COVID - 19

Task Force
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Motivation and Objective

Motivation:

Our current pandemic situation; rationalize why we are in the situation we are in.

Objective:

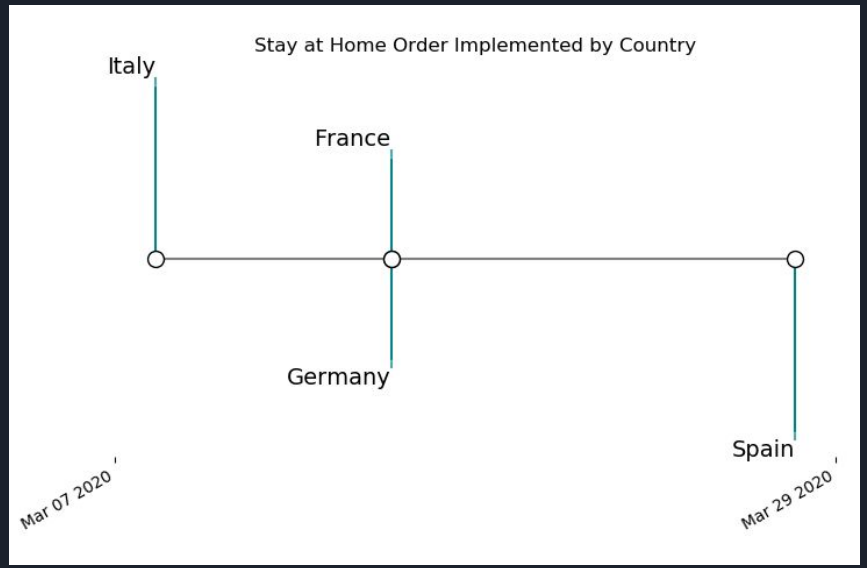
- Analyzing the effect of various public policies and preventative measures on the lethality of the disease on specific population
- Find vulnerable communities and find conclusions/factors on their vulnerability to the disease
- Analyze preparedness of hospital systems grouped by states in the US

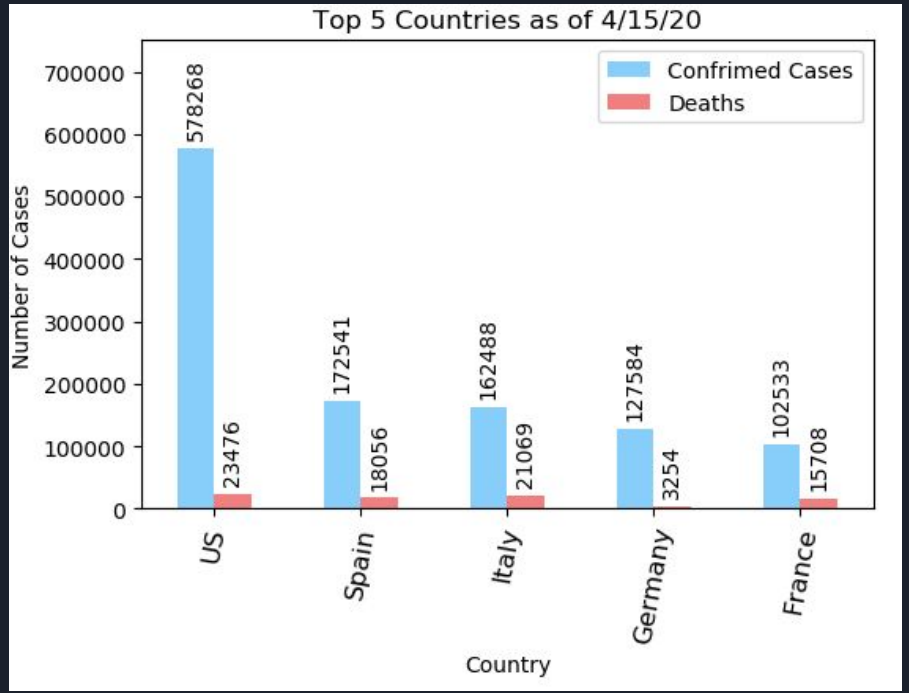
Questions and Datasets Used

- **Questions**
  - How are Public Policies affecting COVID-19? : Global Perspective
  - Identifying trends within the US
  - How prepared were different states in the US for COVID-19?
  - Which demographics in the US are mainly affected by COVID - 19?
    - Overall comparison - Illinois vs New York
- **DataSets**
  - CDC
  - New York Times
    - Countries and Counties
  - Illinois Department of Public Health
    - Demographics
  - NYC Health
    - Demographics
  - American Hospital Association
    - HHR Scorecards
  - Department of Agriculture
    - Unemployment
    - Household income
    - Poverty rates
  - COVID-19 Tracking Project
    - Testing data across states

Question #1 - How are Public Policies affecting COVID-19? Global Perspective

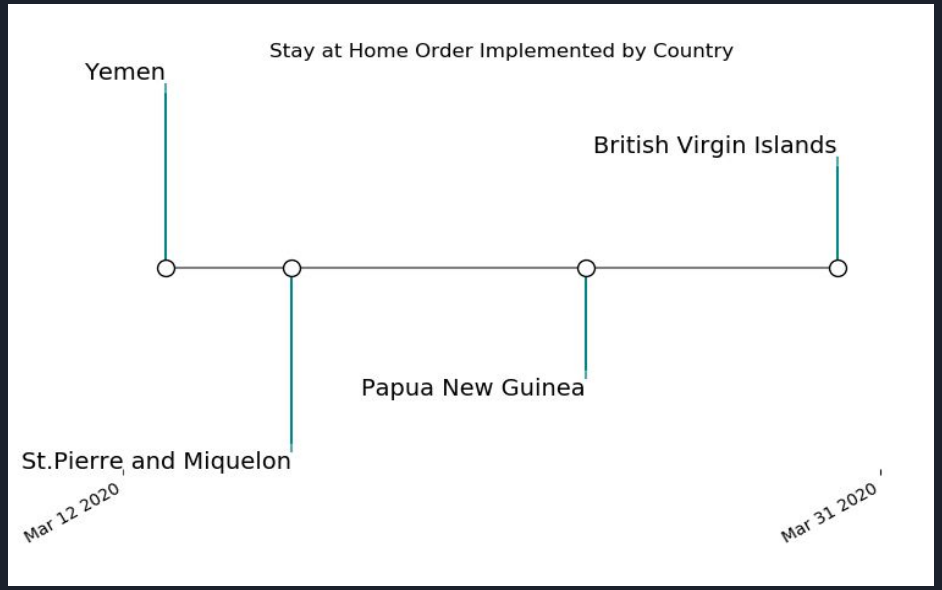
Countries with the highest COVID-19 cases and deaths

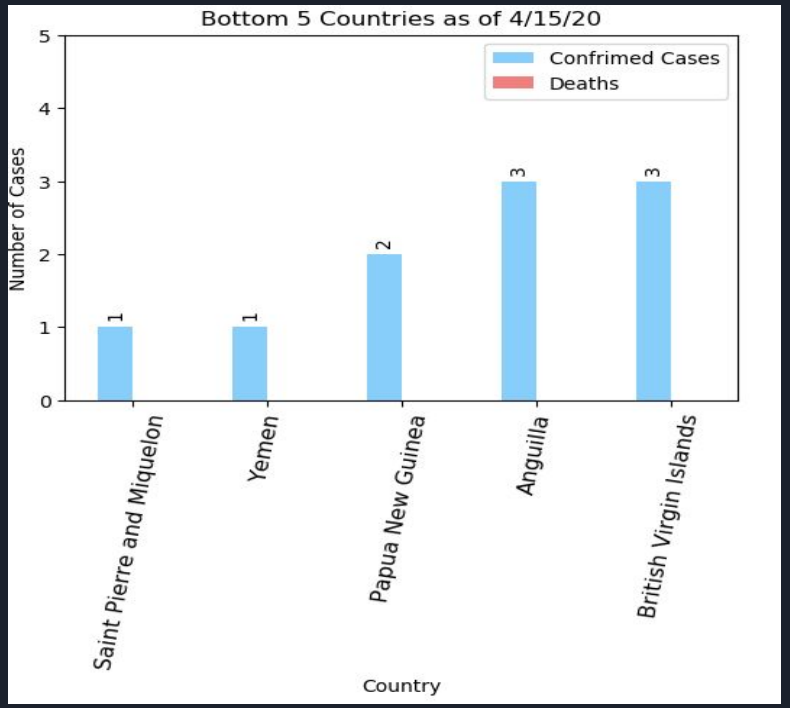




Italy : 3/14
France: 3/17
Germany: 3/24
Spain: 3/30
US: Differs by State ; 44/50 States so far have a Stay at Home Order

