

Foodborne Illness

Nashville Software School
DDA4 Capstone Project
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Motivation

I have chosen foodborne illness as the subject for my capstone project. I have worked in the food manufacturing industry in the past and that experience has brought about a passion for the subject as well as knowledge I can use to bring to light the seriousness of this issue. There are a system of programs and safeguards in place at every step from the farm to the table, but foodborne illness still occurs. I plan to explore possible reasons for that.

Questions to Answer

- What effect does foodborne illness have on people in the United States?
- What are the monetary costs associated with foodborne illness?
- What are the sources of contamination and high risk foods where safer food handling practices can make food safer for consumption?

Data Sources

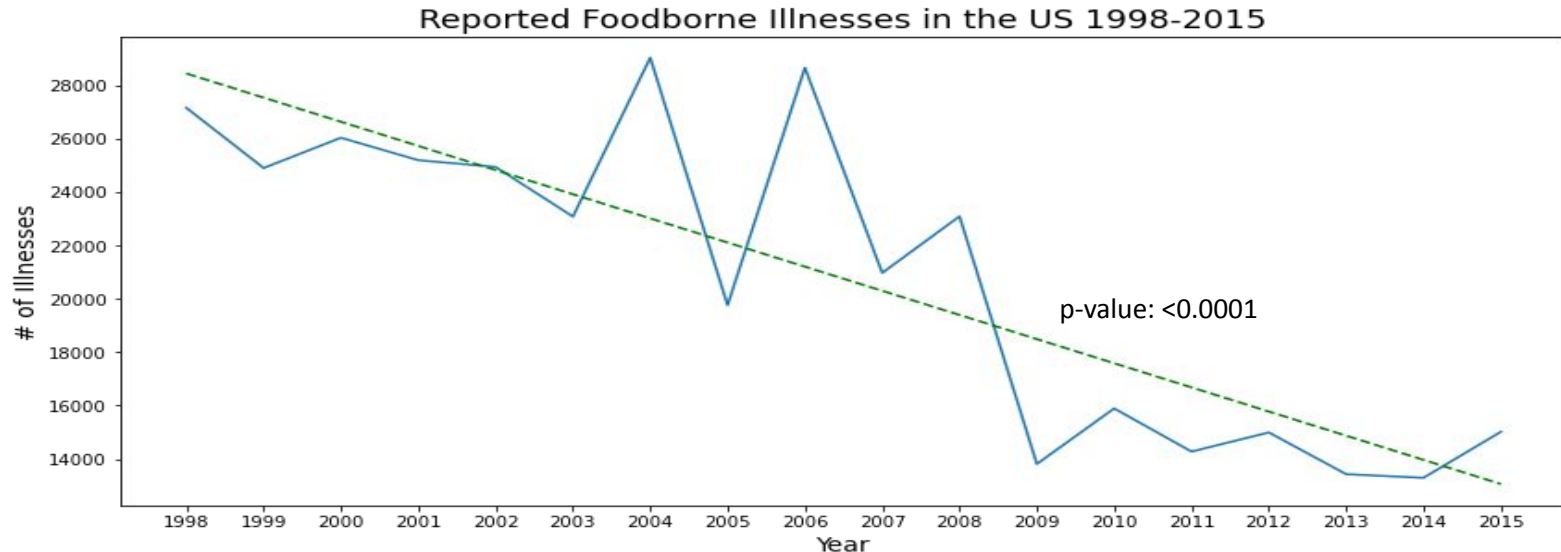
- CDC Dataset:
<https://data.world/cdc/foodborne-outbreak-database/workspace/file?filename=FoodData.xlsx>
- USDA ERS Dataset:
<https://www.ers.usda.gov/data-products/cost-estimates-of-foodborne-illnesses.aspx>
- Annual Cost of Illness and Quality-Adjusted Life Year Losses in the United States Due to 14 Foodborne Pathogens:
<https://pubag.nal.usda.gov/pubag/downloadPDF.xhtml?id=59522&content=PDF>

Effects of Foodborne Illness on the U.S.

