COVID 19 Pandemic - Deaths, Mask Usage, and Vaccination

Problem Set 6

Bern DySart

2024-04-10

Summary

This report briefly examines a merged dataset covering COVID-19 vaccination rates and deaths by county in the United States. The data that was used was from the Center for Disease Control (CDC) COVID data tracker that is constantly being updated with more data across the United States. It also utilises data from the New York Times case coumting map that dates back to 2020 and is constantly being updated as well. The last data collection was in 2023. There are 3,142 observations and 9 variables.

The onset of the COVID-19 pandemic brought an unprecedent wave of deaths on every country internationally but also in the United States and each state was effected differently. The report goes on to show the distribution of deaths per county that were related to COVID with the lowest counting having 29 deaths and the highest at 7,034.

The data is also used to show the percentage of people who answered a question about masking frequency which is followed up with a visualisation on vaccination rates. This county level data is informative for many reasons on the distinct differences but also the similarities across the United States on those who were masking and those who did participate in getting vaccinated against COVID.

Finally the report ends with a visualisation and brief analysis on the impact of masking on death rates in 2022. This shows a correlation between those who did mask and the vaccination rates and the decrease in deaths from COVID from 2021.

Citations

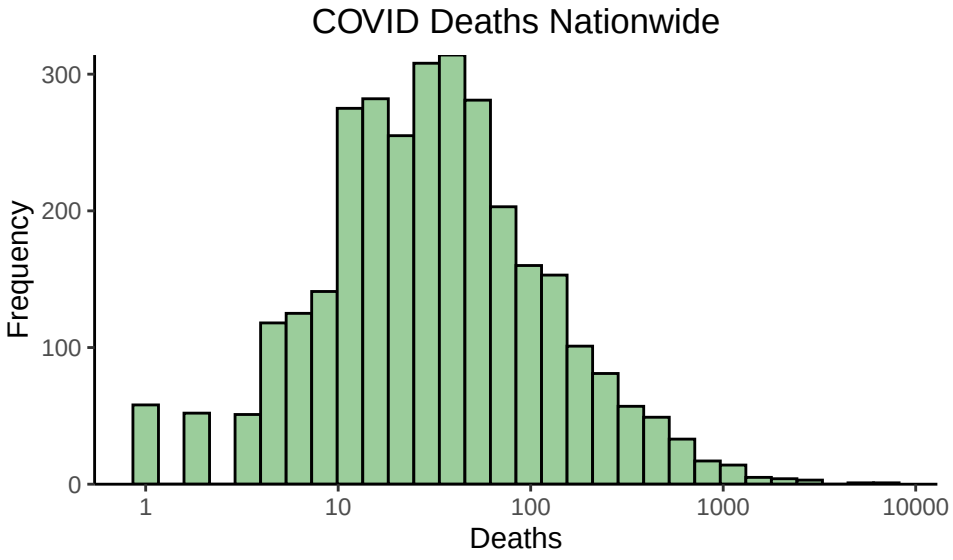
- "Coronavirus in the U.S.: Latest Map and Case Count." The New York Times, March 3, 2020. https://www.nytimes.com/interactive/2021/us/covid-cases.html.
- Centers for Disease Control and Prevention. COVID Data Tracker. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2024, May 01. https://covid.cdc.gov/covid-data-tracker

Data

Data - Deaths Nationwide.

