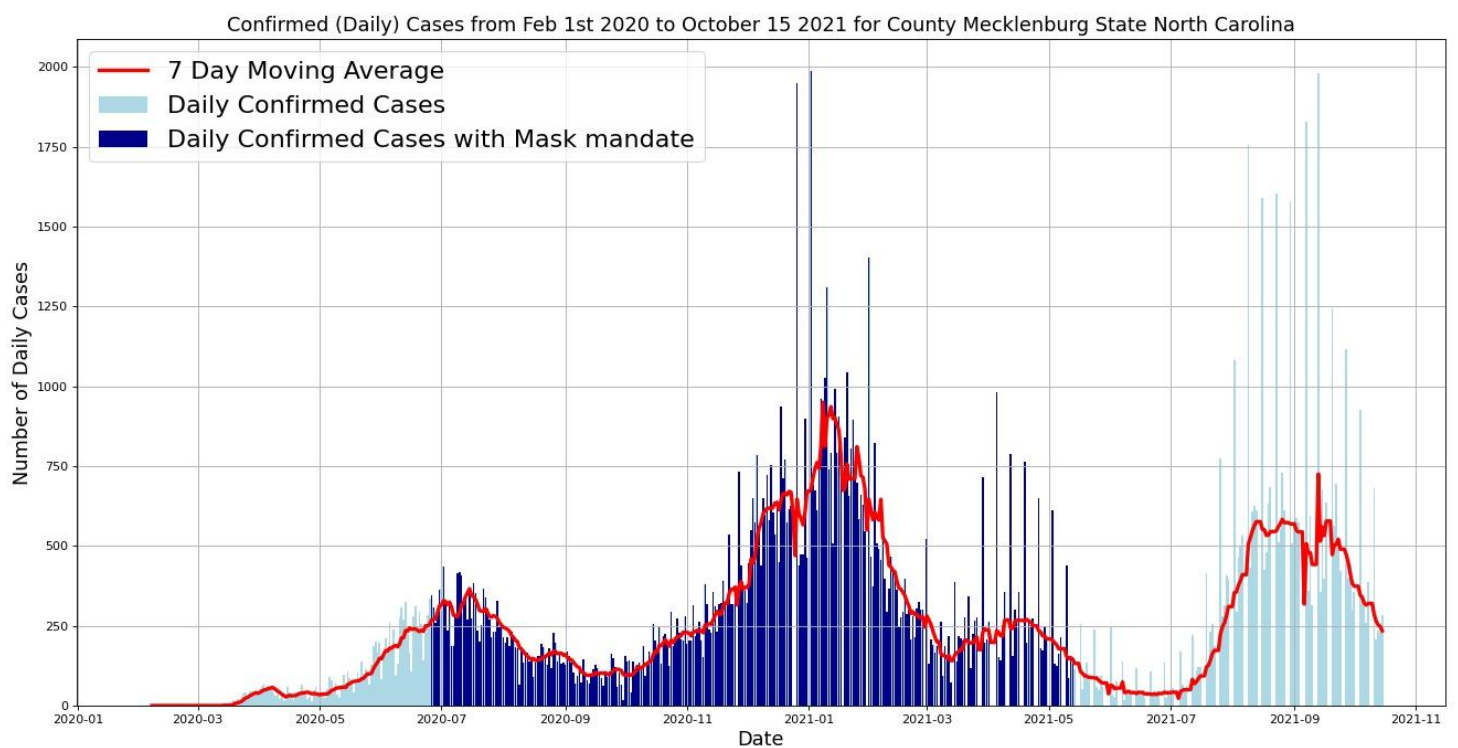
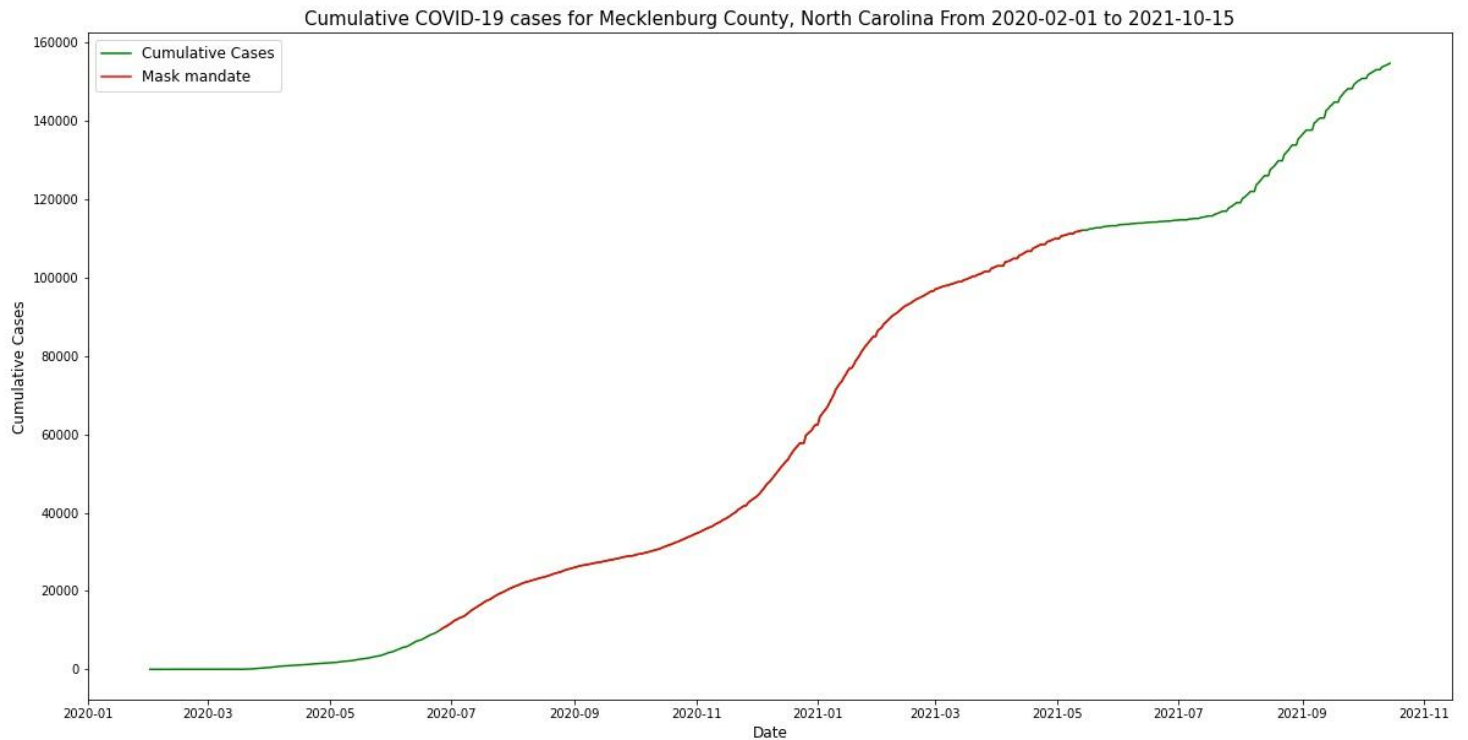
