COVID-19 in New York

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Background Information

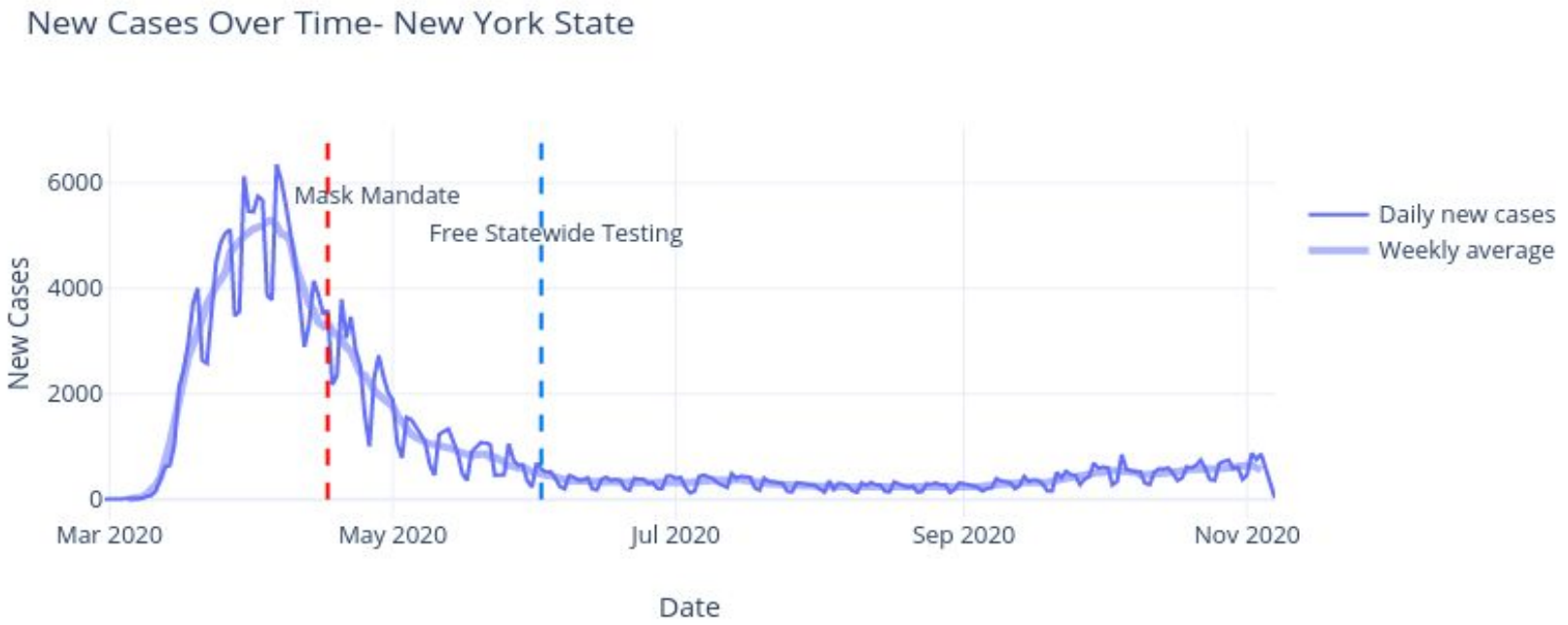
- 4th most populous state with an estimated population of 19.4 million
- New York City accounts for 43% of the population
- 62 counties
- Urban Centers:
  - New York City
  - Albany
  - Rochester
  - Buffalo
  - Syracuse
  - Ithaca
- We chose New York because it was originally the epicenter of the virus in the US and was one of the states that was hit the hardest.

New York Major Events/Dates

Covid-19

Date	Event
February 29	First reported case of COVID-19
March 20	Order to close down all non-essential businesses
April 17	Mask Mandate
April 20	Antibody Testing
June 2	Free Testing
June 8 - July 20	Phase 1-4 Reopening (NYC)