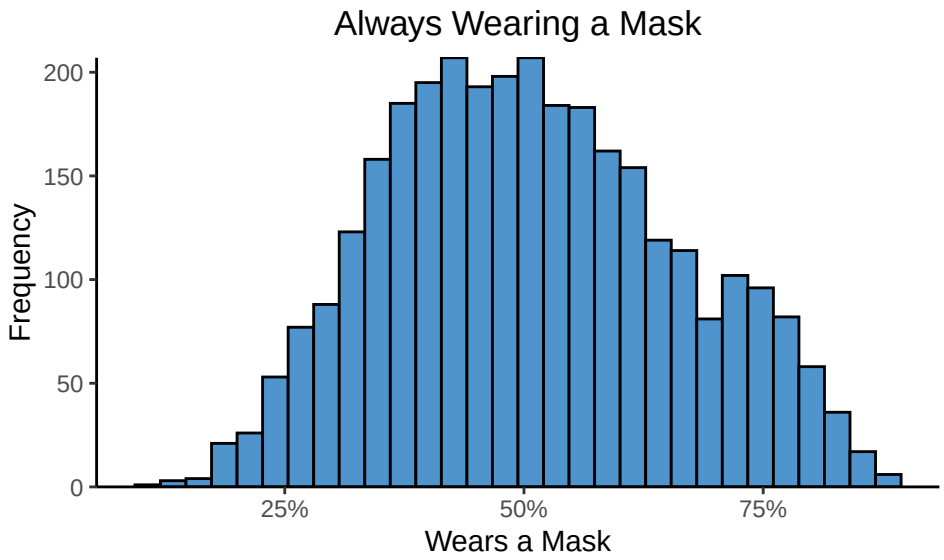
The following is a visualisation of deaths due to COVID nationwide. The data set is organised by state then secondarily by county. The count is the number of confirmed and probable deaths from COVID as recorded per county and the frequency of each death count. The minimum number of deaths for a county is zero and the maximum number of deaths is 7,034 for a county. The average number of deaths per county is estimated at 84 while the median number of deaths is 29. The visualisation shows a high frequency of deaths just

under a hundred but above fifty which aligns with the mean number of deaths per county nationwide. The higher the death count, the shorter the bar which shows that this is not as commonly see per county when it comes to deaths due to COVID. Los Angeles County in California was the county with the highest number of recorded and probable deaths at 7,034. There were numerous counties spanning the states of Alaska, Colorado, Hawaii, Massachusetts, Montana, Nebraska, New Mexico, North Dakota, North Carolina, South Dakota, Texas, Utah, Washington, North Mariana Islands, and Virginia.



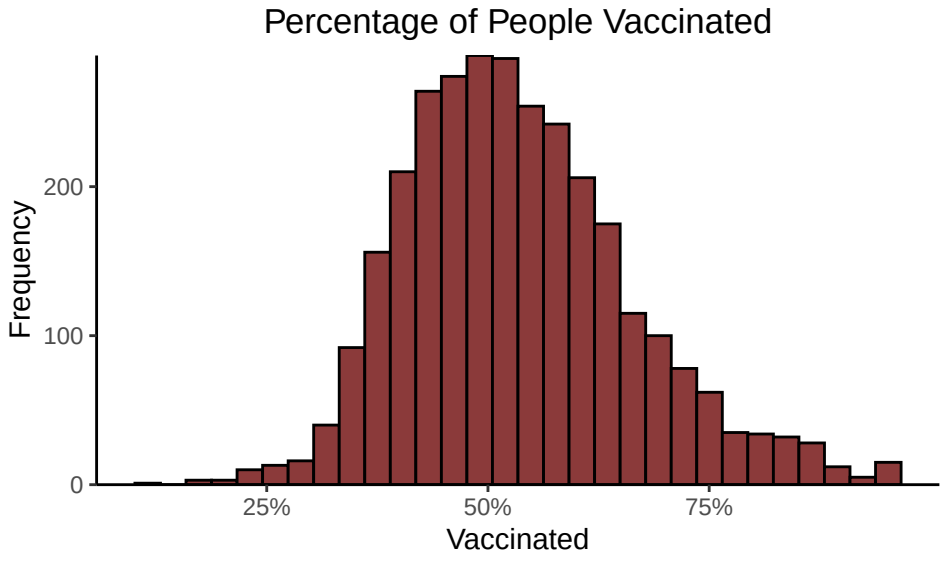
Data - Always Masking.

The following is a visualisation of respondents masking a percentage of the time when going out to interact with others or into public spaces. The data includes only answers where respondents were in fact masking. As seen in the visualisation, along the x axis is the perrceptange of always wearing a mask with the markers of 25%, 50% and 75%. The lowest available percentage is 11.5% of the time people were masking and the maximum is 88.9% of the time respondents were masking. The average is around 50% of the time people were always masking.The county with the highest masking rate is Inyo county in California at 88.9% and the county with the lowest masking percentage is Valley county in Montana at 11.5%.



