**Visualization Explanation**

*(Part 1 - Common Analysis)*

Chart, histogram

Description automatically generated

**Please note,** I’ve attached my visualization here in my visualization explanation doc as well, to allow for easy back and forth between my explanation and visual for the reader. **Visualization explanation is provided in the next immediate page of this document.**

Above is a time series plot visualizing the variations in the COVID-19 daily infection rate in Jefferson County (state of Kentucky) during and beyond the periods when mask mandate policies were established in Jefferson County.

* Here, the X-axis represents the dates for which the cumulative inflected case count is made available through the RAW\_us\_confirmed\_cases.csv data set for Jefferson County. The Y-axis represents the number of cases per day which is derived by subtracting the previous date's cumulative inflected case count from the current date's cumulative inflected case count.
* The changepoints (represented by the red dotted lines) indicate the abrupt variations in the rate of infections i.e., timestamps where the change in inflected cases is significant from the confirmed cases dataset made available for Jefferson County. These changepoints were calculated using Pruned Exact Linear Time (PELT) Test
* The mask mandate policies data w.r.t Jefferson County is also incorporated into this visual. The 2 black dotted lines represent the date boundary for which mask mandate policy information is available in the US State and Territorial Public Mask mandates data provided (ie., from 04/10/2020 to 08/15/2021) The green line within this date boundary represents the variations in the daily infection rate when mandatory mask usage was established in Jefferson County and the blue line within this date boundary represents the variations in the daily infection rate when mandatory mask usage was not established in Jefferson County. The blue line beyond the date boundary represents the variations in the daily infection rate during periods where there is no information regarding the mask mandate policy in Jefferson County.
* The continuous black line depicted over all dates in the x-axis indicates the 7-day moving average of the daily case rate. This is to account for case counts not being updated for every single day in a week and it helps smooth out-trend information by creating constantly updated average rates.

Observations:

Through this visual, we can see that the masks were made mandatory from mid-June 2020 to mid-July 2021 (7/10/2020 to 6/10/2021) in Jefferson County. It is interesting to see that before and during the start of the mask mandate, we see that cases per day spread was kind of controlled and during the central period (Oct 2020 to Feb 2021) of the mask mandate the spread seems to move towards an uncontrolled trend. However, the same cannot be said during the end of the mask mandate. We see a controlled spread during the beginning of the end of the mask mandate period (i.e., from Mar 2021 to June 2021). If we were to consider the masking mandate to be the sole reason for the trend period, one can say the effects of removing the mask mandate can be observed in a little over the next 30 days’ time period (i.e., from Aug 2021) were the cases per day are starting to spread uncontrolled again. The voluntary masking survey shows us that 60.2% of the people in this county always wore masks and 91.5% of people wore masks more than sometimes (including sometimes survey points). This timeframe (July 2 - July 14) was when CDC had nationwide guidelines for wearing masks. So, technically our assumption is people in the county were following CDC guidelines religiously without a state mandate. Hence, these non-uniform variations in the case rates during different mask mandate periods lead me to infer that perhaps the mask mandates are not the only factor impacting the case rate variations. Additionally, moving away from the impact of mask mandates, we see that there is a huge uncontrolled spike in the case rates for Jefferson County at the beginning of the year 2022. One explanation for this can be the rise of the Omicron variant detection in several counties of the United States at the beginning of 2022.