Mini-project 1

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Introduction

The first COVID-19 vaccine was given Emergency Use Authorization (EUA) on December 11th, 2020. Since that point, the vaccine has saved countless lives and decreased the severity of the illness in those who do still contract the disease. Unfortunately, many people are hesitant to receive the vaccine. There are many causes of vaccine hesitancy, but politics are one of the bigger motivators. This can be easily visualized by the three largest countries in North America. Mexico, The US, and Canada are all developed countries which have access to vaccines. However, due to the politics of these countries and the resulting trust or lack thereof in public services and medicine, there is a large difference in the vaccination rate of these countries. In this report, we will look into the relationship between vaccination rates and COVID-19. To do this, we will examine the relationship between vaccination rates and the levels of positive cases in the three largest countries in North America.

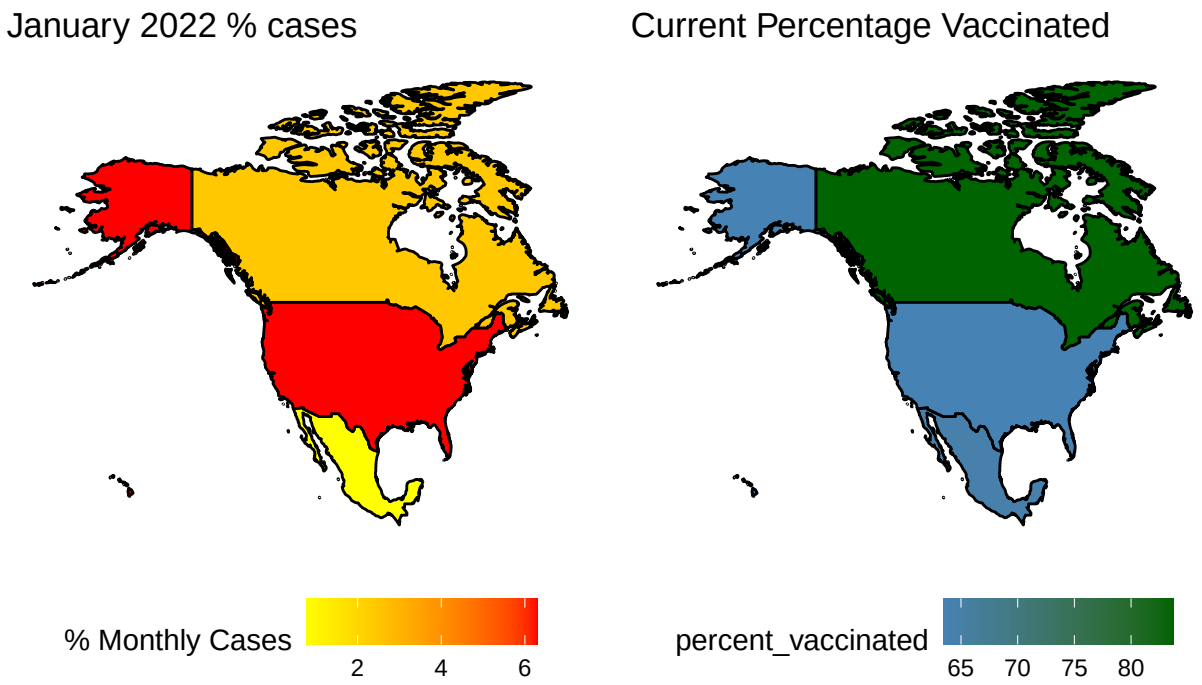

Figure 1: Coronavirus data from John Hopkins University CCSE

As seen in Figure 1, there is about 15% difference in the percent of the population which has been vaccinated in the US and Mexico as opposed to Canada. This is a large number of people and surpasses that commonly cited "herd immunity" percentage of 70%. Additionally, it should be noted that the percentage of positive cases lines up as would be expected with the percentage of the population which has been vaccinated.

Analysis

As COVID-19 shifts towards being an endemic disease as opposed to a pandemic, the mutations have become increasingly mild and transmissible. The most recent dominant strain, Omicron, has made vaccination rates more important than ever. Omicron is less severe than past strains, but is so transmissible that there has been a huge spike in the total number of cases. These cases are less likely to be severe, but the sheer number of total cases results in a rising number of severe cases as well.