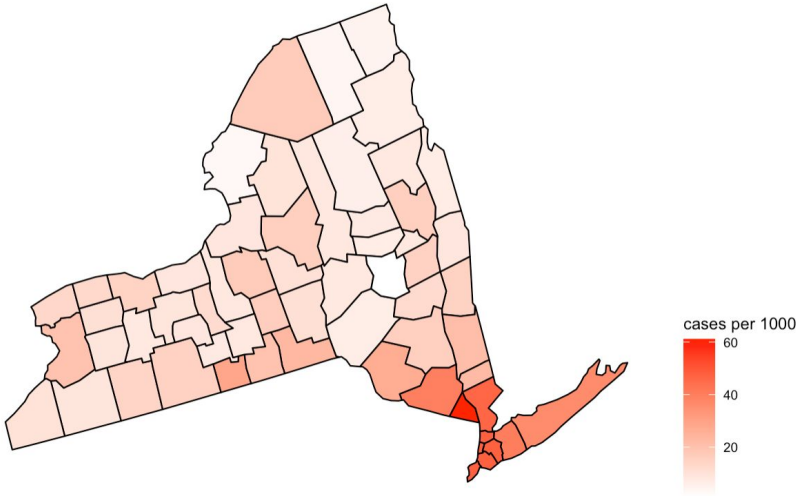
Daily New Cases- New York



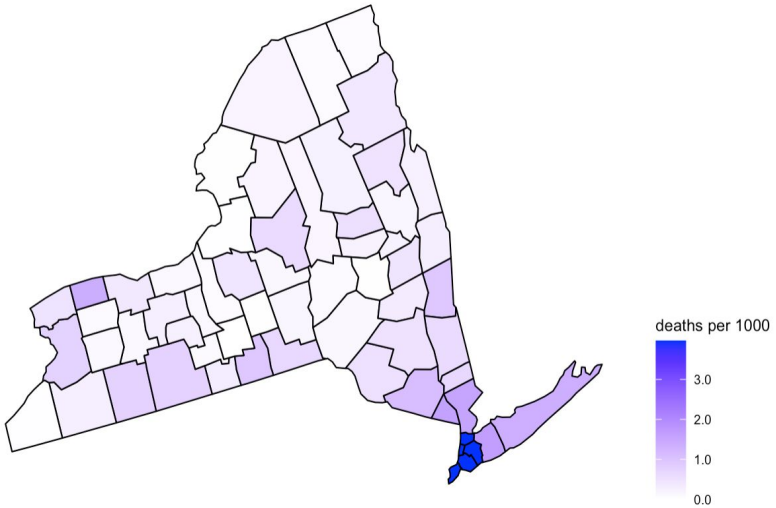
Daily New Deaths- New York

County Plots

New York
Cases Per 1000 By County



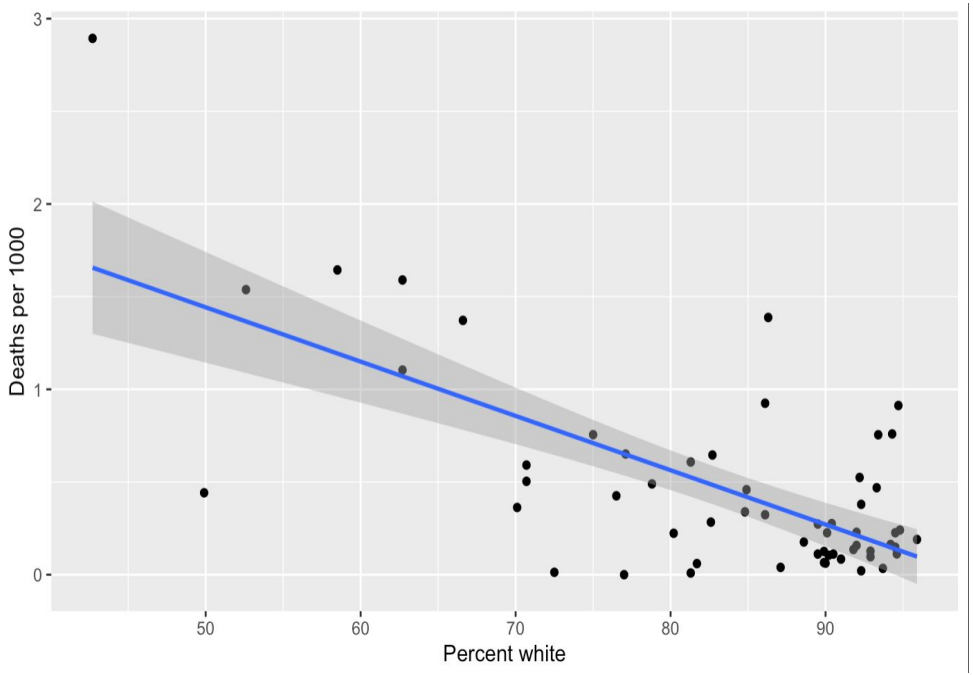
New York
Deaths Per 1000 By County



Socioeconomic Factors to Consider

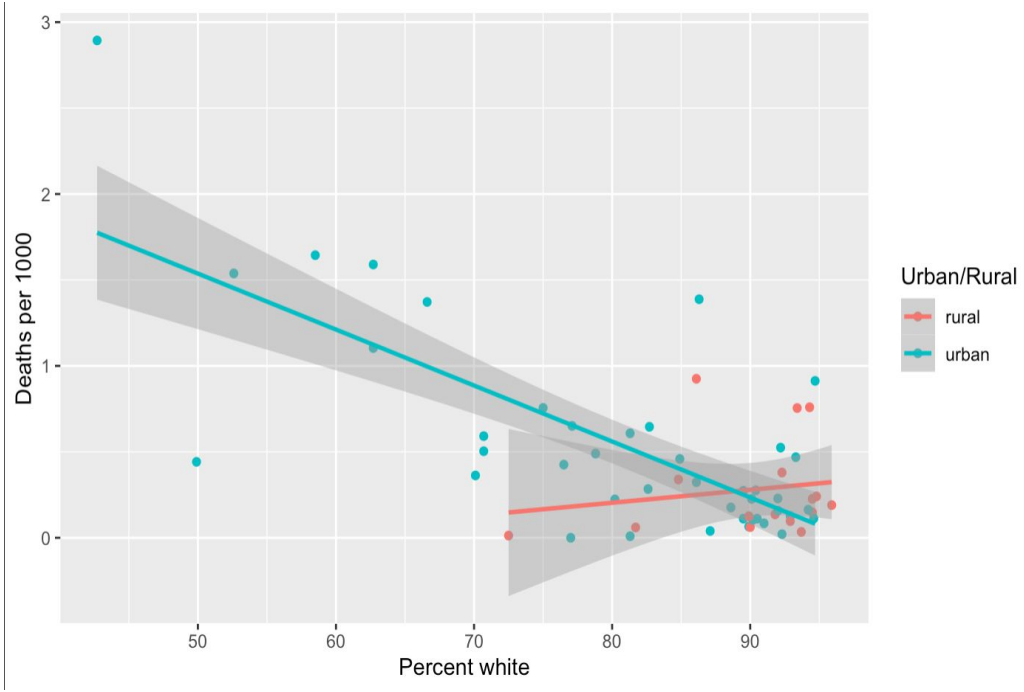
- Race Disparities
- Distance from NYC (major urban center)
- Population Density
- Household Income/Poverty Rate
- Median Age
- Political Affiliation
- Urban/Rural

Race vs Mortality Rate



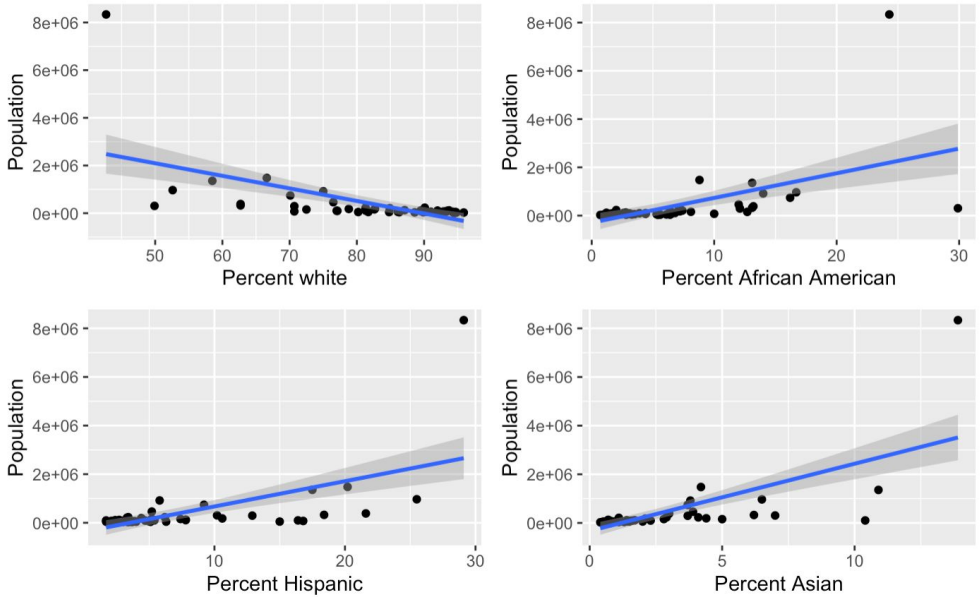
- For every 1% increase in percent white, we have a 2.9 decrease in deaths per 1000 (+/- 0.004)
- P-value of 0.
- Race clearly impacts mortality rate. The question is why?
- Unexpected inverse relationship between income and percent white.

