Research Proposal: Effect of state policies and population on the spread of COVID-19?

Cody Burker, Emily Fernandes, Margo Suryanaga

Background and Research Question

The COVID-19 pandemic is the first pandemic seen in a century, affecting each individual worldwide. While many countries issued lockdowns, travel quarantines, and other COVID-19 restrictions on a federal level, the US federal government placed the power with the governors to regulate the implementation of these restrictions on a state-by-state basis. There has been increased skepticism on the true effectiveness of restrictions in slowing down the spread of COVID-19, especially due to the amount of economic impact resulting from these procedures.

From this, we will be investigating the following research question:
`Does a state's implementation of closures of public spaces, stay at home orders, and face mask mandates have an effect on their COVID-19 case counts?`

Data sources

1. COVID-19 US State Policy Database A database of state policy responses to the pandemic, compiled by researchers at the Boston University School of Public Health.
2. NY Times Covid-19 Data Repository A series of data files with cumulative counts of coronavirus cases in the United States, at the state and county level, over time.
3. Office of Personell Management A list of U.S. federal holidays.

From data source (1), we expect to get variables:
- Closure and reopenings: Start and end dates of closures of public spaces
- Stay at home: Start and end dates of stay at home policies
- Face masks: Start and end date of face mask mandates
- Population per square mile: State's population per square mile
From data source (2) we expect to get the variable:
- Weekly COVID-19 case counts From data source (3) we expect to get the variable:
- A list of federal holidays

Methodology and Expected outcome

We will investigate the causal effect the following variables have on the 7-day moving average of cumulative COVID-19 cases:
- Closure and reopenings (whether a stay-at-home order was in effect at that time and number of days since it started)
- When mask mandates were required (as an indicator variable, and number of days since the mandate started)
- Whether the state implemented legal consequences for violating stay-at-home orders
We will assume that these variables have no effect on COVID-19 cases, and will construct tests to investigate

whether a relationship exists using three regression models, starting with stay at home and population per square mile as our key explanatory variables in our limited model.