Countries with the lowest COVID-19 cases and deaths

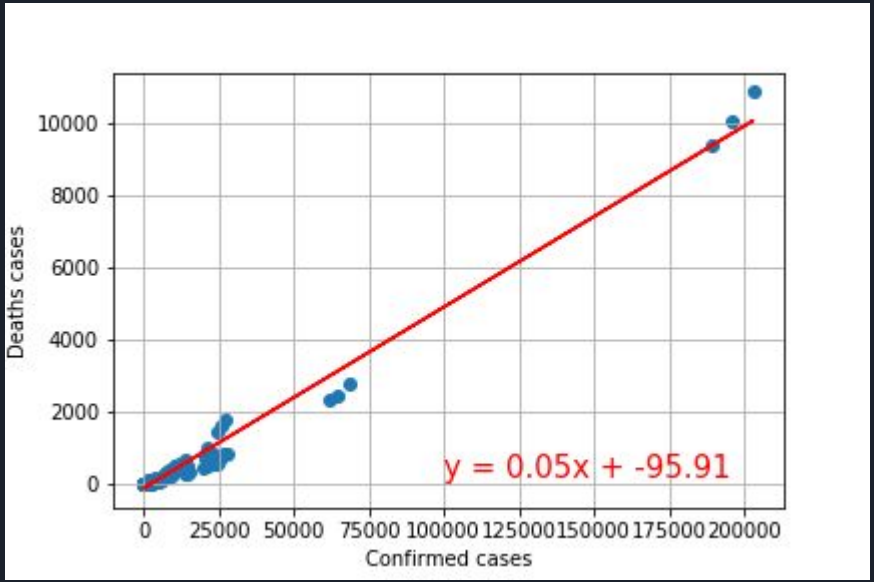


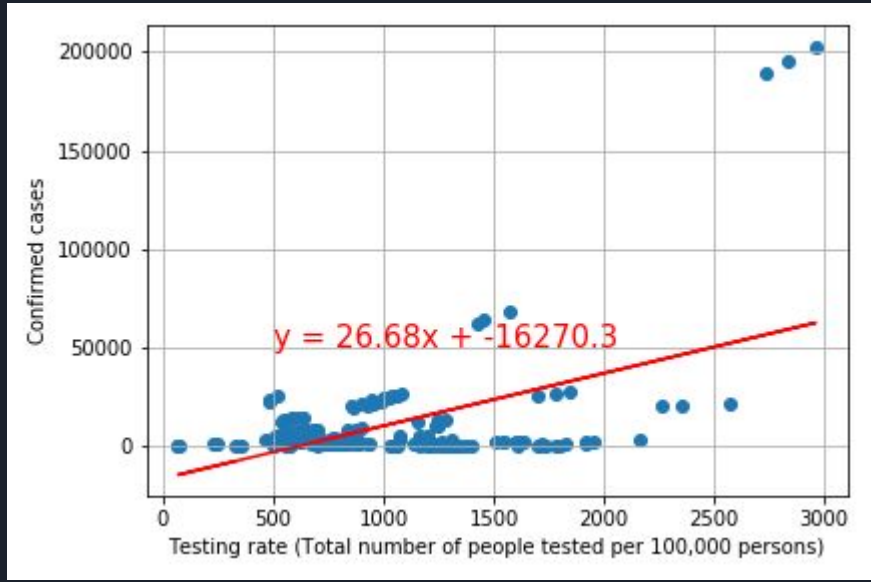


Yemen: 3/14
St. Pierre and Miquelon: 3/17
Papua New Guinea: 3/24
British Virgin Islands: 3/30
Anguilla: Has not implemented a nation wide Stay at Home Order as of now

Question #2 - Identifying trends within the US

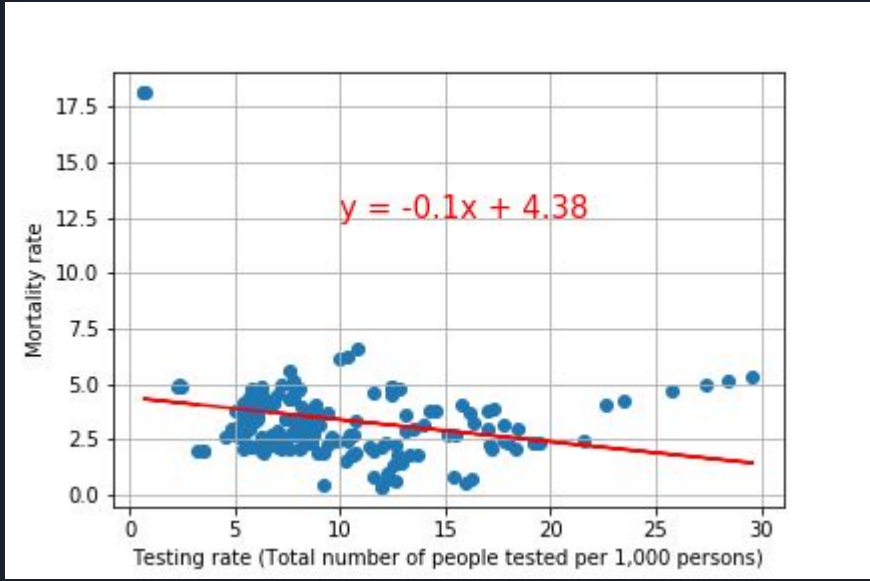
The correlation coefficient for confirmed and deaths cases is 0.99