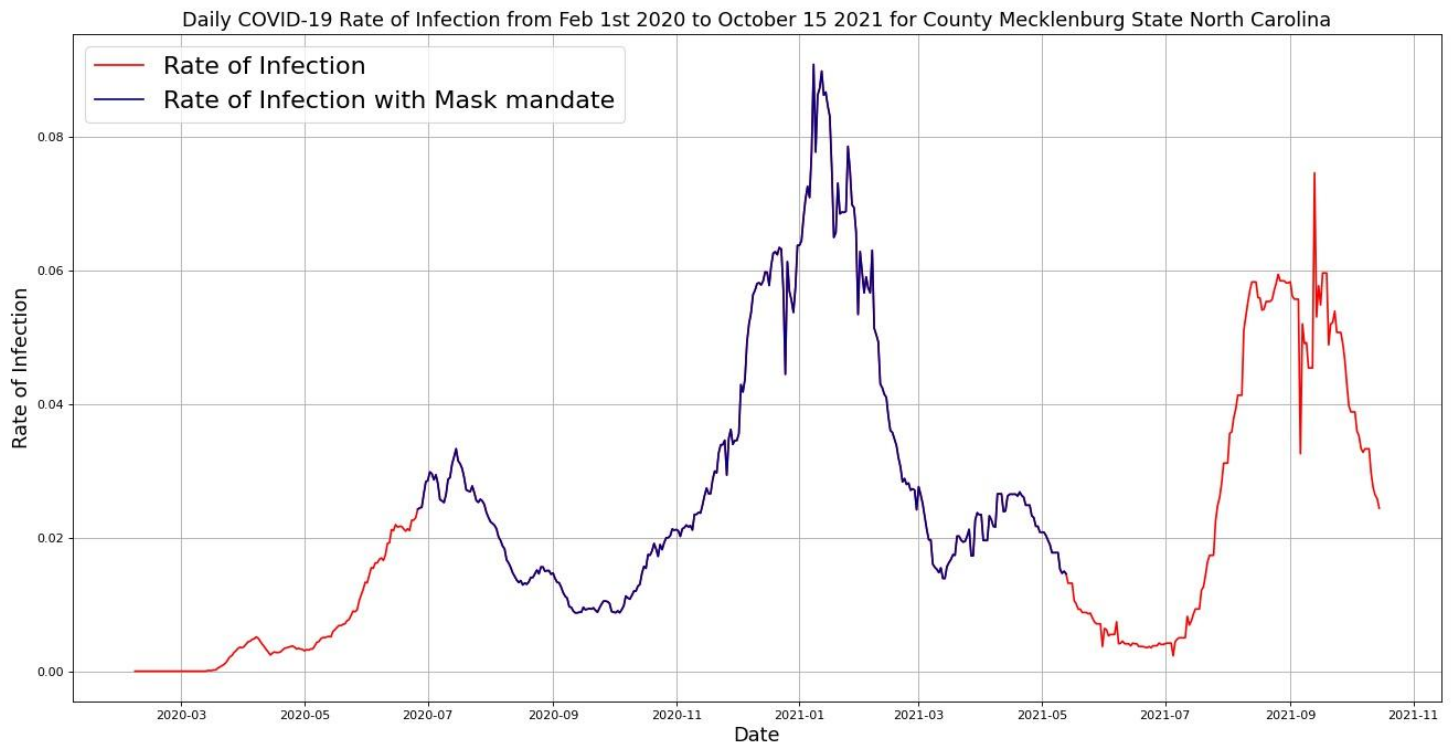


