A4: Common Analysis
DATA 512
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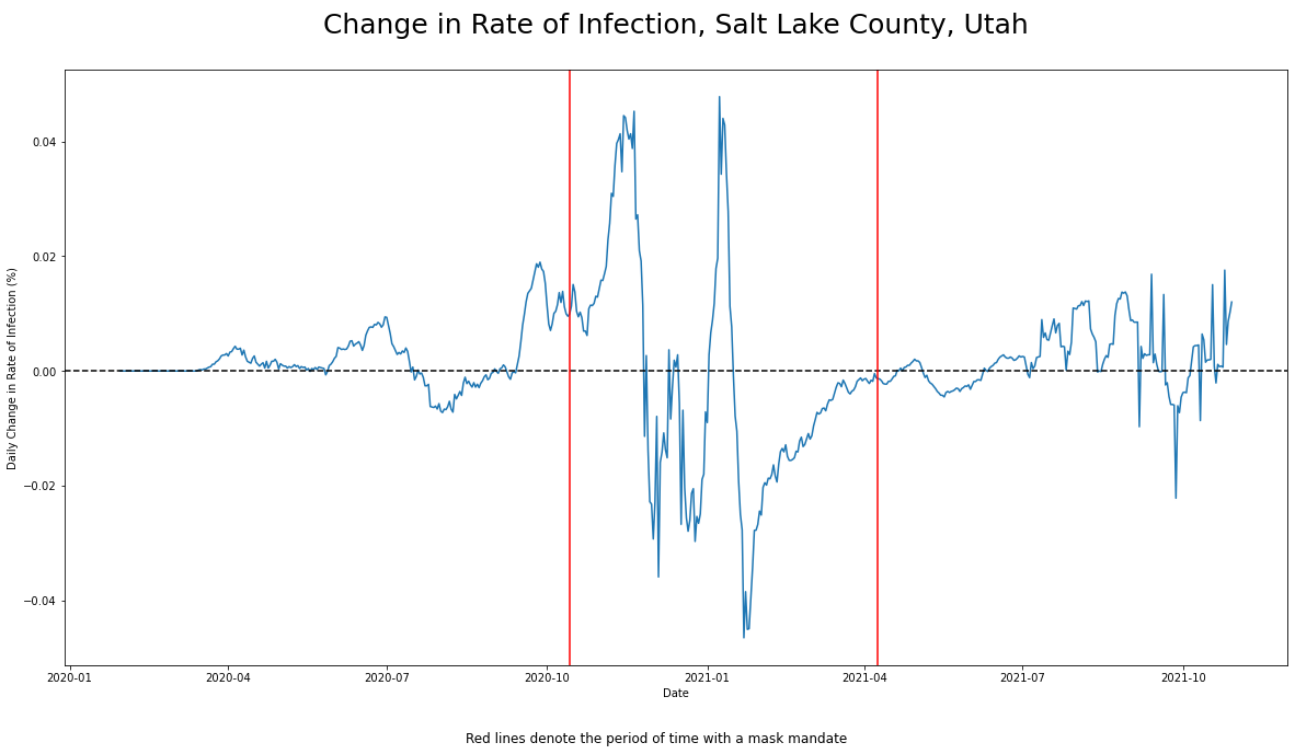
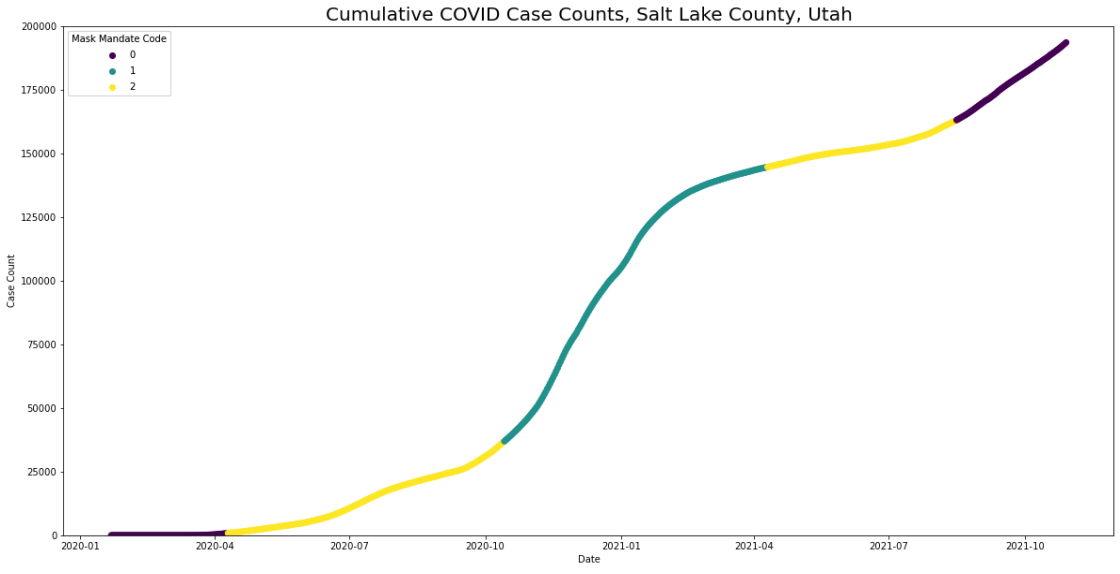
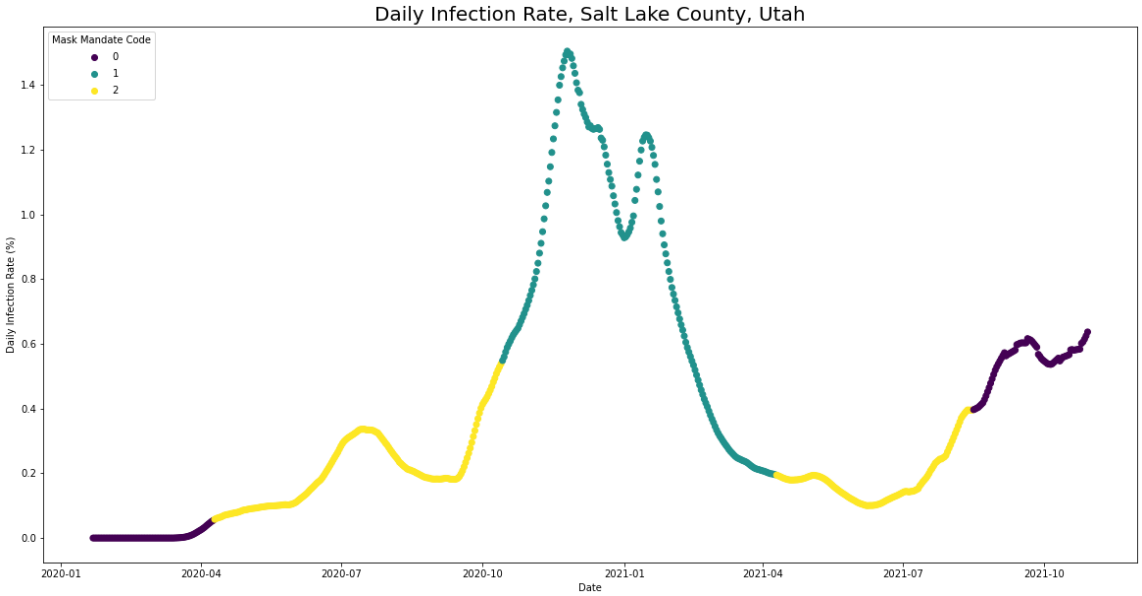
November 4, 2021