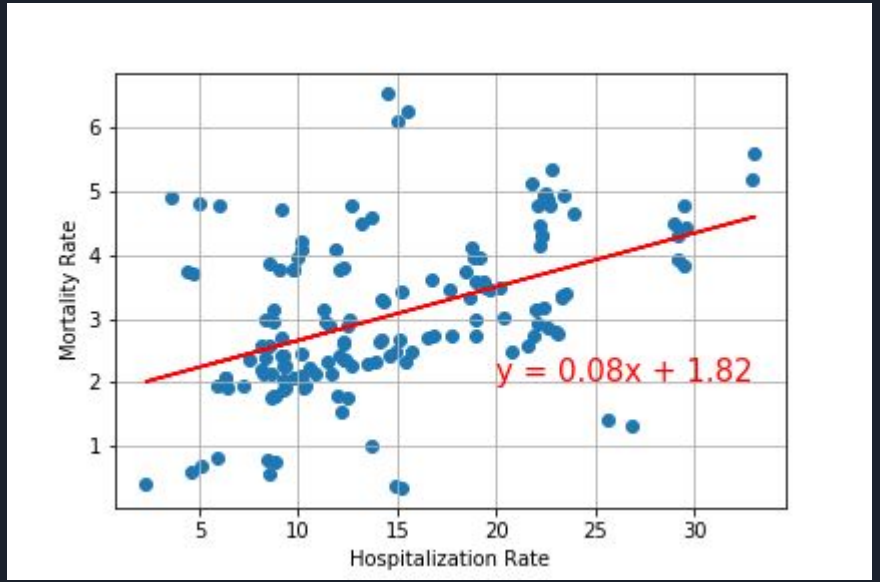




The correlation coefficient for testing rate and confirmed cases is 0.51

The correlation coefficient for testing rate and mortality rate is -0.22

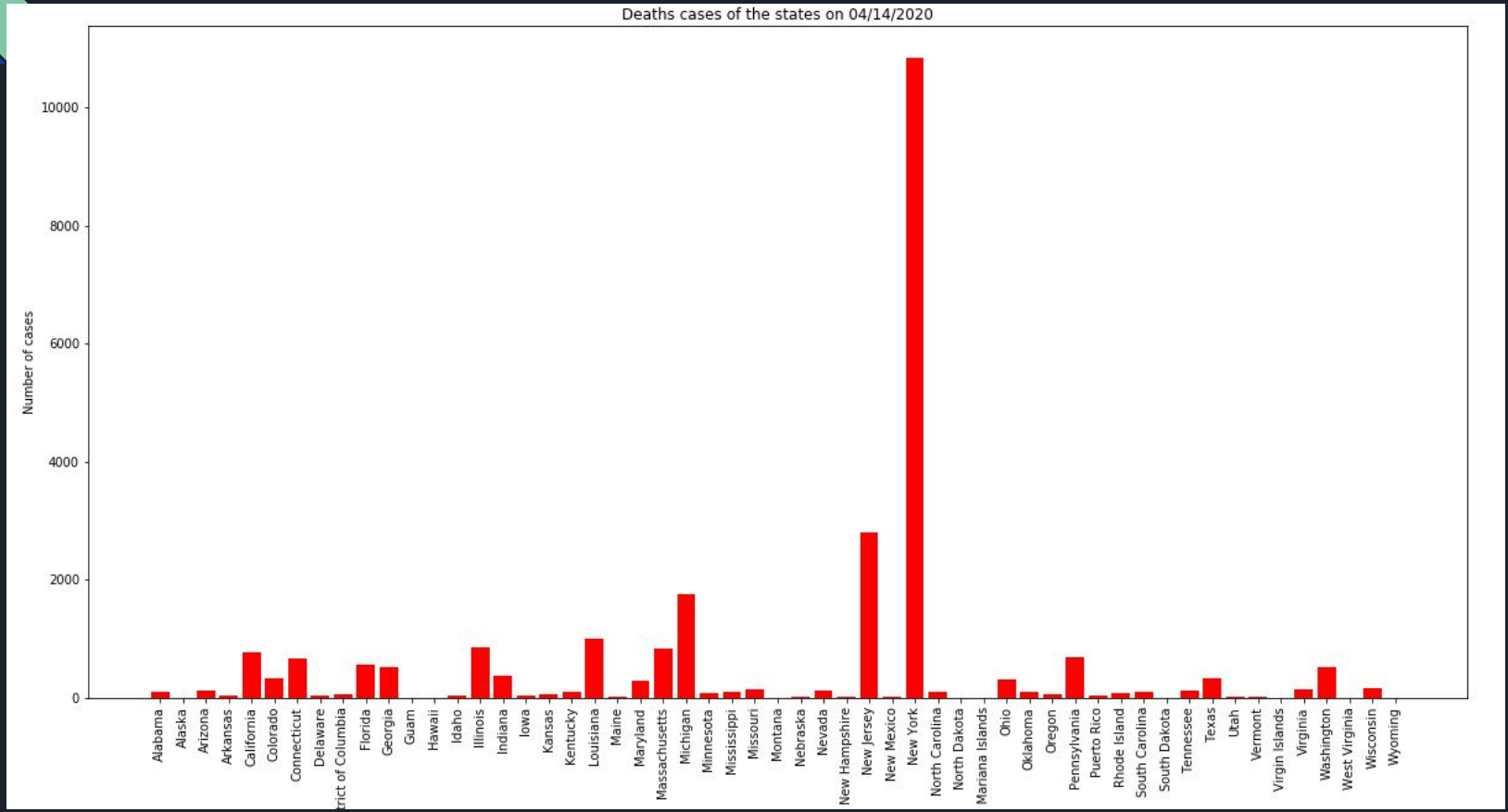




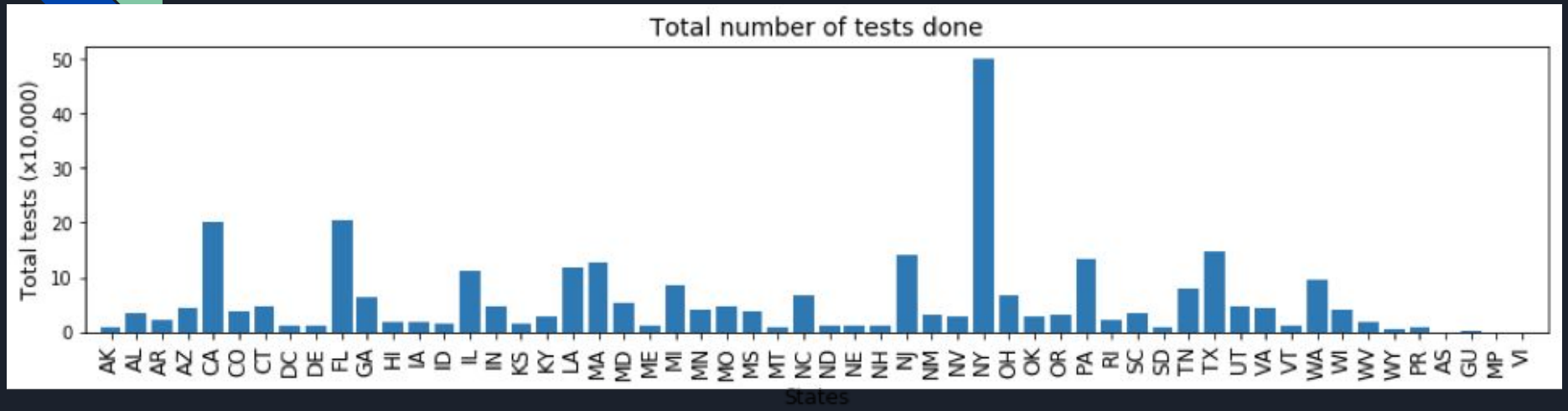
The correlation coefficient for hospitalization rate and mortality rate is 0.45

Question #3 - How prepared were different states in the US for COVID-19?

Which states have the worst mortality rates?



Question: Are all the states running similar number of tests?



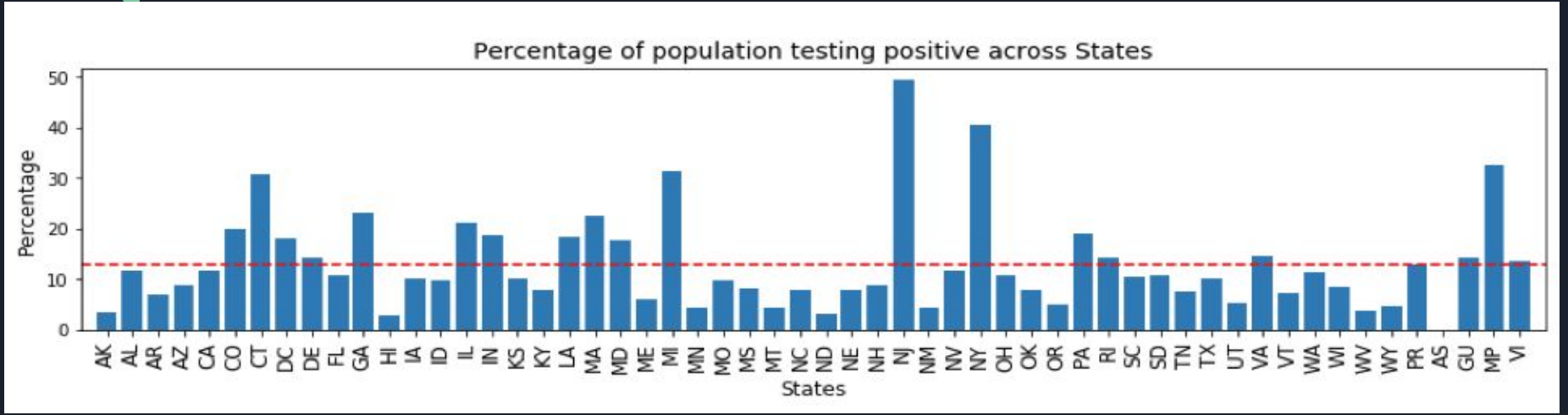
Conclusions:

Some states like NY, CA, FL are running more tests than the rest of the country and so can be assumed to be aggressively testing for COVID19

Limitations:

Total tests are not normalized to the population of each state

Question: What percentage of the tested population is positive for COVID19? Is the percentage similar across the different states?