What if we control for urban/rural?



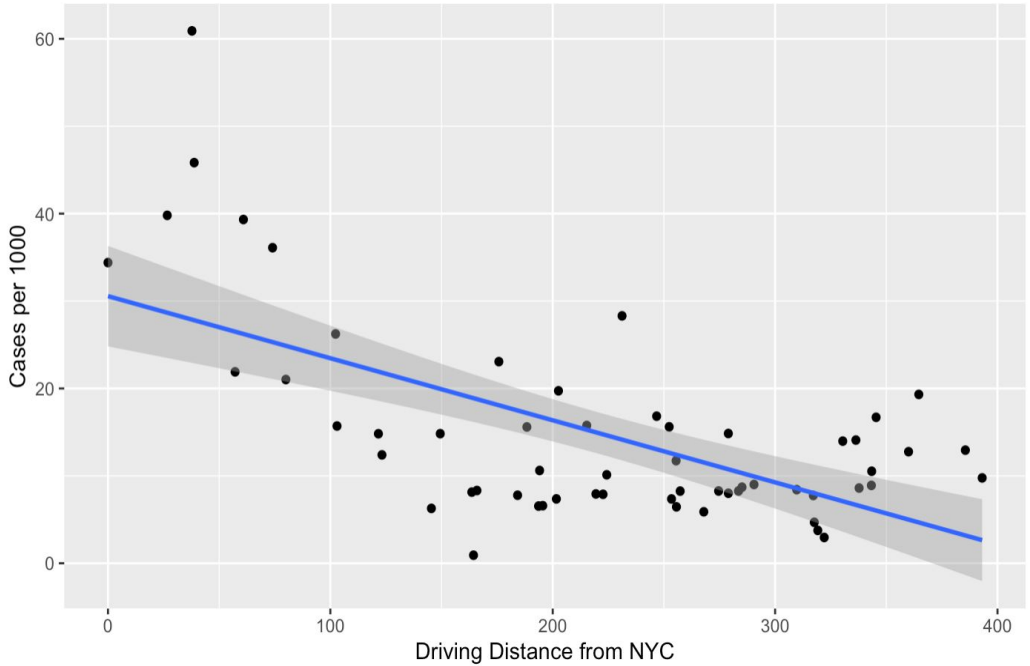
- Negative relationship in urban counties.
- Slight positive relationship in rural counties.
- Still does not explain inverse relationship in urban counties.

Could Population be the culprit?



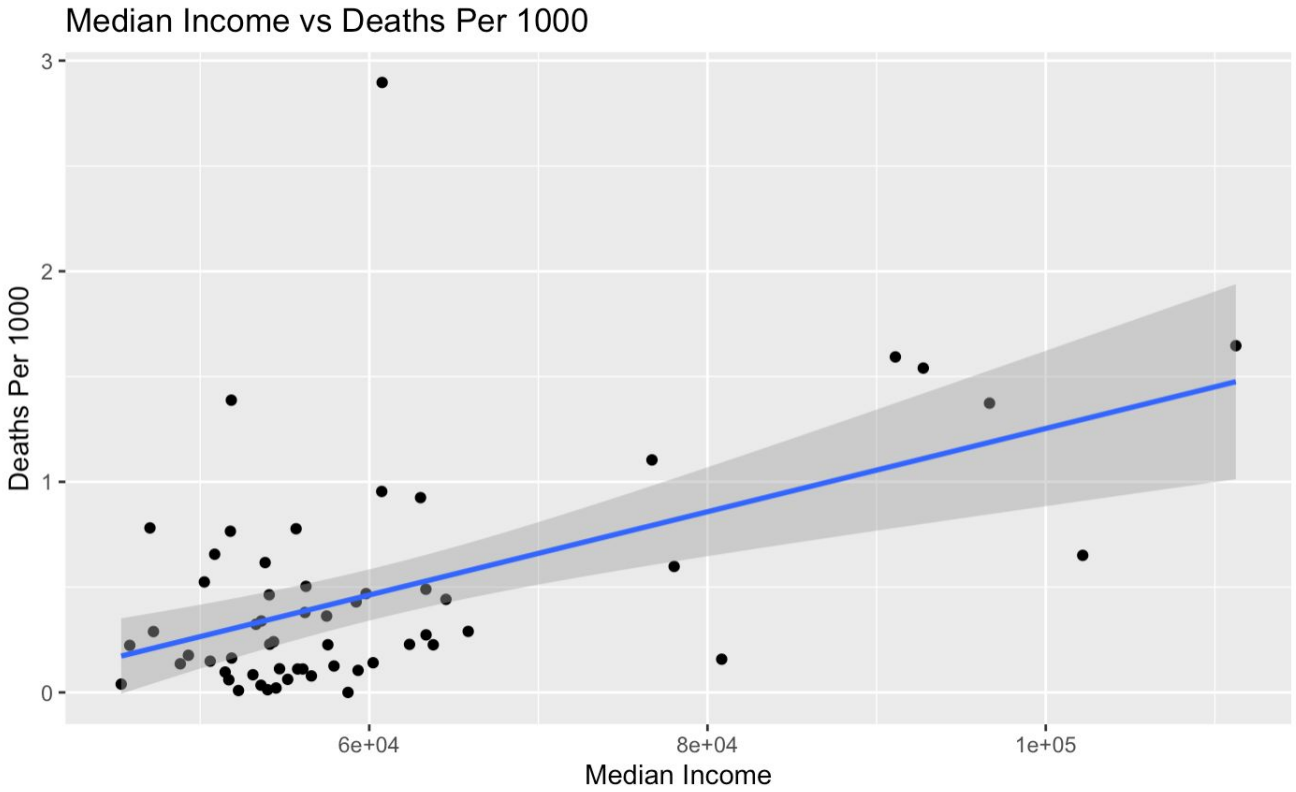
- As percent white increases, population decreases.
- Minority races tend to be more concentrated in populous/urban areas
- Urban areas tend to have higher case/death rates, even though they have higher median incomes.