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Explanation:

Figure 1: This figure shows the cumulative increase in confirmed covid-19 cases from February 1, 2020, through October 15, 2021. We do see a sharp increase in the cumulative case in the year 2020 and a slow increase in the cumulative case in 2021. This confirms our assumption that the covid cases spread rapidly in 2020 and slowed down by almost half in 2021 because of both masking and vaccination.

Figure 2: This figure shows the daily confirmed cases with both mask mandates enforced and not enforced. The graph has an x-axis of Date ranging from February 1, 2020, through October 15, 2021. The y-axis represents the number of daily confirmed cases. The dark blue area represents the number of daily cases when the mask mandate was in place and the light blue area represents the number of daily cases when the mask mandate was not enforced. The red line represents the 7 days rolling average to account for the variations because of weekends and holidays. The red line smooths out the extreme outliers.

Figure 3: This figure shows the rate of infection with both mask mandates enforced and not enforced. The rate of infection is calculated using a seven-day rolling window to account for variations in cases due to weekends and special holidays. Infection Rate is calculated using

moving average daily cases divided by population at risk. The population at risk is computed by subtracting confirmed cases and confirmed deaths from the total population.

The above graphs are based on the below assumptions

1. For the County Mecklenburg and State North Carolina
2. The population is taken from the 2020 Census Bureau
3. The population at Risk is computed as Total Population - Confirmed Cases - Confirmed Deaths
4. 7 Day rolling average is used to account for variation caused by weekends and public holidays
5. The time period is restricted from Feb 1st, 2020 to October 15, 2021.

Reflection:

From the graphs, we cannot conclude that the mask mandate indeed helped in lowering the spread of covid-19. We do see a fall in the daily covid cases after the mask mandate was started on 07-2020. However, after declining, the cases again start to increase despite the mask mandate starting in October. This perhaps was because of people starting to get complacent with wearing masks and also could be because of the holiday season during Thanksgiving and Christmas and New Year. After the holidays the cases start to go down. Once the mask mandate is removed in may we again see a sharp increase in the daily cases. However, we can observe an overall decrease in the covid cases starting mid-2021 and this was perhaps because of the vaccines starting to roll out.

The most interesting data point in the graph is around May 2021 when the masking mandate was lifted, there was still a period of around 1 month when the cases kept going down. This could be because people were not aware that the mandate was removed and continued to wear masks for a period until they realized at which point the cases started going up. It could also be that it took a while from the time the mandate was removed to the time for the cases to spread and symptoms to surface and people to actually test positive.

I would like to attribute the idea of computing a 7-day rolling average to a classmate who brought up the idea on Teams. Also reading other people's comments on slack helped me understand how each county is so different and how data needs to be handled differently for each county as some counties never had a masking mandate, some counties did, while some counties always had a masking mandate so there was no pre-masking data to compare against. This goes to show that for each county the results are different as it depends on the population of the county if people in a particular county are mostly staying indoors and following the protocol.