



Anika Negi, Ahmed Ahmed

Final Project Report

It's Not the Burger, It's the Paycheck

This project is a web-based interactive data story about the correlation between fast-food density and its relationship with income and poverty in Massachusetts. "It's Not the Burger, It's the Paycheck" conveys our main message and story: Easy access to fast food may matter, but the conditions of economics within a certain state explain the patterns behind obesity patterns clearly. The project stemmed from MATH345 Probability and Statistics, where a study examined 113 randomly sampled U.S. counties. That study was originally meant to test whether the counties with more fast food restaurants per capita had higher adult obesity rates. The results showed a different pattern than expected. Fast food density had a rather weak correlation with obesity as opposed to income and poverty. The visualization found brings a new found light into Massachusetts using an interactive county map, selectable data layers, hover cards, and side by side comparisons to view. The map allows users to switch between obesity rates, fast food density and median household income. Certain features can be turned off such as fast food restaurant dots. The goal is to make the user question the idea that obesity is mainly caused by the easy accessibility to fast food restaurants as well as notice the correlation of how poverty and income shape the health outcome more clearly than fast food density alone.

Updated May 22, 2026

Description

Introduction

This project focuses strictly on adult obesity patterns in Massachusetts and compares them with fast-food density, median household income, and poverty rate. It's an important topic to focus on because obesity is often discussed as a personal choice or in terms of the number of fast-food restaurants nearby. However, the data from our earlier MATH 345 study showed that this explanation is not entirely correct. Fast-food density did not explain the increase in obesity by itself, while on the other hand, income and poverty gave a much more defined correlation on why some areas had higher obesity rates.

The visualization is meant to take our original statistics project and turn it into an interactive county data story. Rather than only reading numbers, users can explore the data through a Massachusetts map, switch between layers, and hover over counties to see the actual values. The goal is to make the pattern easier to understand visually.

Motivation

We chose this topic because we wanted to challenge the common view that obesity is mainly about fast food. Prior to doing the statistics project, we expected counties with more fast-food restaurants per capita to have much higher obesity rates, and after looking at the data, the result was different from what we expected. Some counties did not follow this pattern, and economic factors seemed far more important than accessibility. Our goal during this project was to tell a story using data, and that's exactly what we were able to do here. We turned raw data and numbers with a background into a full-fledged website with visualizations and, most importantly, a data story.

Project Plans

The main plan for this project is to build a web-based visualization that lets users explore the data and do so incrementally. The first thing they are greeted with is the Massachusetts map that contains different counties listed. Users can choose which layer they want to view, such as adult obesity rate, and then see dots overlay the county map that can also be turned on/off to show restaurant locations across the state in comparison to income or other things.

The website also includes hover cards for each county so you can see two counties side by side. When users hover over or select a county, they can see statistics such as obesity rate, fast-food restaurants per 1,000 residents, income, poverty, and population. This allows users to compare places more efficiently rather than just looking at colors on a map.

The final goal is to guide users toward the main story: fast food may play a role, but income and poverty better explain obesity patterns. The website is designed to be interactive and visually friendly, with easy-on-the-eyes colors and varying shades to clearly distinguish different factor densities, making it easy to follow and allowing users to reach conclusions themselves.

Datasets

Official Data

[Food Environment Atlas Data Download](#)
[Adult Obesity Counties in Mass Per Year](#)

Wrangled Data

[MA Food Environment.xlsx](#)
[MA Obesity Trends 2011 2025.xlsx](#)
[MA Food Health Master.xlsx](#)

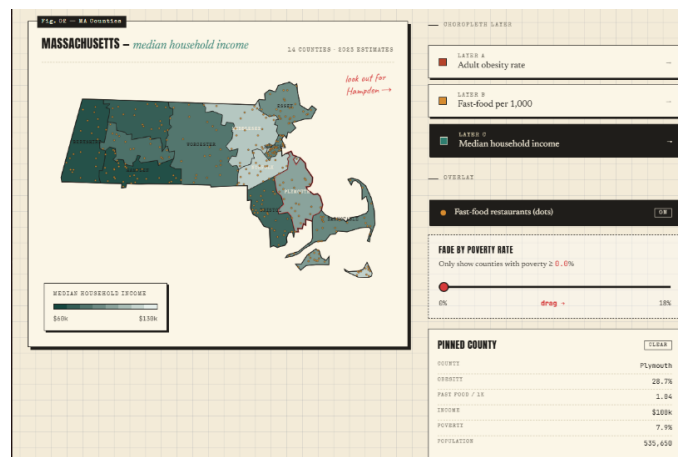
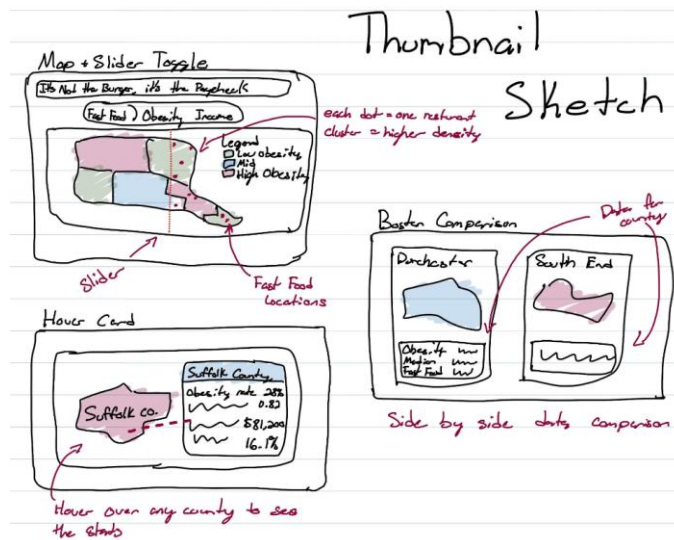
Data Processing