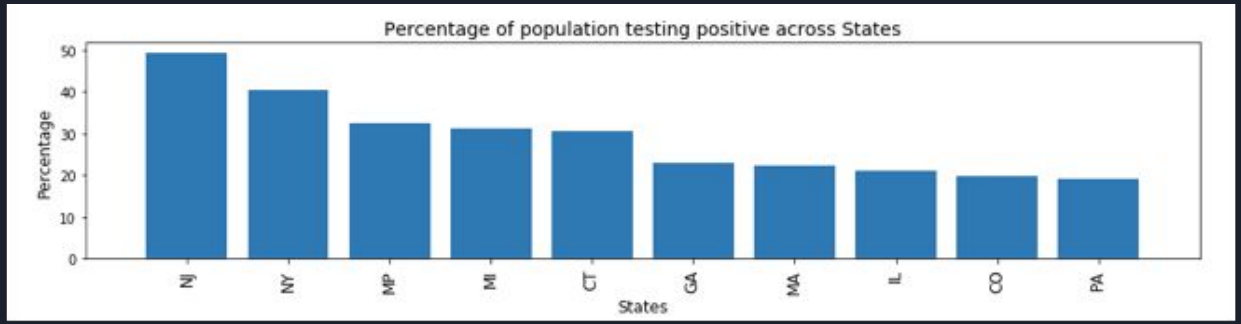


Conclusions:

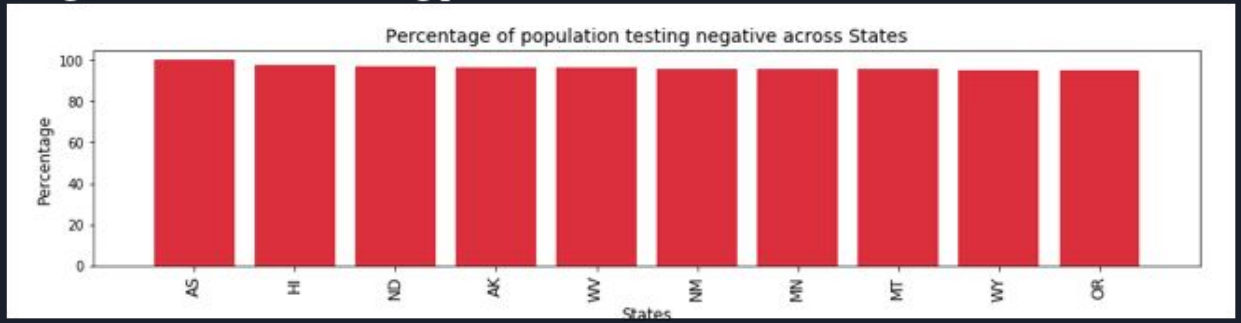
Average percentage of positive cases across the US is 12.78%

20 states have a rate higher than the national average: NJ, NY, MP, MI, CT, GA, MA, IL, CO, PA

Calculation
(Positive cases / total tests)*100



These states might have high infection rates or they employ strict testing criteria – only if you meet certain criteria are you tested leading to a higher number of cases being positive