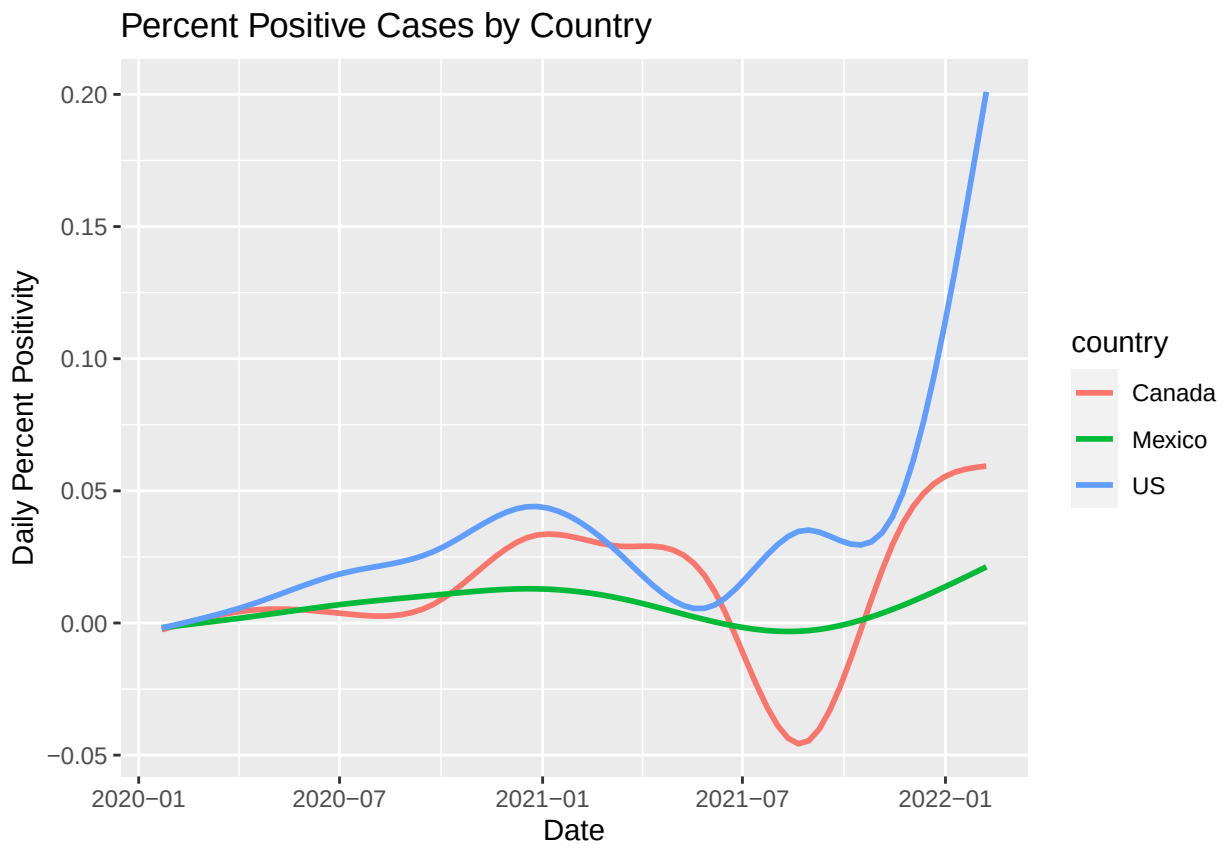

Figure 2: Coronavirus data from John Hopkins University CCSE

As seen in Figure 2, the spike is most prominent in the US, but the number of COVID-19 cases is rising in Mexico and Canada as well. While Mexico seems to be doing better with this wave than Canada, this is likely because Mexico began the wave later than Canada. The higher vaccination rate in Canada will likely result in a lower peak which will be surpassed as Mexico's wave picks up speed.

The trend of vaccines decreasing the percentage of COVID-19 cases can be seen on a smaller scale than simply the total percent of population which has contracted the disease. This is easily visualized by looking at the percentage of the population of each country which has contracted COVID-19 for each month in 2021.

As we can see in Figure 3, Canada has a history of having the lowest number of new COVID-19 cases per capita of the three largest North American countries. Figure 3 also clearly shows the increase in COVID-19 cases associated with the Omicron variant. This visualization shows the importance of the COVID-19 vaccine. There is an obvious correlation between higher rates of vaccination and lower rates of COVID-19.

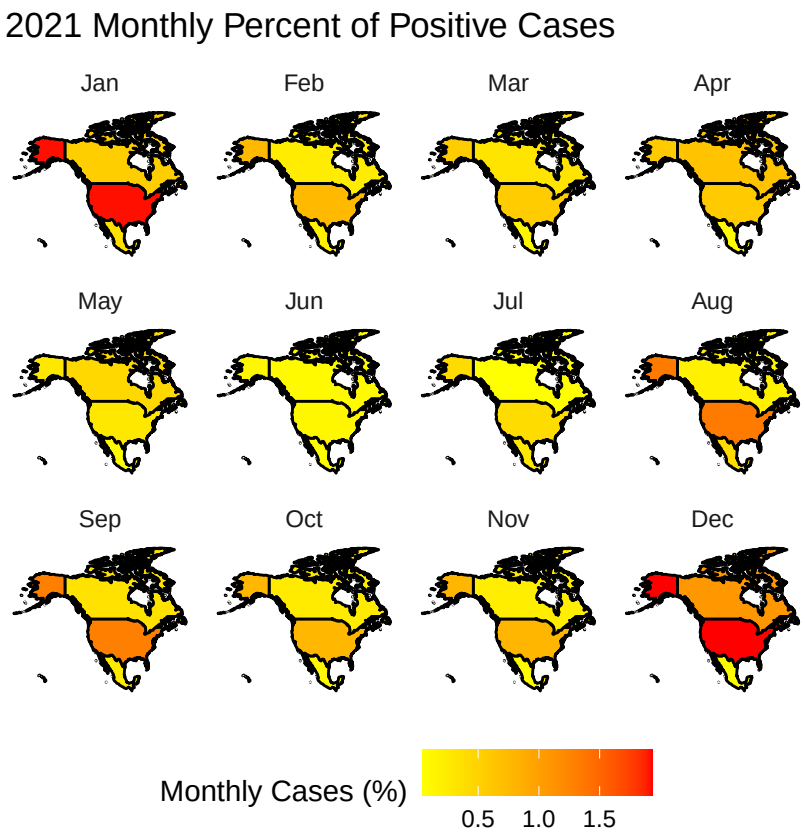

Figure 3: Coronavirus data from John Hopkins University CCSE

Conclusion

While we realize that correlation does not equal causation, the general scientific consensus is that vaccines do decrease the severity and likelihood of the disease. As such, we believe that the correlations we have observed are worthy of note. Our initial question was how the COVID-19 vaccine affected positivity rate. We believe that the answer to our question, as observed in our data and visualizations, is that higher rates of COVID-19 vaccination rates lead to lower numbers of COVID-19 positive cases.

Sources

"What You Need to Know about Variants." *Centers for Disease Control and Prevention*, Control and Prevention, https://www.cdc.gov/coronavirus/2019-ncov/variants/about-variants.html.

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