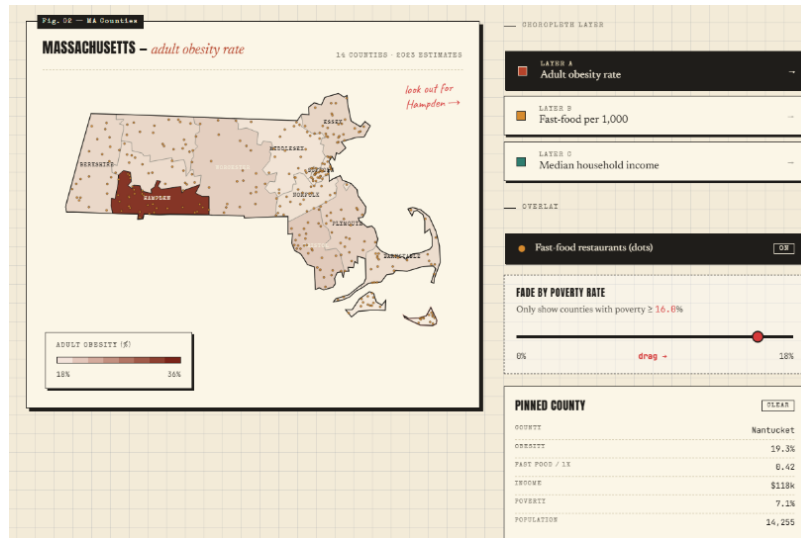
Five datasets on fast-food restaurants, health outcomes, and economic factors in Massachusetts are used in this project. The names, addresses, and locations of fast food establishments nationwide are listed in the Kaggle Fast Food USA Dataset. The Census API gives access to data on poverty rates, median family income, and demographics by county and census tract from the U.S. Census American Community Survey (ACS). A closer look at Boston was done by Analyze Boston (data.boston.gov), which provides neighborhood boundary shapefiles and health indicators. Additionally, our earlier MATH 345 statistics dataset containing cleansed data for 113 sampled U.S. counties, including Essex, Hampden, Nantucket, Norfolk, and Suffolk in Massachusetts, was used in this study.

For wrangling the data so we could use it for our visualization project, there were a few

steps taken for sorting. The Kaggle fast food dataset was filtered to include only Massachusetts, and fast food counts were adjusted to per capita rates so counties could be compared fairly. The county health and census data were combined using FIPS county codes, and census tract data were converted to GeoJSON for use in the D3.js choropleth maps. The final cleaned and merged data was generated using Papa Parse to convert CSV to JSON, along with Claude to help file the data into Excel.

Paper Sketches and Prototypes





Technologies, Development and Deployment

We built the project using plain HTML, CSS, and JavaScript, with D3.js as the main library for visualizations like choropleth maps, GeoJSON paths, scatter plots, and a 15-year obesity trend line chart. To show Massachusetts county and state boundaries, we used TopoJSON and the D3 Mercator projection. For the obesity, income, and fast-food density layers, we created colorblind-friendly color scales using D3's interpolateLab. We precomputed county-level data and served it as a static JavaScript file, so there was no need for a backend. For typography, we loaded Google Fonts from a CDN. The whole app was deployed as a static site on GitHub Pages.