Distance from NYC



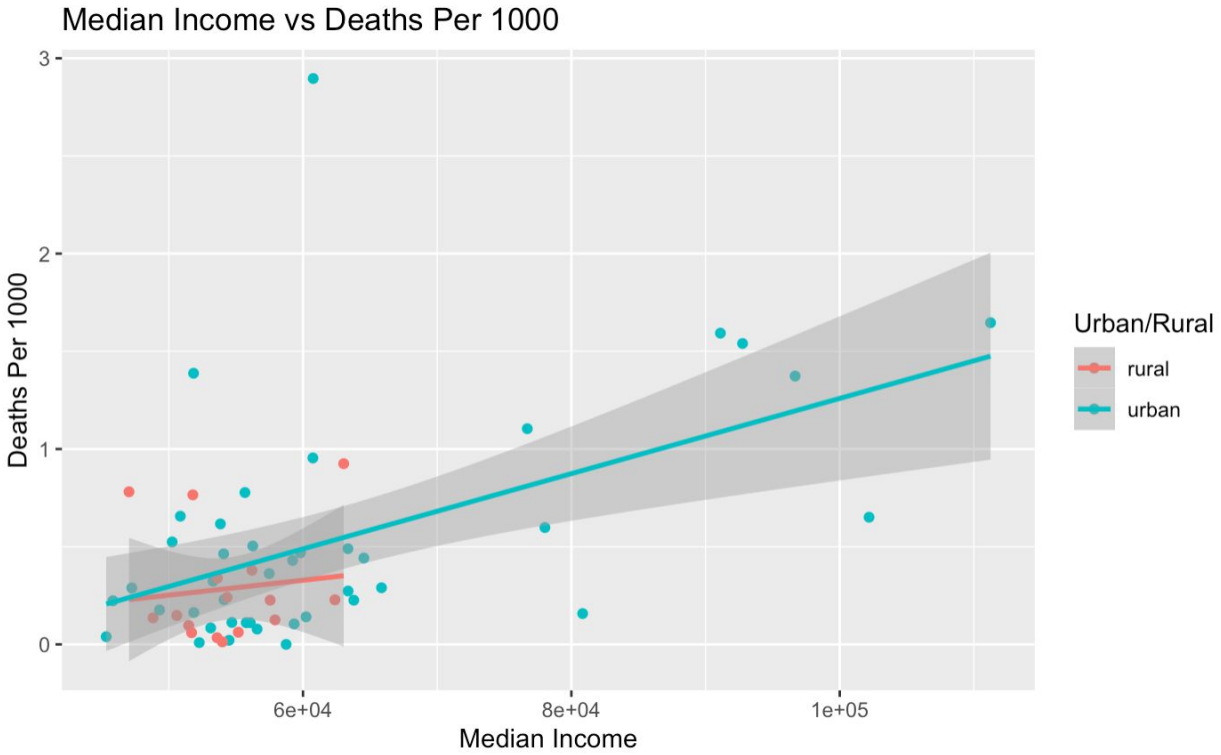
- Another important factor to consider.
- NYC is the largest urban center in the state
- NYC also has JFK Airport (Queens county)

Median Household Income vs Mortality Rate



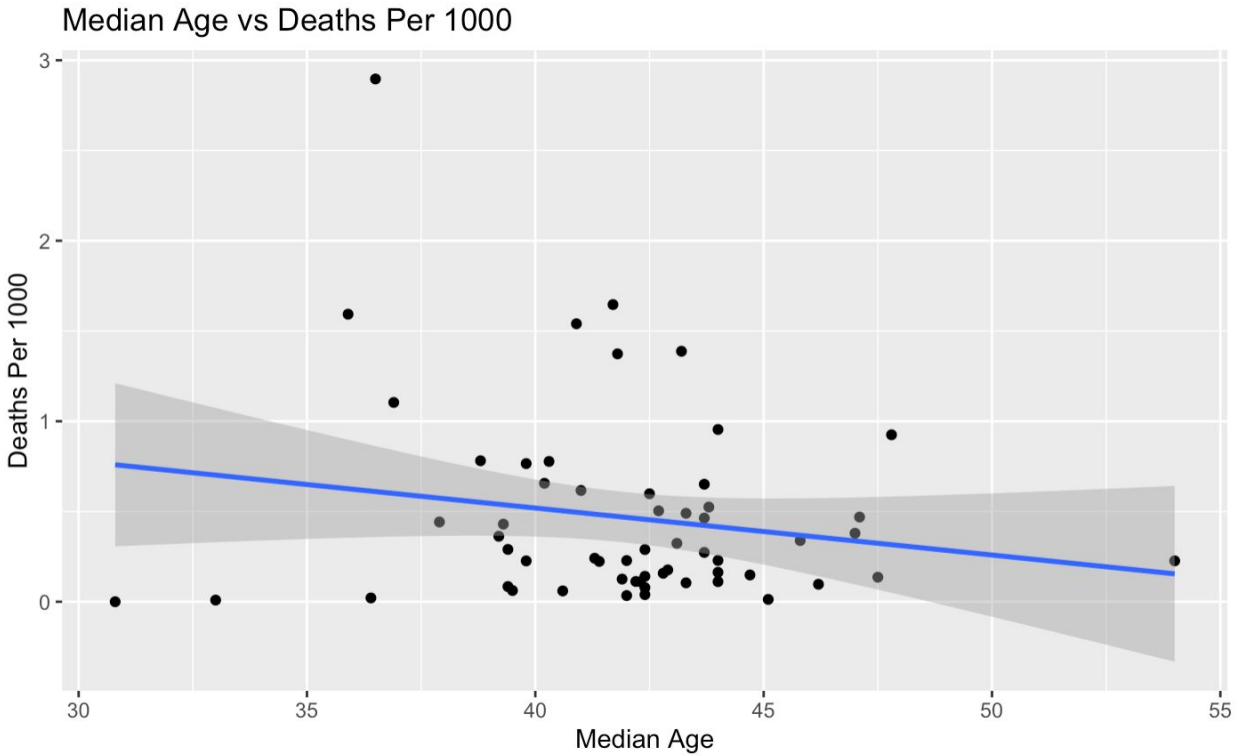
- Positive relationship between median income and mortality.
- P-value of 0
- Therefore, we reject the null hypothesis.
- Unexpected relationship between income and mortality rate.