- Timeframe 1998-2015
- Number of Illnesses
- Number of Hospitalizations
- Number of Deaths

Effects of Foodborne Illness on the U.S.

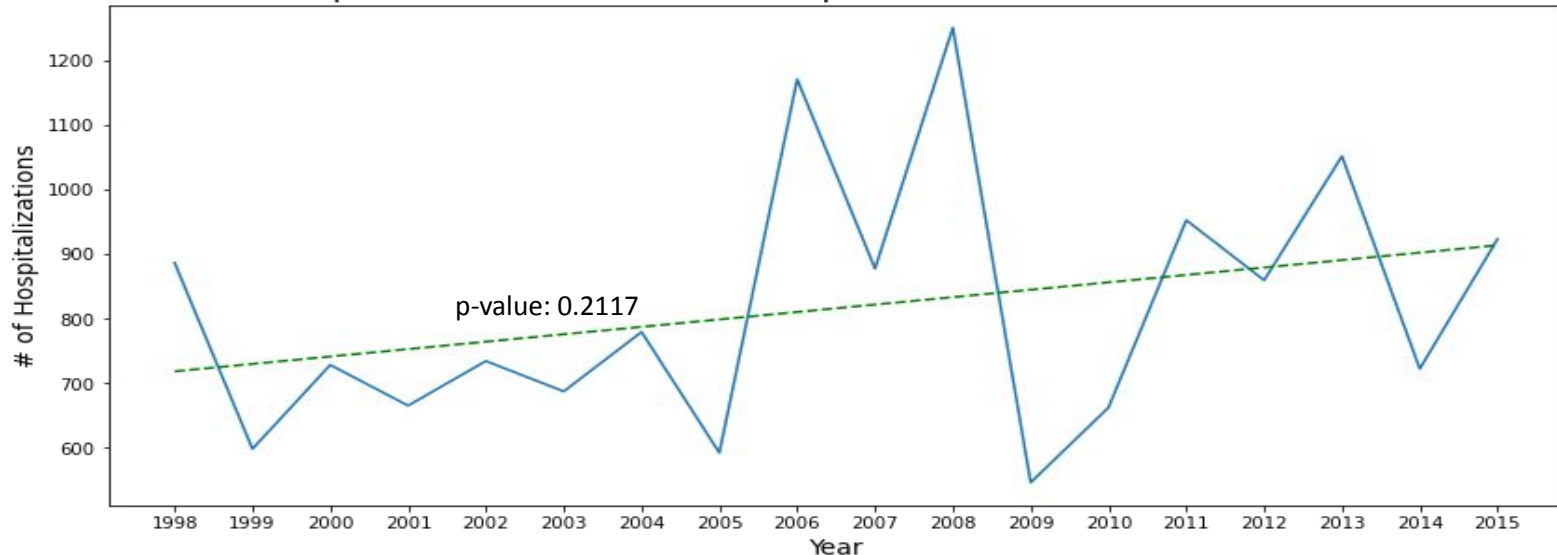
- Mean number of illnesses over this timeframe was 20,752 per year
- Is the trend decreasing over this timeframe?
- Hypothesis test to see if slope of trendline is zero, p-value: <0.0001
- P-value: <0.05 so there is a change over time
- Change in reporting process in 2009