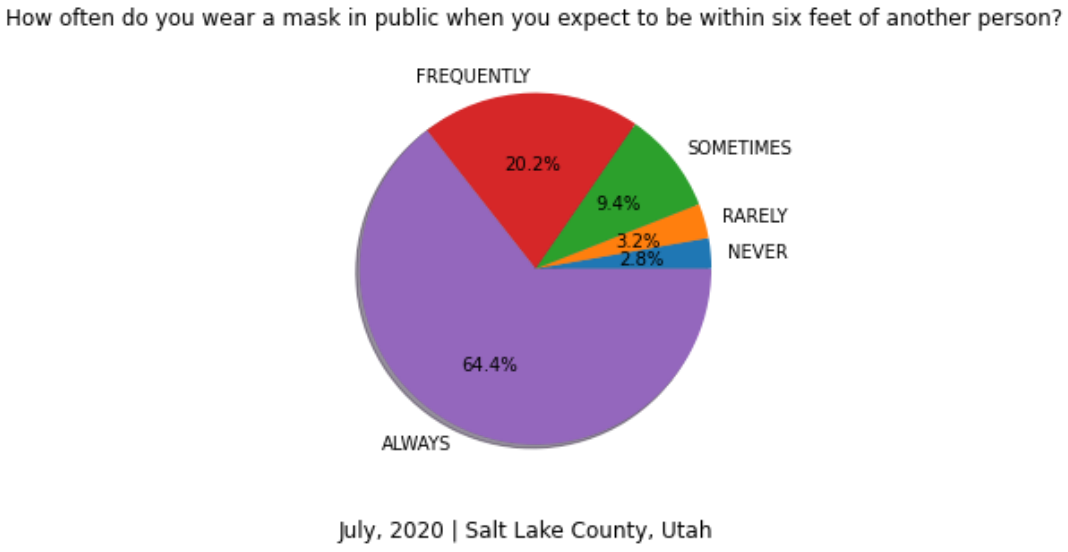
The above figure shows the daily change in infection rate for Salt Lake County, Utah from January 22, 2020 to October 29, 2021. The daily infection rate is the proportion of the population at risk who are considered to be actively infected, assuming a 14 day infection period. “Population at risk” estimates the number of people in the county who are not currently in active infection, including those who were previously infected. In order to smooth the volatility and reduce noise, I first used a rolling 7 day average for the daily counts of confirmed cases and used these figures to calculate the infection rate.