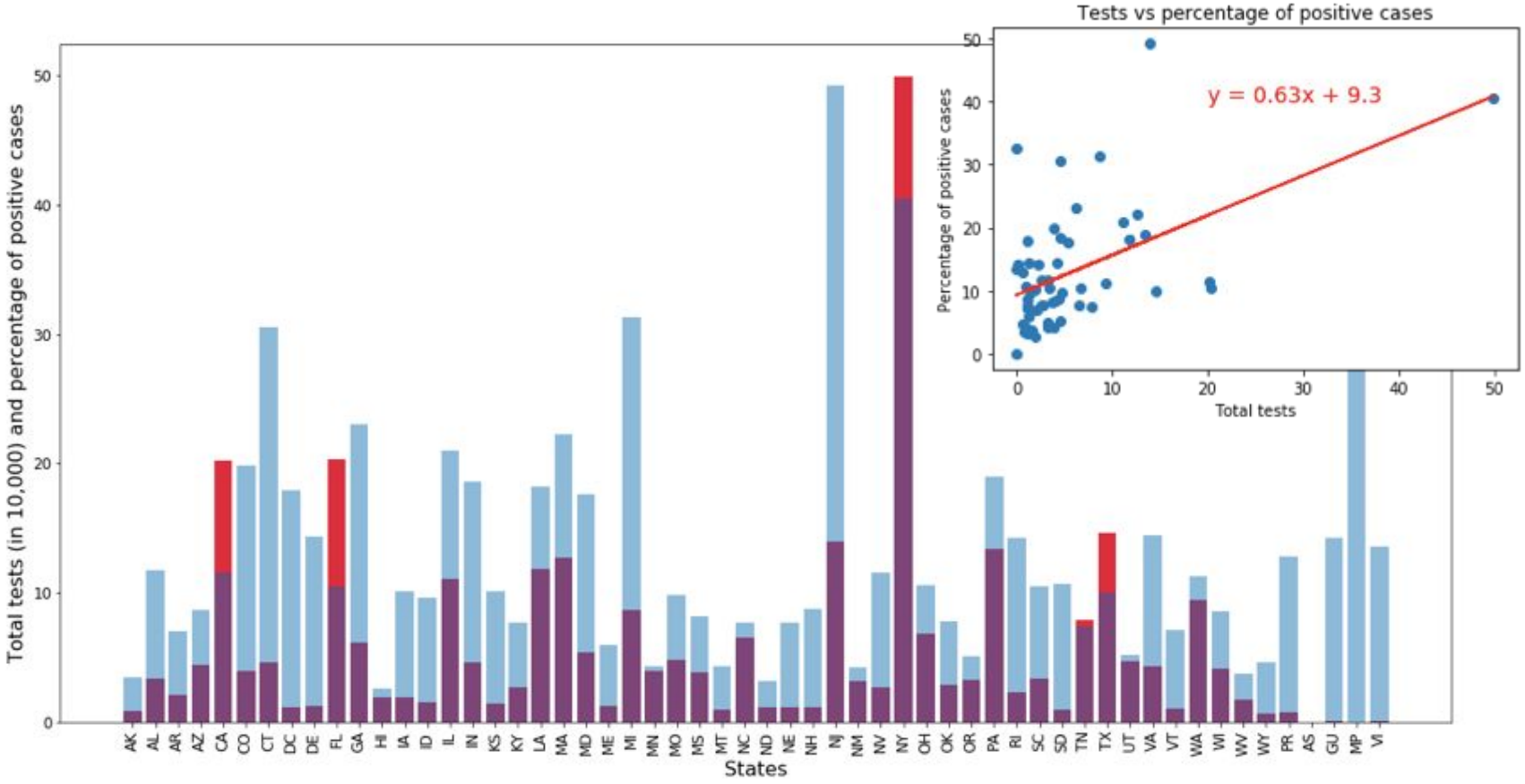


"Paranoia" states

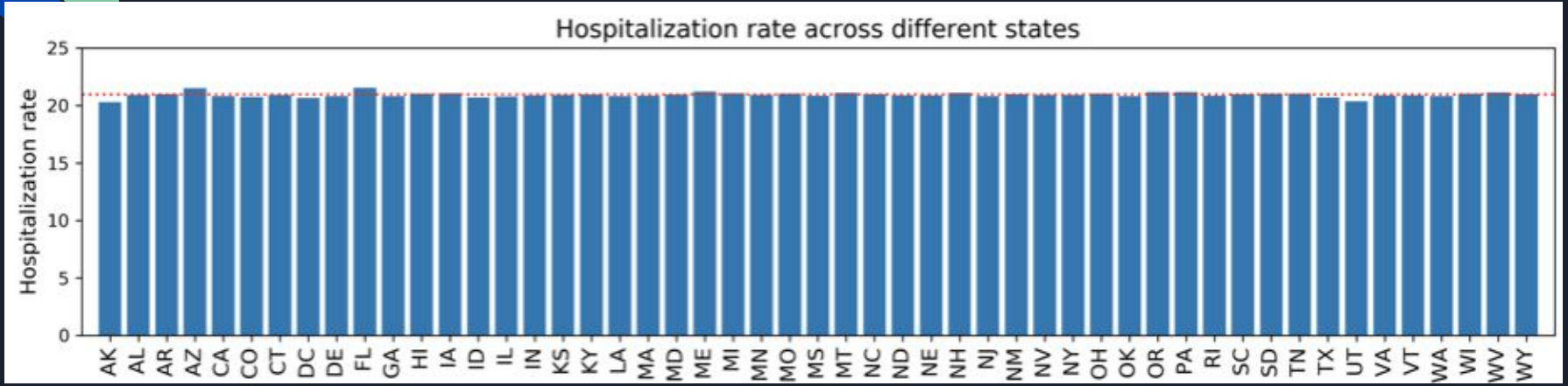
Relaxed testing criteria

<u>Limitations:</u>

Possible correlation between the total number of tests done in these states


Tests vs percentage of positive cases
y = 0.63x + 9.3
Percentage of positive cases
Total tests
Total tests (in 10,000) and percentage of positive cases
States
AK AL AR AZ CA CO CT DC DE FL GA HI IA ID IL IN KS KY LA MA MD ME MI MN MO MS MT NC ND NE NH NJ NM NV NY OH OK OR PA RI SC SD TN TX UT VA VT WA WI WV WY PR AS GU MP VI

Question: Are the projected hospitalization rates different between states?



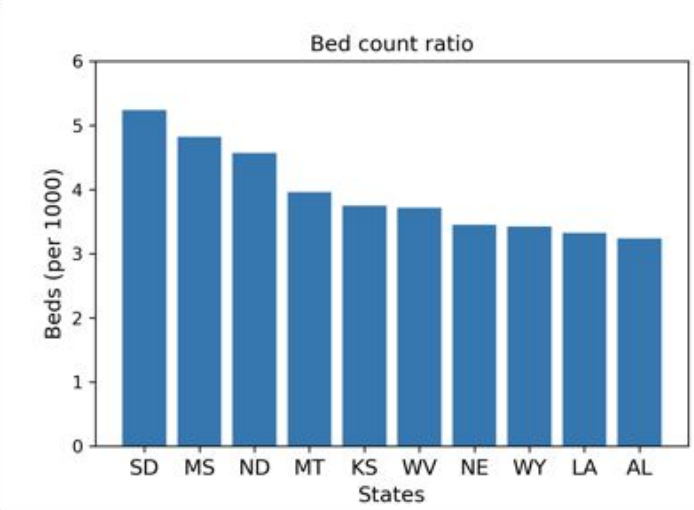
Conclusions:

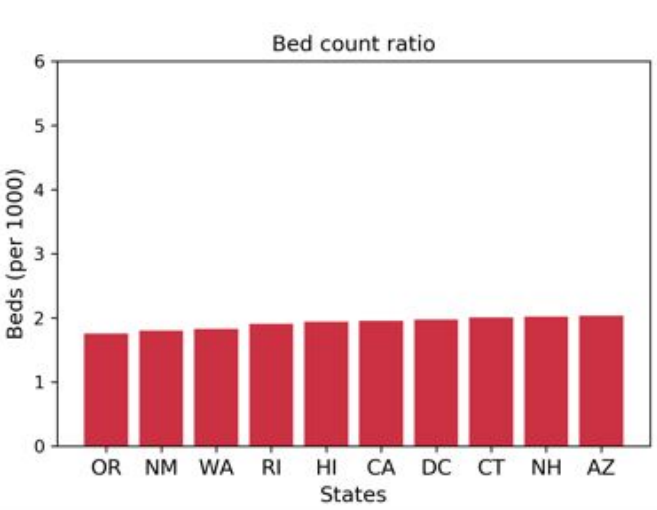
No difference in the projected hospitalization rates

Calculation

(Projected Hospitalized Individuals / Projected Infected Individuals)*100

Question: Which states are better prepared with respect to bed counts considering the projected hospitalization rates are similar?





Conclusion:

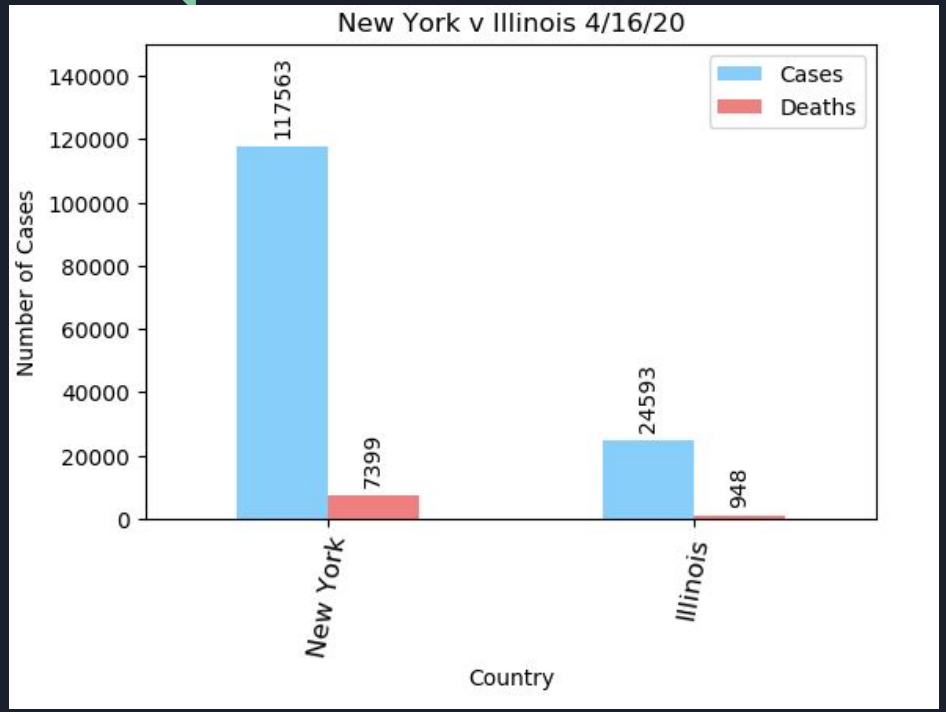
SD has about 5 beds for every 1000 individuals whereas OR only has 2 beds for every 1000 individuals