Effects of Foodborne Illness

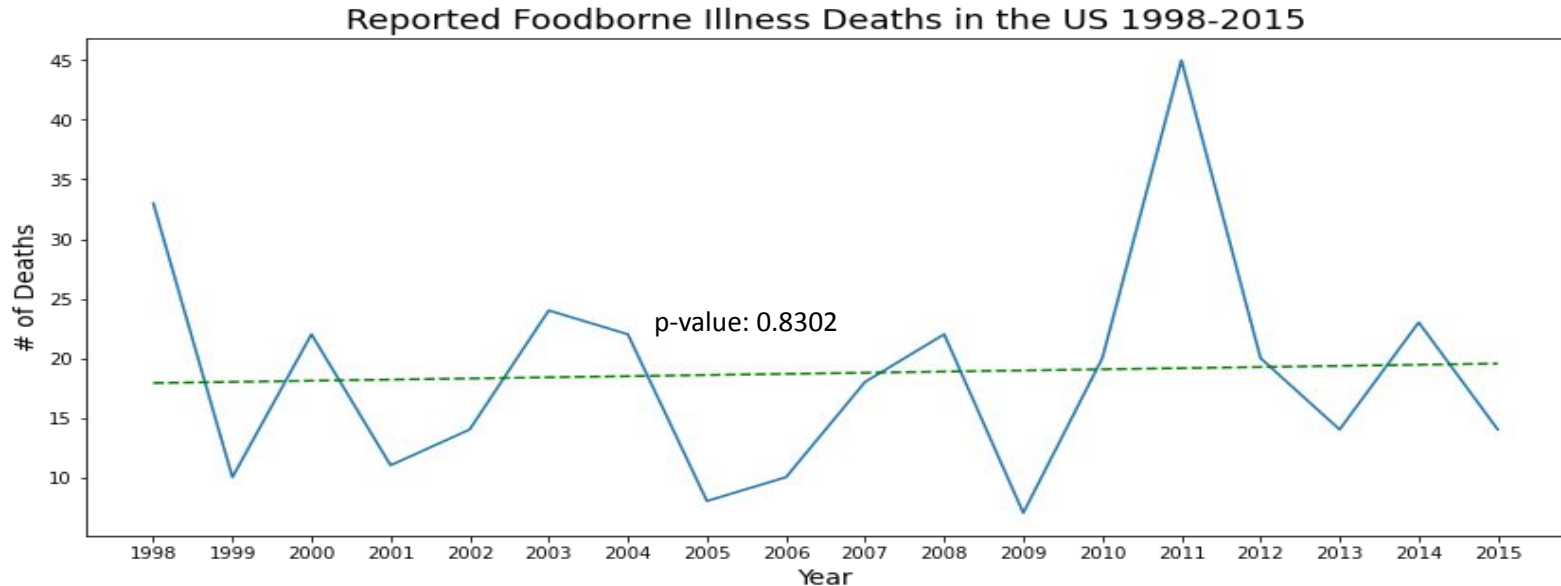
- Mean number of hospitalizations over this timeframe was 816 per year
- Is the trend increasing over this timeframe?
- Hypothesis test to see if slope of trendline is zero, p-value: 0.2117
- P-value: >0.05 so there is no change over time

Reported Foodborne Illness Hospitalizations in the US 1998-2015



Effects of Foodborne Illness

- Mean number of deaths over this timeframe was 19 per year
- Is the trend increasing over this timeframe?
- Hypothesis test to see if slope of trendline is zero, p-value: 0.8302
- P-value: >0.05 so there is no change over time



Effects of Foodborne Illness on the U.S.