What if we control for urban/rural?



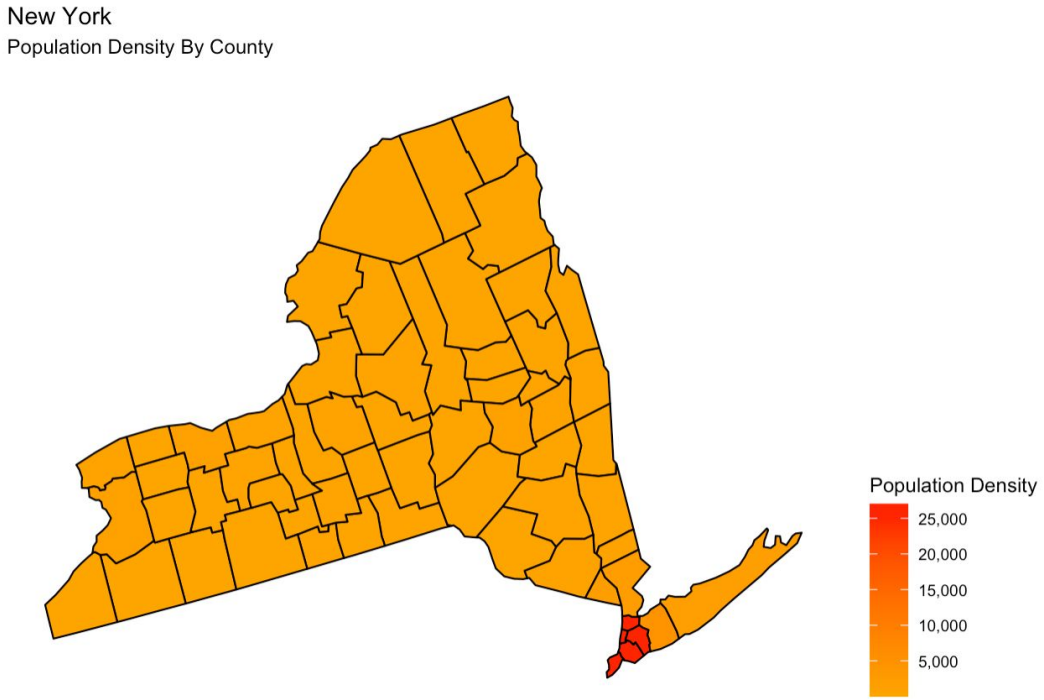
- Positive relationship in urban counties.
- Positive relationship in rural counties.
- Therefore, doesn't contradict the previous model.
- This model could give us insight into urban/rural populations being the cause of higher death rates.

Median Age vs Mortality Rate

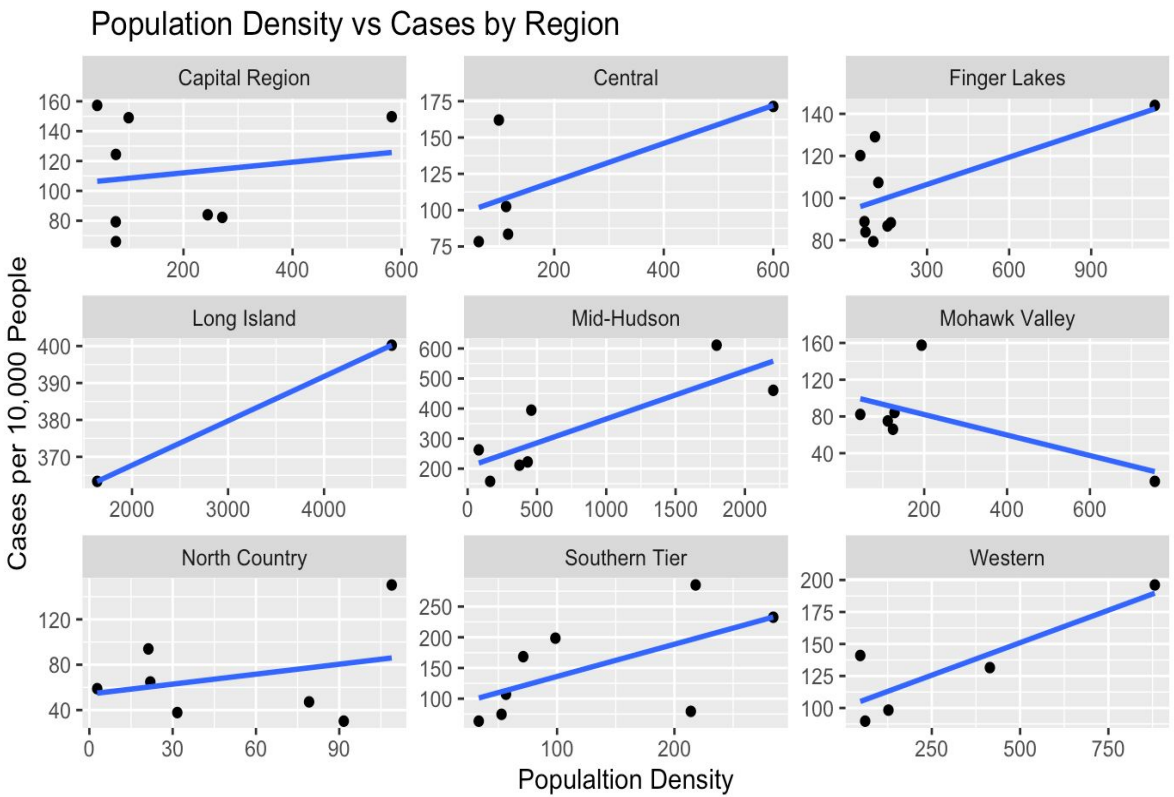


- Slight negative relationship is seen between median age and mortality.
- For every increase by 1 year in median age, we have a 0.024 decrease in deaths per 1000.
- P-value of 0.211
- This shows strong evidence of null hypothesis.
- Therefore, there seems to be no relationship between the 2 variables.