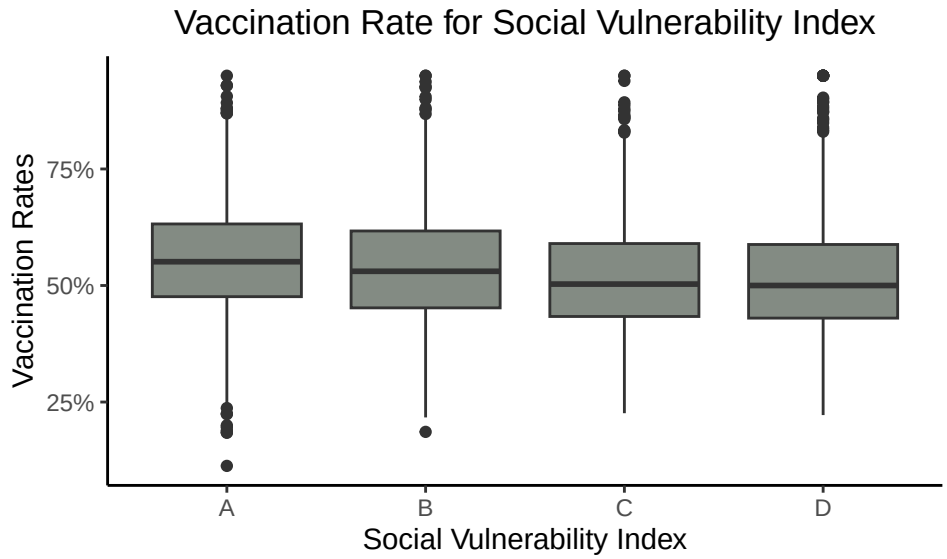
Data - Vaccination Rates.

The first visualisation examines the over all rates of vaccination across all counties in the United States. This variable measures the number of people who were vaccinated against COVID during the pandemic. The smallest vaccination percentage in a county is at 11.3% for Slope County North Dakota. The largest vaccination percentage in a county is at 95% which is seen in numerous counties within the states of Arizona, California, Colorado, Georgia, Kansas, New Mexico, Texas, and Wyoming. The mean vaccination rate is aroung 53.4% which aligns with the visualisation of the highest frequency being just about the 50% mark.A majority of the data ia just below or above 50% with the data jumping rapidly in the lowest and highest percentage directions.



This second visualisation examines rates of vaccinations for those who are identified as belonging to the social vulnerability index. The index is sorted from least vulnerable to most vulnerable as denoted by the labels A, B, C, and D. Looking at all the groups the average vaccination rate is above or around 50% vaccinated

for all four groups The most vulnerable group, as grouped into D has a mean of 50% vaccination rates with some outliers that are in 75% or above. All four are in the same general area and are on track with the overall vaccination rates for all counties across the United States.



Analysis

Vaccination and Mask Usage on 2022 COVID Deaths

See Figure 1. The regression table shows three models of the number of deaths from covid per county scaled by total population in the United States. In model one, a one point increase in masking per county meant that there was a 112 point decrease in deaths. This number is significant. In comparison to model 2, a one point increase in vaccination per county meant that there was a 1 point decrease in deaths and this is also significant. When looking at model 3, the one point increase in masking and vaccination did mean that there was an 83 point decrease and a .9 decrease in death respectively. Both of these numbers are significant. Model 3 does show that masking and vaccinations did impact both deaths. When beginning to control for the greater population in models 1 and 2, there is a significantly smaller decrease in death. Also looking at controls across all three models, when there is a one point increase in the social vulnerability index there is an increase in deaths no matter controls for either vaccination, masking, or both.

Table 1: Effect of Vaccination and Mask Usage on 2022 COVID Deaths

	m1	m2	m3
always.mask	−112.887*		−83.296*
population	0.000*	0.000*	
svi.indexB	11.415*	9.968*	9.581*
svi.indexC	15.142*	14.399*	13.128*
svi.indexD	19.811*	18.353*	17.491*
vax.complete		−1.123*	−0.923*
Num.Obs.	3049	3049	3049

* $p < 0.05$