IL is in the middle averaging about 2.59 beds for every 1000 individuals

Calculation

(Total bed counts / Total population)*1000

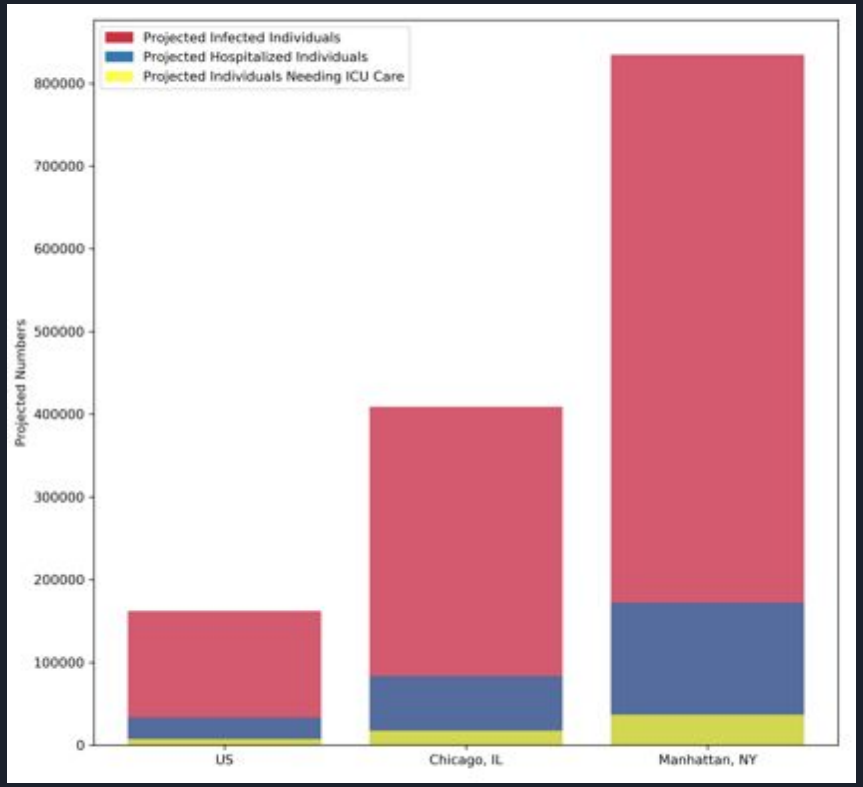
Stay at Home Order Timeline - US



Illinois Stay at Home Order - March 20th, 2020

New York Stay at Home Order - March 22nd, 2020

Question: How does Chicago fare with respect to projected number with the rest of the US?

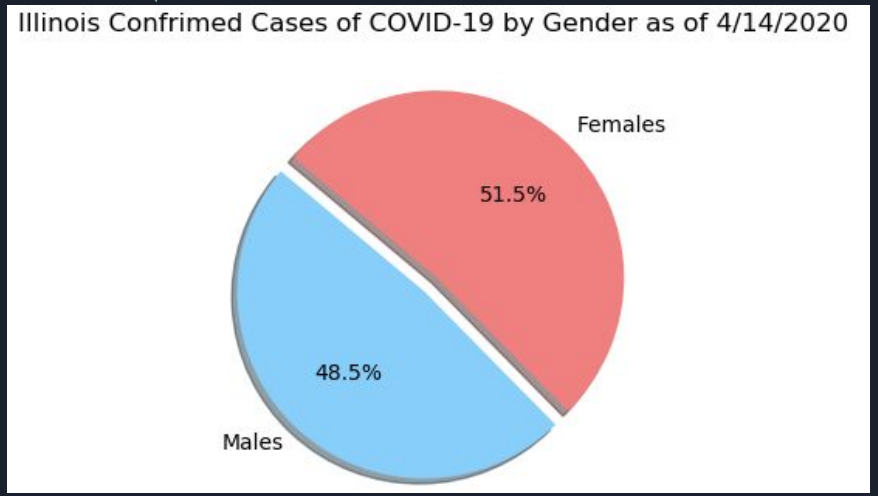


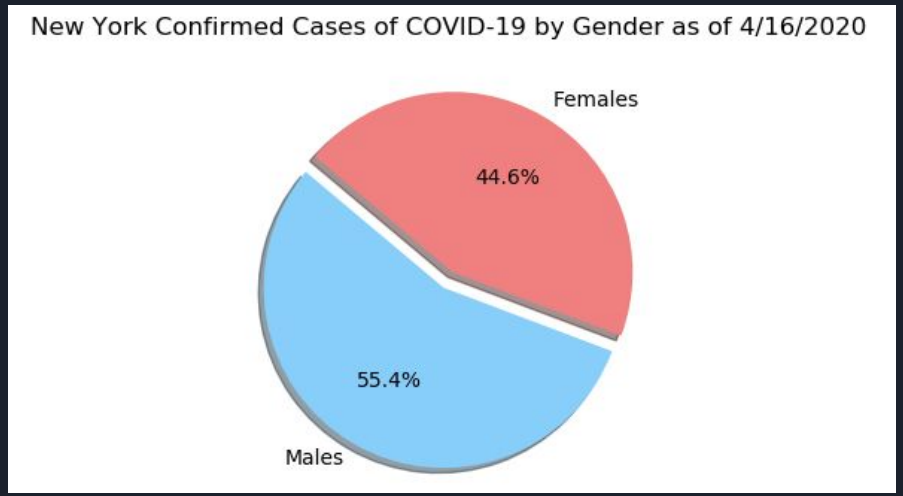
<u>Conclusion:</u>

Chicago is projected to be worse than the rest of the US but still looks to be better than Manhattan in the 6-month projections

Question #4 - Which demographics in the US are mainly affected by COVID - 19?

Question: Are men more susceptible to COVID-19 infections?

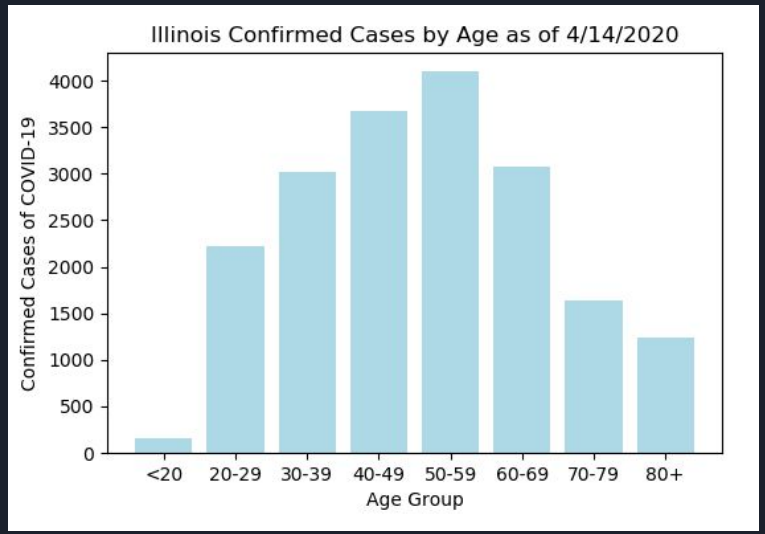


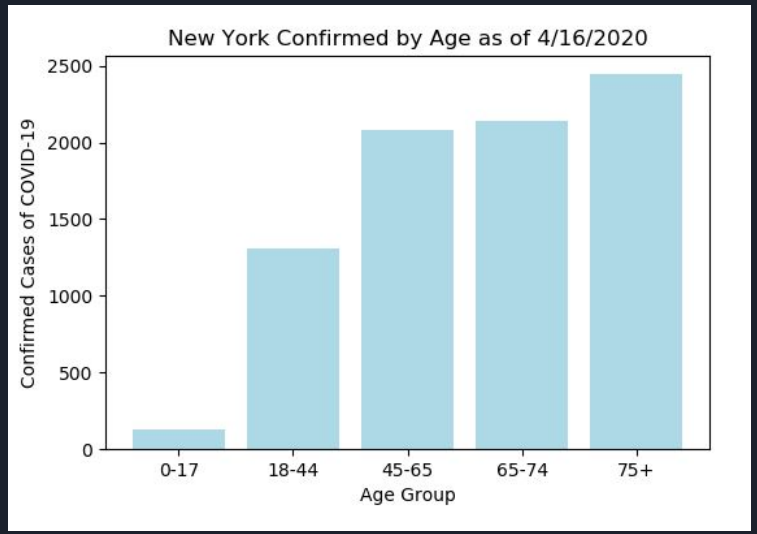


Conclusion:
Equal susceptibility

Limitation:
Is there a gender-based difference in getting tested?