Population Density Across the State

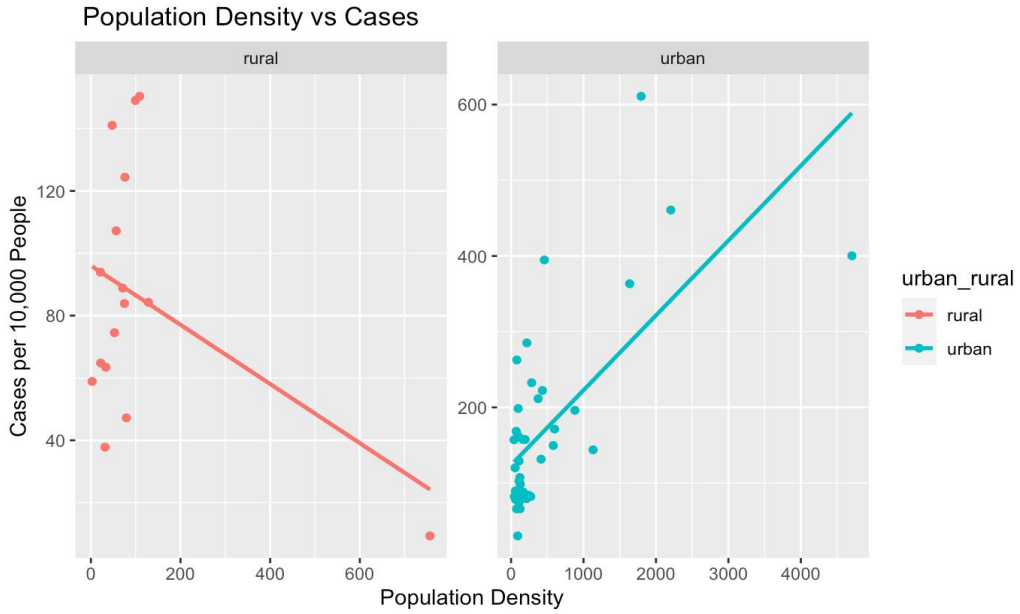


New York City, is extremely populus compared with the rest of the state.



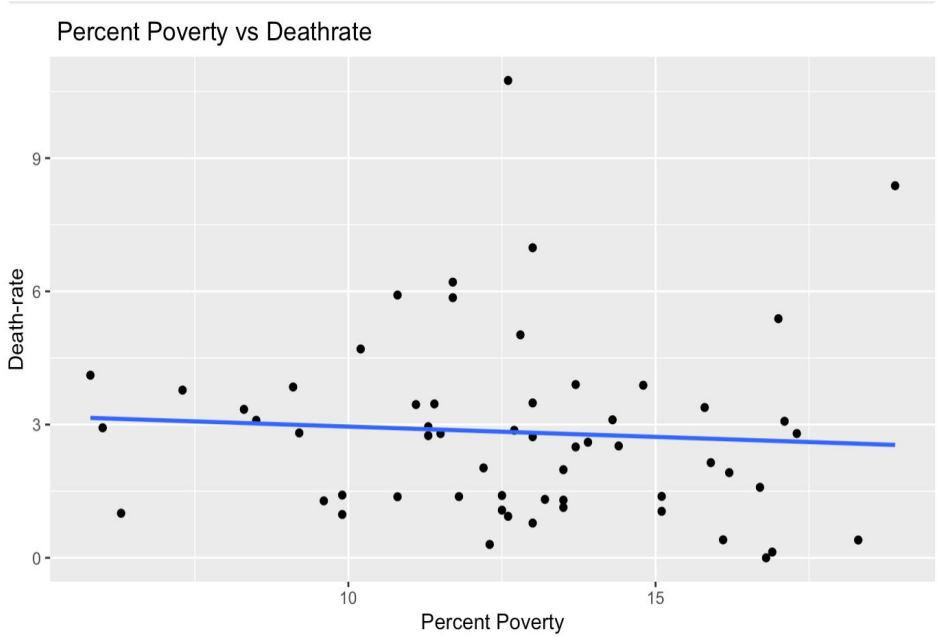
We can observe a positive relationship between population density and cases in most regions.

- Cases per 10,000 vary across the entire state despite the population density. This explains why there are two completely different correlations amongst urban and rural counties in the same state.



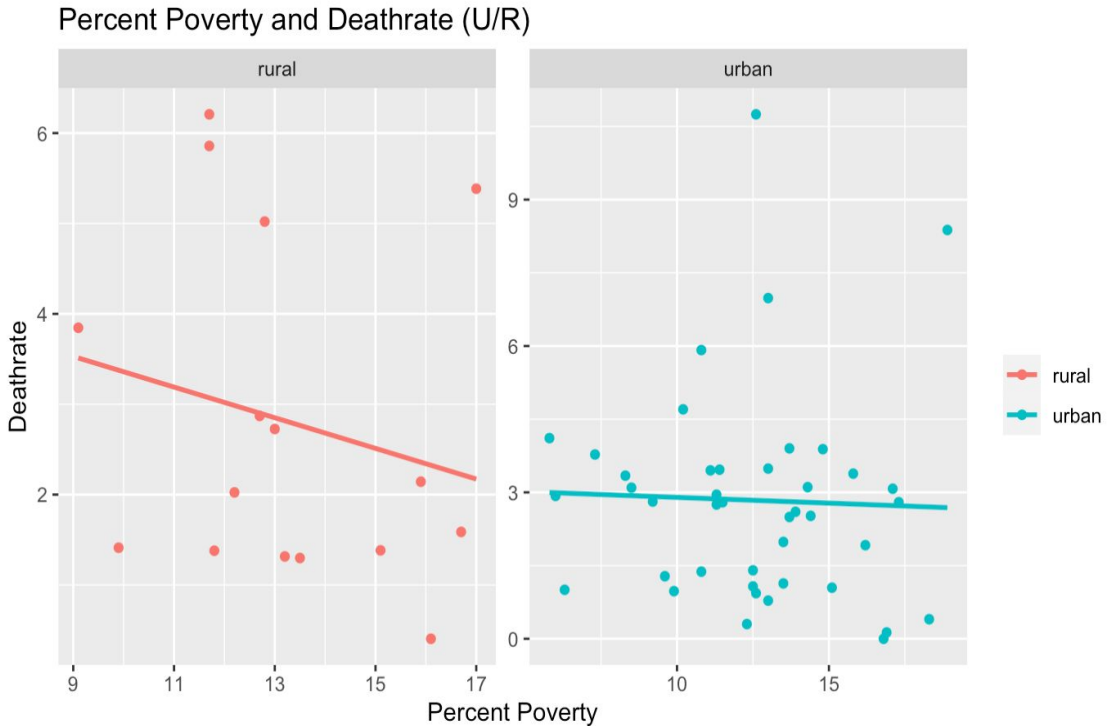
- The rural plot, is a bit unreliable because most counties have a low population density, and one outlier has an extremely high population density.
- Really, a better interpretation of the rural counties would be there is no correlation between the two variables.
- Slope: .099
- P- value: 0