Summary

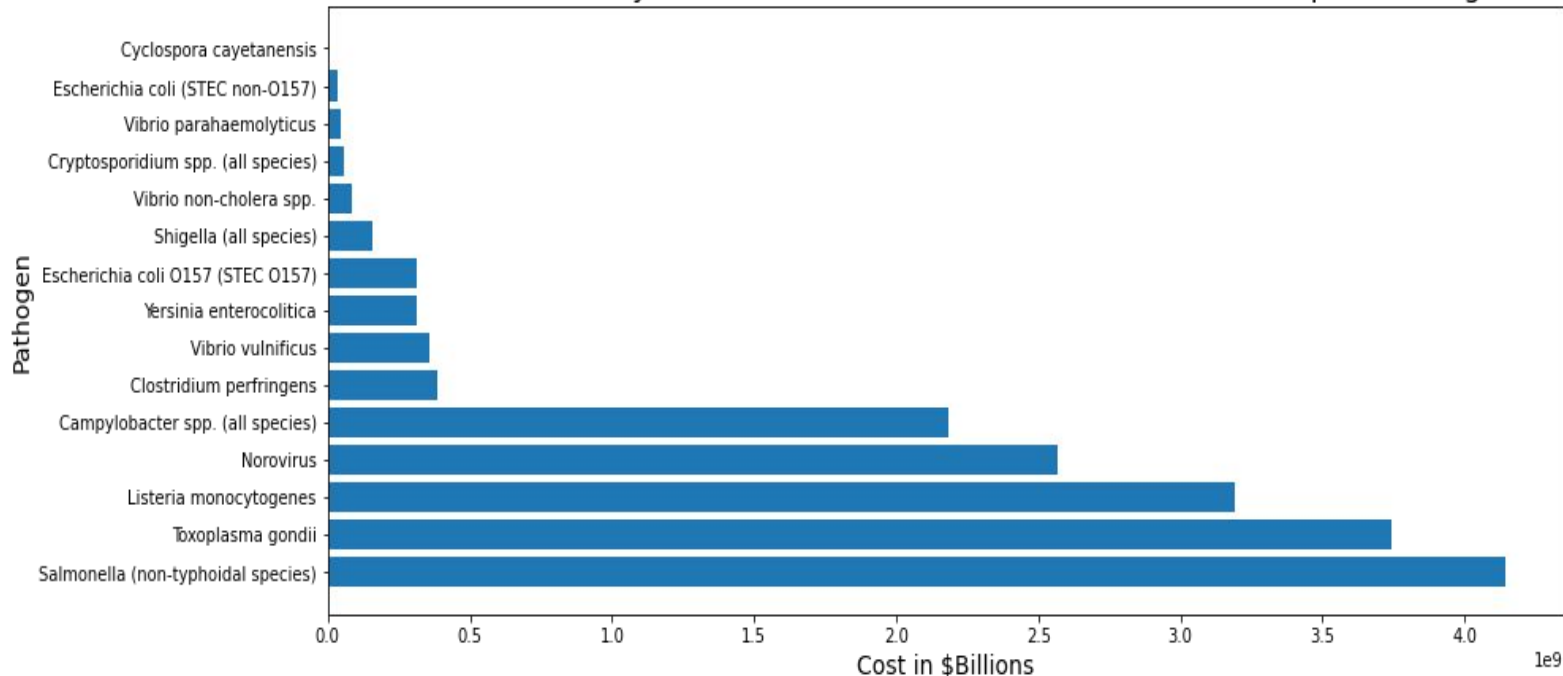
- Illnesses: Mean 20,752/year
 - Seems to be declining over this timeframe
 - p-value: <0.0001 therefore there is a significant decline of this timeframe
 - Change in the reporting process in 2009
 - Is the severity of foodborne illness increasing?
- Hospitalizations: Mean 816/year
 - No change over this timeframe
 - p-value: 0.2117
- Deaths: Mean 19/year
 - No change over this timeframe
 - p-value: 0.8302

Monetary Costs of Foodborne Illness

- According to the USDA ERS, estimated mean monetary costs associated with the top 15 pathogens causing foodborne illness in 2018 was \$17.6 billion
 - Physician visits
 - ER visits
 - Outpatient clinic visits
 - Medications
 - Lost productivity
 - Hospitalizations
 - Premature deaths

Monetary Costs of Foodborne Illness 2018

Estimated Monetary Cost of Foodborne Illness in the US in 2018-Top 15 Pathogens



Monetary Costs of Foodborne Illness Summary

- 8.9 million estimated foodborne illness cases in 2018
- Salmonella ssp. is pathogen with the highest estimated cost of \$4.1 billion
- Total estimated costs associated with foodborne illness for the top 15 foodborne pathogens in 2018 is \$17.6 billion