Question: Which age group has the highest confirmed cases?

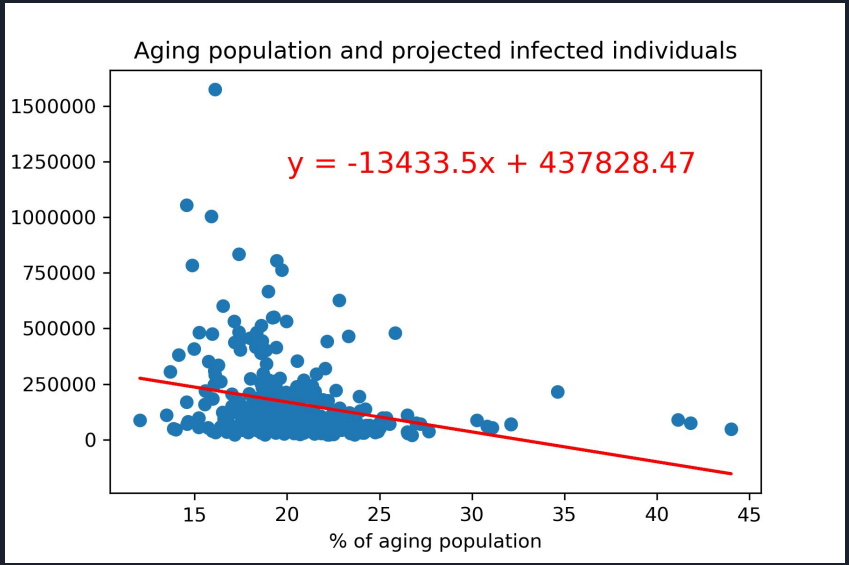




Conclusion:
Different distribution in Illinois and New York
0-20 age groups seems to be protected

Limitation:
Different bins in the two datasets

Is there a correlation between age and susceptibility to infection?



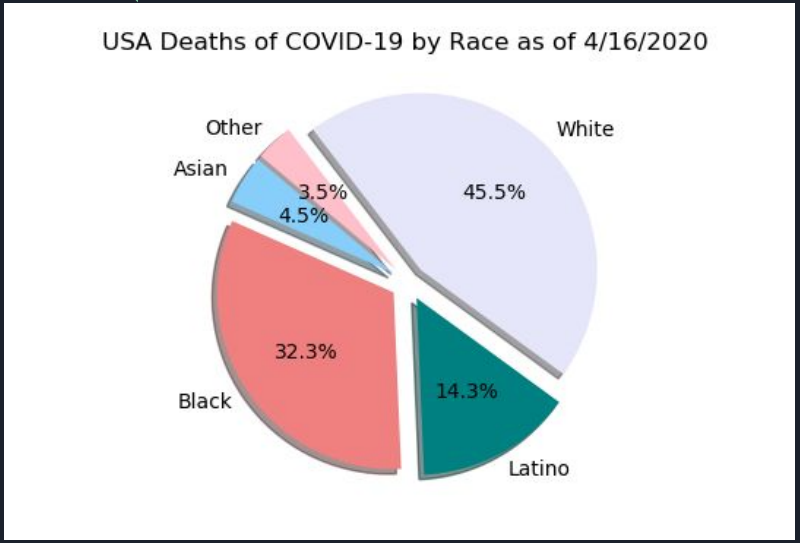
Conclusion:

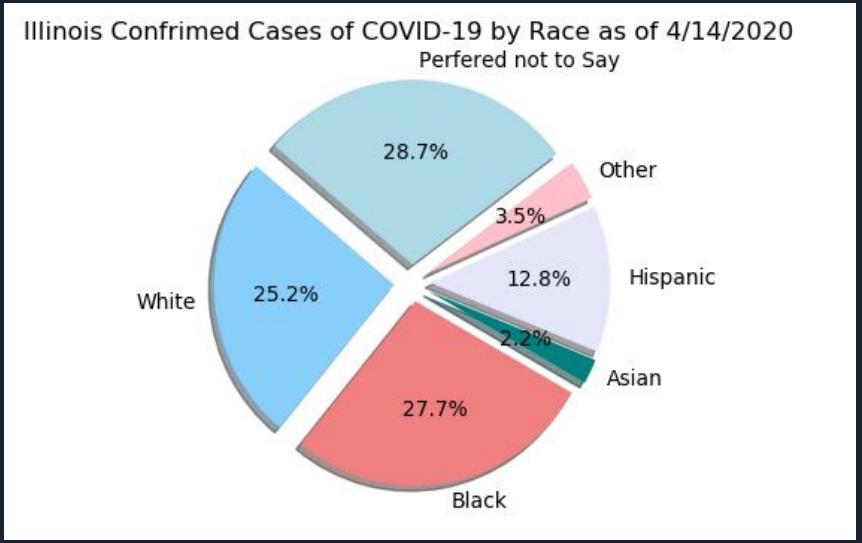
There is no correlation between age and susceptibility to infection which suggests that the youths need to exercise caution

Calculation

(Number of 65+ people/ Total population)*100

Question: Is race an indicator of susceptibility of COVID-19?

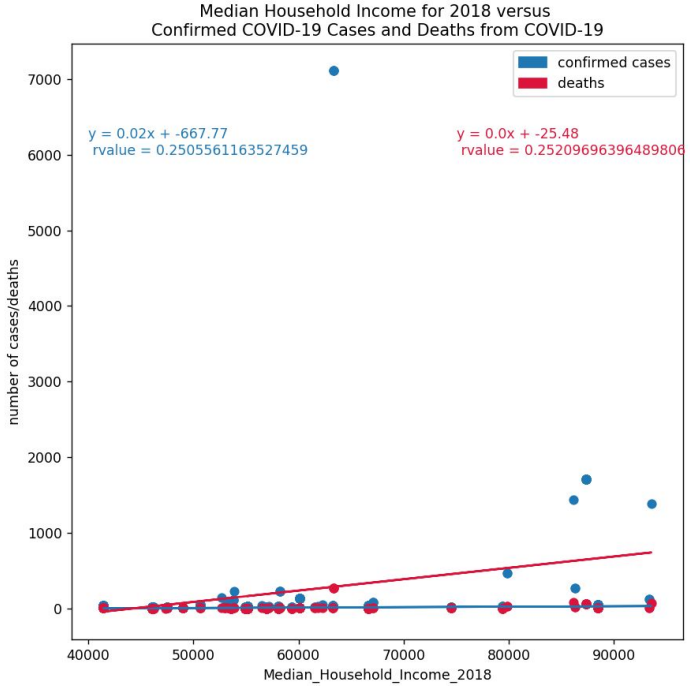


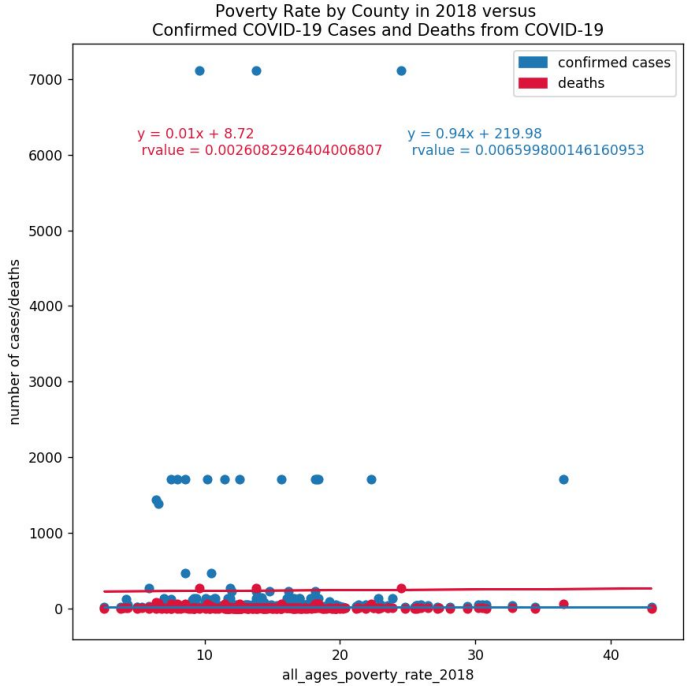


Conclusion:
Race is not an indicator

Limitation:
Race is not categorized the same across datasets

Do wealth and prosperity have an effect on infection rates and death?