Percent Poverty and Mortality-rate

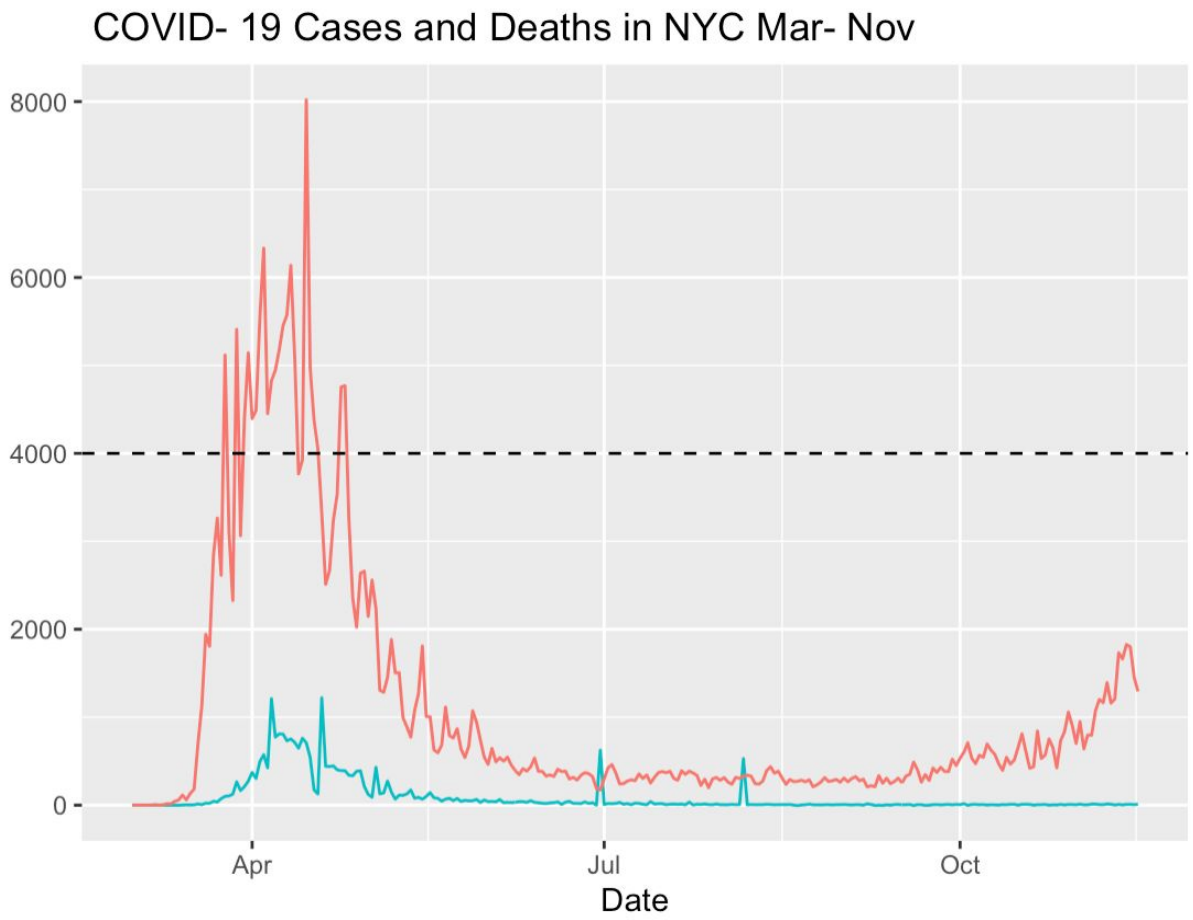


- I would expect poorer populations to fair worse against Covid -19 and thus lead to a higher death rate.

- However, it seems was not the case, and we can see a slight negative correlation.



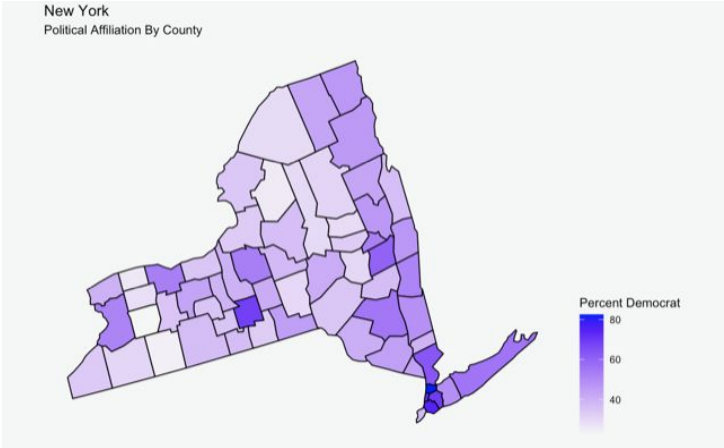
- For every 1% increase in percent poverty, there is a estimated .046 decrease in death-rate across NYS.
- P-value of .610
- Percent poverty is not the best variable to compare to death - rate.

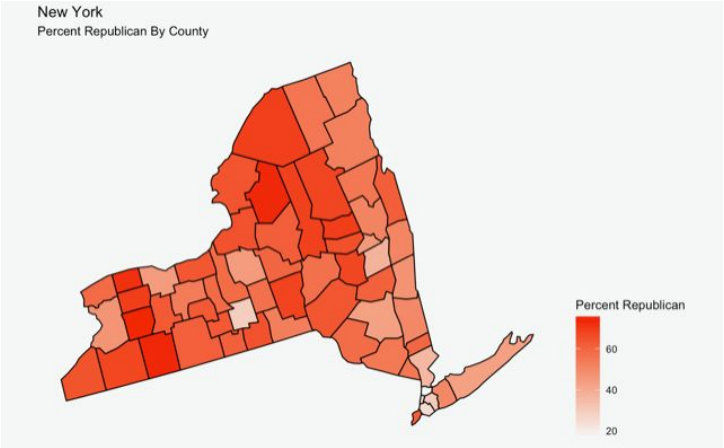


The black line represents the capacity of NYC's health care facilities.