Sources of Contamination and High Risk Foods for Foodborne Illness

- Geographic considerations (Number of Illnesses by State)
- Causative agents
- Location of preparation
- Food vehicles responsible for the transmission of foodborne illness

Foodborne Illness by State

California - 10.71%

Illinois - 6.61%

Florida - 6.17%

Ohio - 5.48%

New York - 4.66%

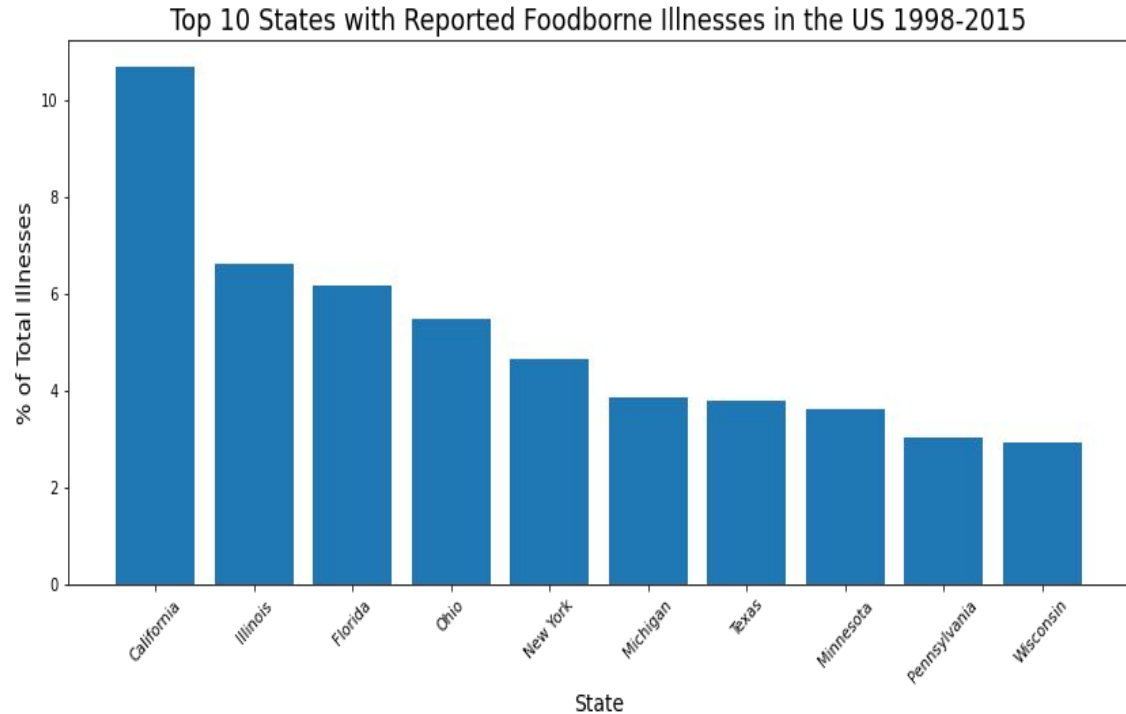
Michigan - 3.87%

Texas - 3.80%

Minnesota - 3.62%

Pennsylvania - 3.04%

Wisconsin - 2.95%



Foodborne Illness by State per Capita

Minnesota - 0.002465