Final Product

Git Repo

<https://github.com/AnikaNegii/Fast-food-CS617-Final-Project>

Live Website

<https://anikanegii.github.io/Fast-food-CS617-Final-Project/>

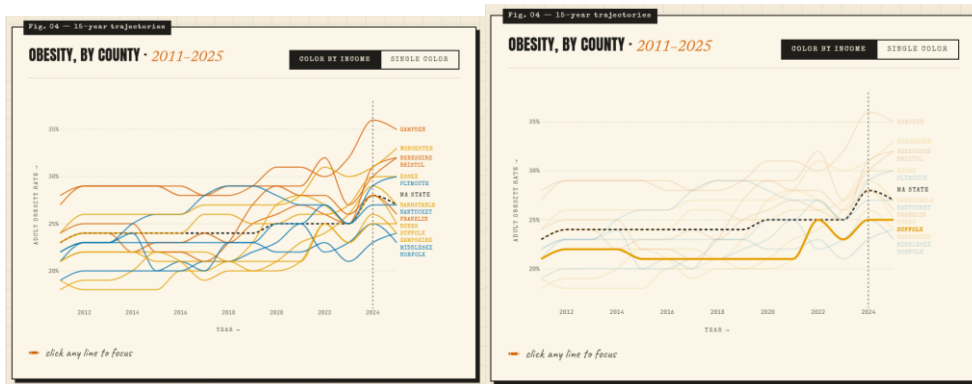
(Look below Visuals for Project Description)

Visuals!!

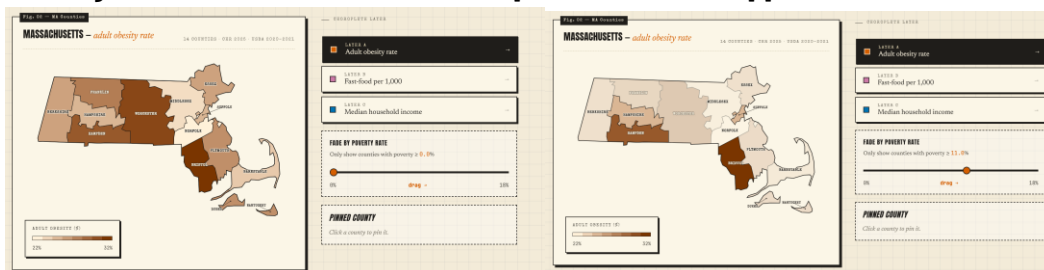
- **Selecting counties on the dot plot will highlight them on the choropleth map**



- **MA State line and compared trends will be highlighted when clicked**



- **Poverty Rate slider makes relationships in data more apparent**



Our project, *It's Not the Burger, It's the Paycheck*, is an interactive data story that is meant to explore the relationship between income, fast food availability, and obesity rates. The website is put into four main parts, each showing how income plays a more significant role in obesity than easy access to fast food.

We start with the main question behind the research, then shows two comparison cards. One card looks at the connection between fast food density and obesity, which only shows a small negative link ($r = -0.195$), with Nantucket being the outlier. The other card compares income to obesity and gives us a much stronger downward pattern ($r = -0.511$). Here, Middlesex and Norfolk are the wealthier counties, while Hampden and Berkshire are on the lower-income side.

The next and most important visualization is an interactive map displaying all 14 counties in Massachusetts, built with D3.js. Users can toggle and go between adult obesity rates, fast food density, and median household income to see how each layer changes the story. Hovering over a county reveals its statistics, while clicking a pin displays the information for easy side-by-side comparison. There's also a slider to adjust the poverty threshold, so the focus is on counties above a certain poverty rate, making it easier to see how income and obesity are linked. Below the map, an interactive scatter plot lets users select counties and see those selections highlighted on the previous choropleth map.

The final section shows a timeline chart tracking each county's obesity rate from 2011 to 2025. When clicking on a county, the trend line zooms in for a closer look, while the side panel gives quick info on important details. The visualization ends with a small reflection on why fast food is so often blamed for obesity, even though the data suggests income is a more important factor.

References

County Health Rankings and Roadmaps, University of Wisconsin Population Health Institute: <https://www.countyhealthrankings.org>
 Kaggle Fast Food Restaurants USA Dataset: <https://www.kaggle.com/datasets/datafiniti/fast-food-restaurants>
 U.S. Census Bureau American Community Survey (ACS) 5-Year Estimates: <https://data.census.gov>
 Analyze Boston Open Data Portal: <https://data.boston.gov>
 U.S. Department of Agriculture Food Access Research Atlas: <https://www.ers.usda.gov/data-products/food-access-research-atlas/D3.js>: <https://d3js.org>
 Plotly.js: <https://plotly.com/javascript/>
 Prior MATH 345 Statistics Project (Negi, 4 Final Project Proposal, Spring 2024 Guzman, Leng, December 2025) Link to the report data created last semester
<https://docs.google.com/document/d/10GzO8iymeahdtqm8C6PPBXwh9WmsJrdMe0P-qzFi-RE/edit?usp=sharing>
 Claude for coding