closest to HSC campus (by LAC USC Medical Center) all have good restaurant scores (see screenshot above). The Jack in the Box and El Pollo Loco near campus have lower scores (but still passing).

I created additional maps to overlay a heat map of proportion with diabetes, obesity, or depression in a city with the chain restaurant inspection scores. These interactive maps allow one to explore any geospatial patterns between chain restaurant inspection scores and proportion with diabetes, obesity, or depression in a city. Higher proportions of diabetes are found in poorer Eastern LA as well as South/Central LA communities. Obesity was low in Eastern LA and coastal cities, and highest in South/Central LA. Interestingly, Coastal cities had high proportions with depression, but South/Central LA and eastern LA had lower proportions with depression. These patterns did not correlate well with restaurant inspection score patterns, as even Beverly Hills had restaurants with low inspection scores.

Summary and Conclusions

Overall, restaurant inspection scores in LA County are good (average 93.94). San Gabriel Valley cities, like Monterey Park, Alhambra, and Rowland Heights, were found to have the lowest average inspection scores in LA County. Long Beach and Calabasas had the highest average score.

There appears to be minimal linear correlation between health outcomes and restaurant inspection scores by city. The linear regression line appears to be nonsignificant for the relationship between inspection scores and diabetes, and slightly positive for restaurant inspection scores and proportion with obesity or depression.

Looking at the interactive maps, there does not appear to be a clear geographic pattern of chain restaurant inspection scores. The cities with higher proportions of diabetes and obesity tended to be poorer communities whereas cities with higher proportions of depression appeared to be higher-income and coastal. For example, Beverly Hills had a surprisingly high proportion with depression, calling to question how these health outcomes were measured (not mentioned on the LA County website).

All in all, there appears to be minimal correlation between restaurant inspection scores and health outcomes by city or by geospatial distribution.