Illinois - 0.001921

Wisconsin - 0.001908

Ohio - 0.001761

Michigan - 0.001458

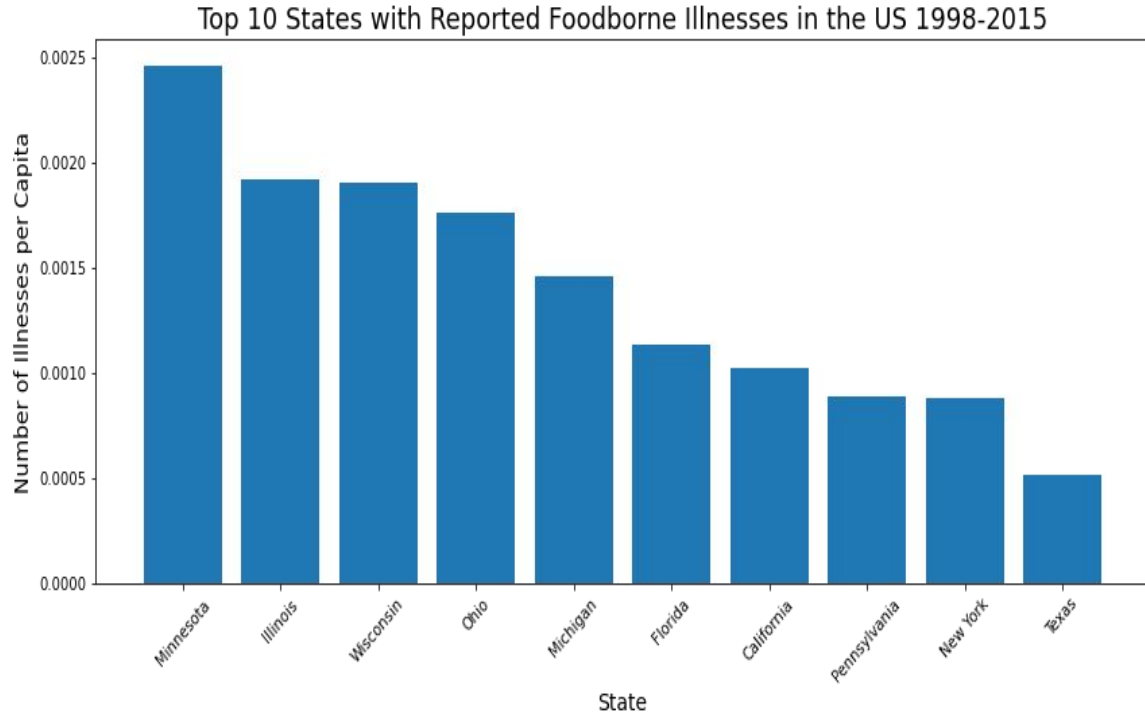
Florida - 0.001137

California - 0.001022

Pennsylvania - 0.000888

New York - 0.000879

Texas - 0.000516



Foodborne Illness by Causative Agent

Norovirus - 37.11%

Salmonella - 17.44%

Clostridium - 7.92%

Escherichia - 3.23%

Staphylococcus - 2.39%

Shigella - 2.17%

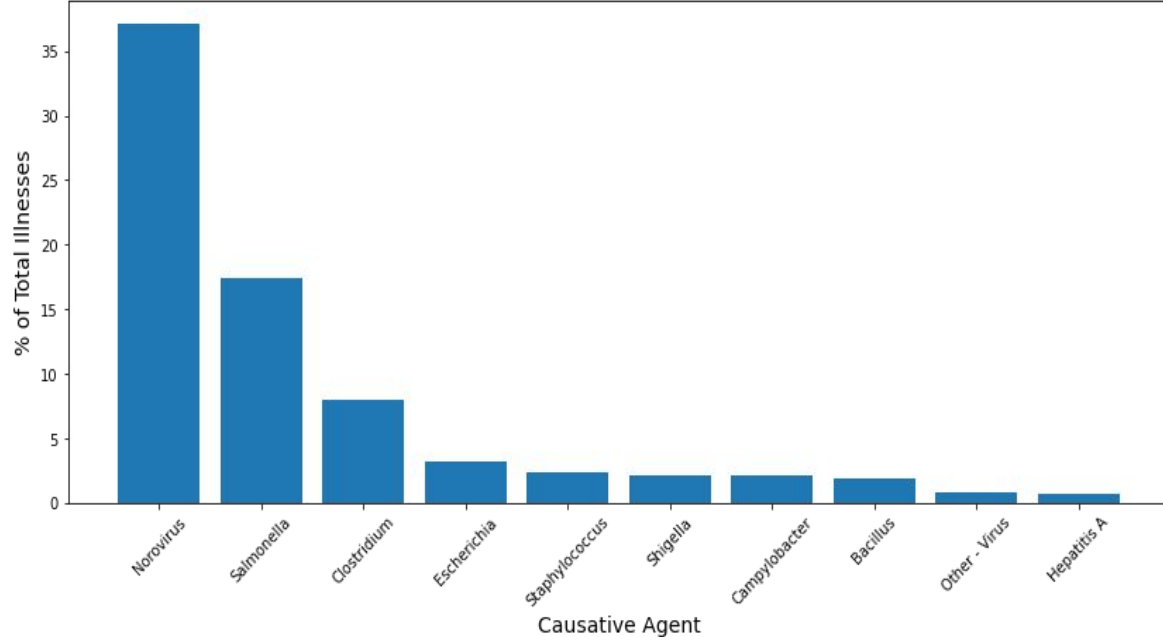
Campylobacter - 2.16%

Bacillus - 1.92%

Other Virus - 0.81%

Hepatitis A - 0.64%

Top 10 Agents Causing Reported Foodborne Illnesses in the US 1998-2015



