Brantley, Kawabata, Urgitus
CSC405 FA20
Project Stage II Report

Introduction

In this section we began comparing trends in Covid data over counties, states, and countries. To ensure accurate comparison, we normalized our US and International data sets by population. We also converted the data from “Total Cases/Deaths” to “New Daily Cases/Deaths” to better identify trends and aggregate the data.

Correlation of Enrichment and Covid Data

Hospital

After comparing the hospital data to the total cases and deaths in a number of counties, we found that there is an alarming number of COVID cases in areas with more hospitals. While areas with little or even no hospitals at all only had around 10 cases for the whole year, it is to be believed that these numbers are not at all accurate. They may be lower than the surrounding counties but our belief is that since there are no hospitals in county A, the residents may be fleeing to hospitals in county B, increasing county B’s COVID numbers. If there are less hospitals, less staffed beds, and less potential for capacity increase, then there will be lower COVID numbers. We would also say the opposite to be true; Higher numbers would mean more hospitals, staffed beds and capacity increase.

Number of Hospitals

There are many counties across the United States that don't have any types of hospitals in them. While this would not be in the hospital enrichment data, these hospital-less counties may have multiple large doctors offices that would suffice for a number of illnesses and injuries. The members of these communities may be relying on neighboring hospitals for any major surgeries or even a life threatening pandemic perhaps. COVID-19 numbers are much lower in counties without hospitals. For example, in the state of Pennsylvania, Cameron County has no hospitals on the enrichment record and only has around 10 cases for the year so far, while Centre County, a neighbor to Cameron, has a few hospitals with upwards of 1500 cases. This difference in cases could also be accounted for by the population difference, but there are counties with ten times the population but similar case numbers. The number of hospitals in an area could give a great insight into the number of covid cases in an area.

Number of Staffed Beds

The number of staffed beds is not necessarily the max number of beds that a hospital can hold, but it can tell us about how prepared the staff can be. If there is a small number of staffed beds compared to the total number of beds, this could mean that if there were to be a sudden influx of

patients then the staff may get overworked or be moved around. Let's say that a nurse is assigned to seven beds. This means that this nurse is in charge of vitals and care for seven different patients. Before the adjustment to COVID, these patients may have been kept in the same area. After the adjustment, there are specific wards in hospitals now dedicated to COVID only patients. More staff have been highered in some areas to account for these wards, but in some hospitals these staff are still being worked to the bone. This could provide a meaningful insight into whether or not certain hospitals would be prepared for increasing numbers of cases.

Potential Increase in Bed Capacity

According to Definitive Healthcare, the potential increase in bed capacity is calculated by taking Licensed Beds – Staffed Beds. While the number of staffed beds may be low, the potential increase could be high.This would mean that the hospital is well prepared to take on multiple new patients over what it usually has. Having this potential increase value could help us predict the number of cases in an area by seeing which hospitals have a higher capacity.

Housing and Demographics

We will begin with our observations from the analysis of correlations between the enrichment data and the number of cases in Florida. An increase in male population resulted in a slight increase in overall cases. As the median age increased the overall cases increased. Higher percentages of younger and middle aged populations lead to higher overall cases, and higher percentages of older populations lead to a decrease in the overall cases. And finally, the increase of housing density, shows an increase in the amount of overall cases. We can now move on to our hypothesis for our three variables, gender, age, and housing density.

Gender: As the male population of a society increases to a higher proportion than the female population we will see a higher rate of increase in the number of COVID cases. For this variable we need to be sure that we have plenty of data to choose from due to higher percentages of female dominant counties. This makes it excellent for state comparison as we will have access to maximum data.
Hypothesis: As the proportion of males to females increases to favor male we will see a higher rate of increase for COVID cases.

Age: There appears to be a sharp decrease in the number of covid cases as the percentage of the population that is over or 62 increases. There is a sharp increase in the number of covid cases as the percentage of the population under 62 increases. We are going to assume that the broad categorization of 0 - 62 aged percentage of population allows for outliers to dictate the trend of the data. Also, consider that we are given roughly the ranges of 1 - 60 percent of the total percent of population for the middle aged and elderly but that the young percentage takes min/max range of 1 - 25 percent of the population. Seeing a positive trend for the younger

population, a positive trend for the middle aged population, and a decreasing trend for the elderly leads me to the following conclusion: the number of covid cases decreases as age increases.
Hypothesis: As the median age increases for a state, we will see that the number of covid cases will decrease.

Housing Density: There is a noticeable correlation between increase of the number of individuals per housing and overall cases. Because we chose Florida I believe that the results may be skewed and that Florida is a low performer, I believe the actual effect of housing density on the number of cases to be much greater. We can see this low selection reflected in the range of individuals per housing. We are given the range of 1.4 - 2.6 individuals per housing where we may expect higher counts of individuals per housing for states that are not known for moving to when retiring.
Hypothesis: As the Housing Density increases the rate of covid cases will sharply increase.

Social

After plotting the Social Enrichment data against the average number of daily new cases in counties across North Carolina, we found some interesting trends in computer usage, age, and family size.

Percent of Households with a Computer
Contrary to our expectations, the data showed that as computer ownership went up, so did the number of cases. This could be explained by the amount of disinformation and politicization surrounding the virus that a computer gives you access to. It's likely that instead of using computers to look up CDC warnings and Covid guidelines, people were spending their time reading polarizing and inaccurate information about the virus. This misinformation caused them to underestimate the threat of disease and engage in unsafe socializing, leading to infection.

Percent of Households with One or more Members over 65
Contrary to our expectations, it seemed that cases actually declined as the percent of households with one or more family members over 65 went up. We believe the reason for this negative correlation is that being a senior doesn't dramatically increase the risk of *contracting* the virus (but it does increase the risk of death once contracted). Furthermore, it is likely that seniors were aware of their increased risk of severe illness and took extra measures to social distance and isolate. Younger people in these households were also aware of these risks and likely took measures to avoid contracting and spreading the virus to their elderly housemates, thus limiting the virus in their county.

Average Family Size

As we expected, higher average family size within a county was correlated with a higher rate of Covid cases in that county. We believe this is due to the highly contagious nature of the virus, and the way members of a household tend to behave.Once one member of a household becomes infected, it's very difficult to keep it from spreading to the other members. The ability of the virus to be spread by asymptomatic and pre-symptomatic people also makes it very hard to contain an infection once it has entered a household.

Citations

"Definitive Healthcare: USA Hospital Beds." *COVID-19 Resources*, 2020, coronavirus-resources.esri.com/datasets/1044bb19da8d4dbfb6a96eb1b4ebf629_0/data?geometry=21.093%2C-16.820%2C-46.055%2C72.123.