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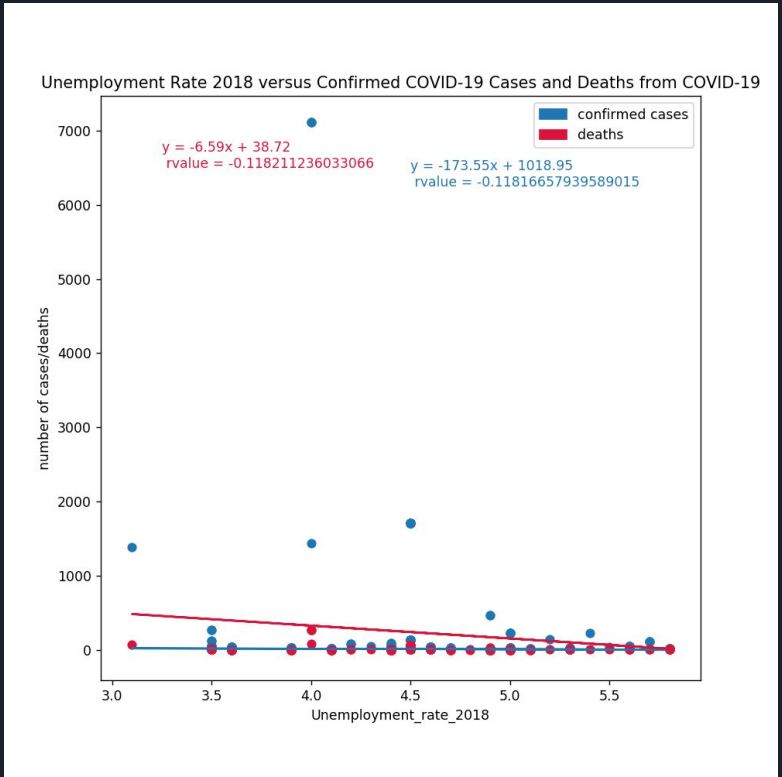

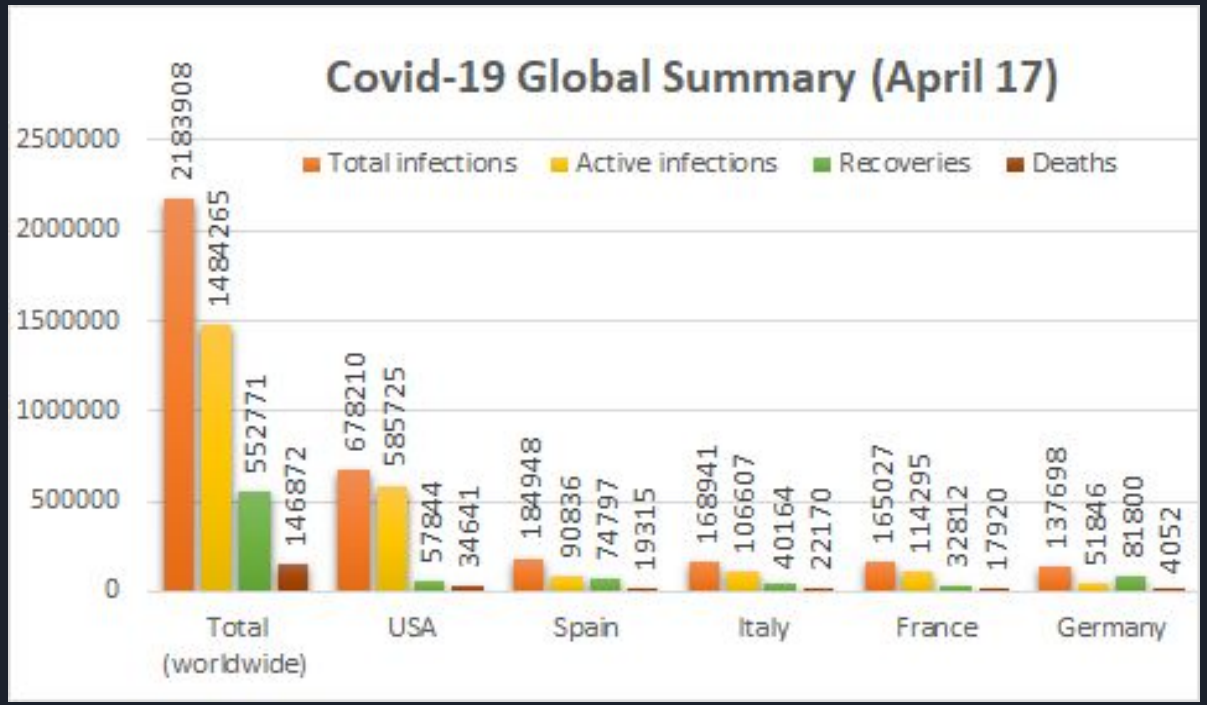

3 Key Observations:

1. The United States now stands alone as the global leader in both active cases and deaths.

2. The Covid-19 infection death rate in the United States is currently either the #1 leading cause of death or fluctuating within the top 3 leading causes on a daily basis.

3. The United States tests approximately 10K per every 1 million people living in the US, as a percentage, that is significantly less than all other nations in this study (and globally).

Key Observations (correlating with our data):

In this study, Spain took the longest to implement stay at home orders which accounts for their relatively high number of cases (tested) when compared to other European countries.

Many countries locked down their citizens and appear to have enacted much more efficient, rapid quarantine measures which resulted in significant reductions of the total infected, even with populations far exceeding the United States (ex. China, India).

There is no correlation between ages and general demographics of individuals and their ability to contract or spread the virus. It is, however, notable that the Asian population (US) and to a lesser degree Caucasian populations (US) have reported significantly less contracted cases.

Our observations revealed no significant difference, by US states, as far as hospitalization projections are concerned. However, date revealed that numerous states and hospitals would experience varying degrees of stress due to limited numbers of beds available to treat sick patients.

Confirmed cases of people as young as 18-20 years of age appeared more significantly in number than assumed. While adolescent children seem to be greatly less effected, or not in need of testing, that group seems effectively sheltered at home.

It is difficult to differentiate between states which tested more often or had a higher rate of infections within the general population, since the US used a state by state decentralized approach to testing and quarantine efforts.

US restricted flights to and from China this past January, but waited until mid March to do the same for European flights, focused on the hardest hit countries. **Lots of travelers + busy airports/ cities = Contagion Disaster**

Avoid this disease? Live on a tropical island because the lowest reported cases were found there. Much smaller populations, limited flight schedule and vast oceans likely acting as the best barriers of all.

Limitations of the datasets

The data available to the public hampered our abilities to draw the number of insights we had originally desired.

Areas we found limited, incomplete or no public data sets available which interested us, included:

Comprehensive, state by state reporting information data.

How does temperature affect the spread of this disease?

Were hospital systems truly prepared for this or did flattening the curve simply buy them more time to better prepare?

Did the actions of the White House Task force start too early, too late?

Did the coordination efforts between Federal agencies and State agencies work as planned or what needs to be fixed going forward?

Questions from the class?