Foodborne Illness by Location of Preparation

Restaurant/other - 33.39%

Caterer - 9.36%

Other - 9.32%

Private home/residence - 7.50%

Restaurant/sit-down - 7.40%

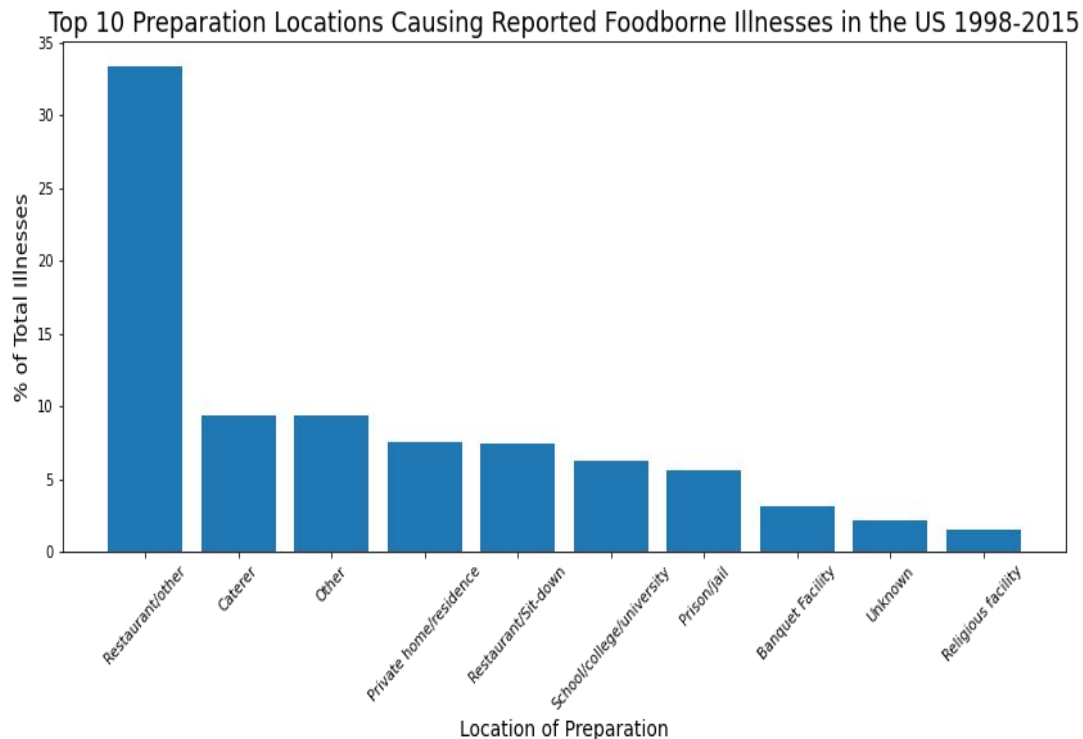
School/college/university - 6.25%

Prison/jail - 5.61%

Banquet facility - 3.11%

Unknown - 2.12%

Religious facility - 1.50%



Foodborne Illness by Food Vehicle

Multiple foods - 1.46%

Salad, unspecified - 0.71%

Pork, bbq - 0.64%

Tomato, unspecified - 0.63%

Potato salad - 0.58%

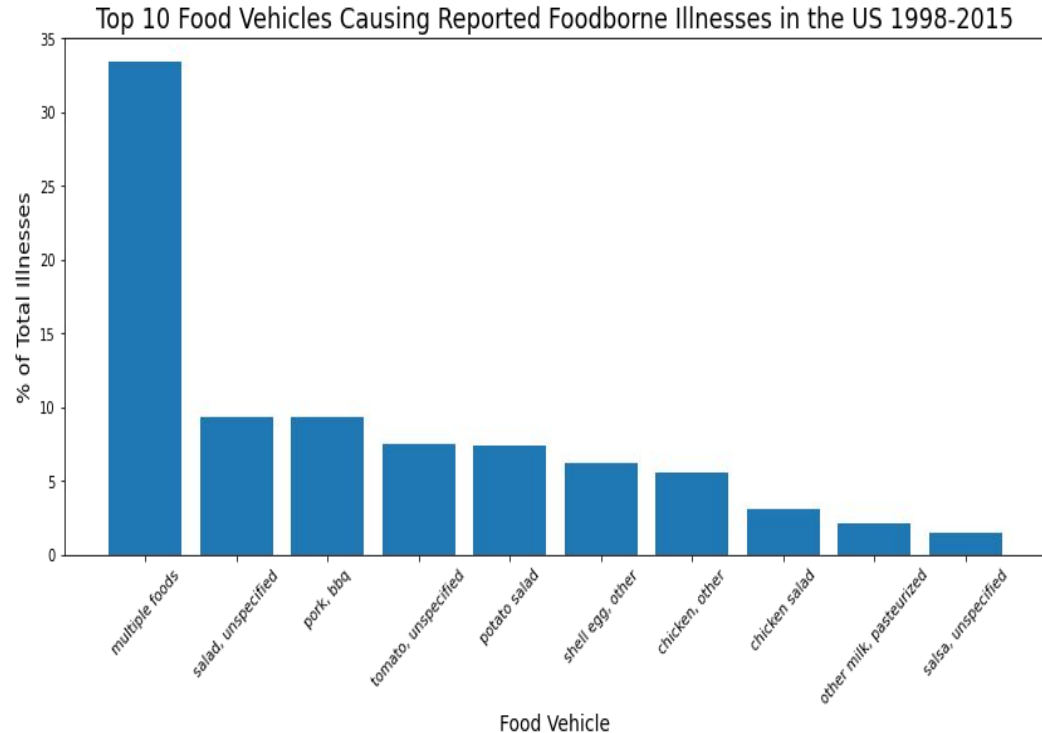
Shell egg, other - 0.53%

Chicken, other - 0.49%

Chicken salad - 0.48%

Other milk, pasteurized - 0.47%

Salsa, unspecified - 0.46%



Sources of Contamination and High Risk Foods for Foodborne Illness

- States with a higher population have a higher foodborne illness per capita rate
- Highest occurring causative agent is Norovirus
- Highest occurring preparation location is a restaurant
- Highest occurring food vehicle is multiple foods

Tableau Dashboard of CDC Data

****Link to dashboard**

Foodborne Illness

Thank You

Questions and Comments?