The figure on the previous page shows the cumulative case counts and mask mandate codes (again smoothed with a 7 day rolling average) for Salt Lake County, Utah from January 22, 2020 to October 29, 2021. Only mask Code 1 reflects the implementation of a mask mandate in the county. Code 2 represents no official mask mandate and Code 0 represents a lack of any data but can be interpreted as equivalent to Code 2.



The above figure shows the daily infection rate and mask mandate code for Salt Lake County, Utah from January 22, 2020 to October 29, 2021. It uses the same hue encoding as Figure 2 to indicate the mask mandate codes. The daily case counts used to calculate the infection rate in this figure were also smoothed using a 7 day rolling average and assume the same 14 day infection period as in Figure 1.



The figure on the previous page shows the distribution of responses from members of Salt Lake County, Utah to the question “How often do you wear a mask in public when you expect to be within six feet of another person?” The survey was taken in July of 2020, prior to the implementation of any mask mandate in the county. Additional survey data from other points in time would provide a means of integrating the results with Figure 1 but on its own it is better served as a standalone supplementary figure. It does highlight a high level of voluntary mask use which suggests the implementation of a mask mandate may not have impacted the existing behavior of a population whose majority are already wearing masks.

Regarding the collaborative activities in this assignment, I found the Slack discussion about defining the “population as risk” to be the most helpful. I ended up defining the population at risk to be an estimate of the number of people in the county who are not currently in active infection, including those who were previously infected. I implemented this by applying a 14 day rolling window to the daily change in average case count and dividing this by the population at risk to find the daily infection rate. As was mentioned on Slack, this estimate does not take into account any deaths resulting from infection and assumes infected people return to the population at risk count after 14 days. It also does not take into account other day-to-day fluctuations in the overall population as those figures are not available in the dataset. This population estimate could be improved by sourcing another dataset with death rates, either specific numbers or an estimated survival rate for hospitals in the area.

While the concept of using a rolling average to smooth volatility in a time series is standard, I did discuss options for the size of the rolling window with a classmate. We agreed that a 7-day window would account for weekly fluctuations in testing/reporting times without losing too much granularity for the changing rate of confirmed cases.

A classmate’s assigned county did not have any mask mandates so we discussed possible solutions for understanding the impact of mask mandates on their county. One solution was to identify nearby counties that did implement a mask mandate and perform a hypothesis test to identify if there is a statistically significant difference between the average rate of change in infection rates over the same period of time. I found this discussion helpful as this method could also be applied to my own county that did have a mask mandate.