Hospitalizations can last weeks.

Political Status - 2020



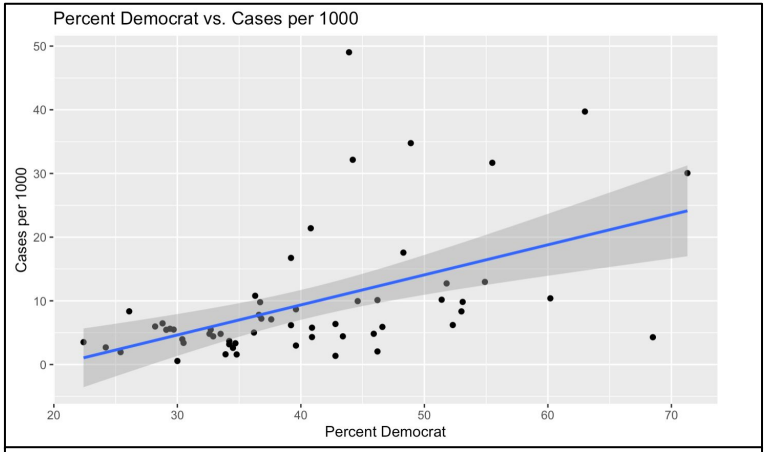


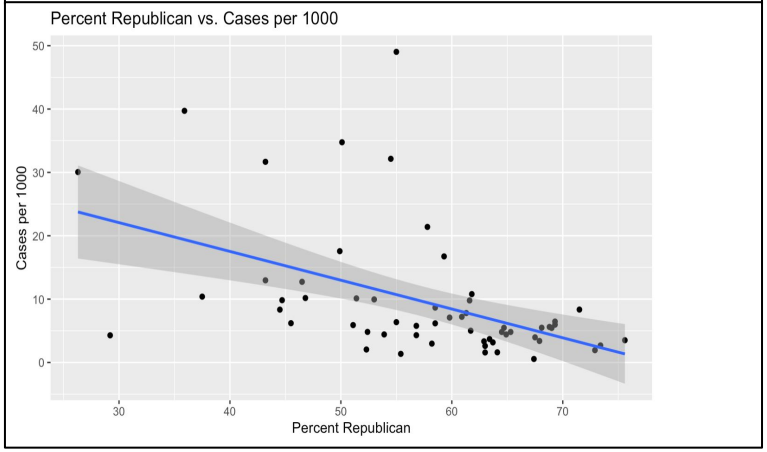
It doesn't seem like there's a lot of democratic counties; however we can see that areas that have major urban centers have a higher percentage of Democrats. (NYC, Ithaca, Western NY)

The rural counties have a higher percentage of Republicans.

Variables we looked at:

1. *cases_per_1000:* the number of cases per 1000 people
2. *pol_perc_dem:* percent of individuals who voted democrat
3. *pol_perc_rep:* percent of individuals who voted republican





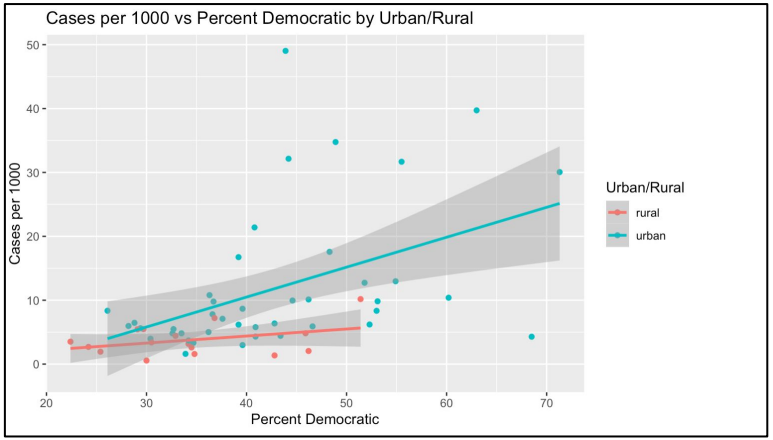
P-Value: 0

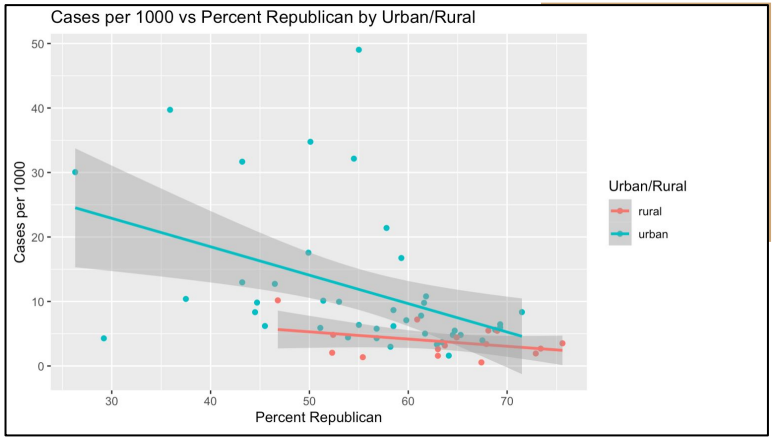
Since the p-value is less than the significance level of 0.05, we concluded that there is a relationship between cases per 1000 and the 2 different political affiliations (Democratic/Republican)

Percent Democratic vs Cases per 1000: Positive relationship.

Percent Republican vs Cases per 1000: Negative relationship.

Why? We had hypothesized that there was a relationship between cases and political status, but we had expected the opposite to be true.





Urban counties have higher percent Democratic and urban areas are more densely packed, so more cases.

Rural areas have higher percent Republican and rural areas are less densely packed, so less cases.

As percent Democrat increases so do cases and the areas with more Democrats are more urban.
As percent Republican increases, cases and the areas with more Republicans are more rural. The urban/rural areas could explain the difference in case rates between Democratic counties and Republican counties.

Conclusion

- We investigated the impact of different socioeconomic factors on the pandemic throughout New York.
- A number of our hypotheses turned out to be opposite to the outcome.
- This could be because of the major urban/rural split in the state, causing us to see widely different patterns.

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Questions?