**Executive Summary:**

Using the dataset provided by Esri Canada about each Province and Territories Daily Totals (Cases, Vaccinated, hospitalized patients etc.) regarding the COVID-19 Pandemic, one is to find out how effective has vaccination truly been at decreasing COVID-19 Cases, and whether the pandemic is almost over or do we have to still brace ourselves for another upcoming wave.

Over the past two years, COVID-19 Pandemic has been integrated fully in our daily lives and has become our new normal, so it is very difficult to imagine going back to life before COVID-19 and the accompanying regulations. Still, with the vaccine’s arrival in early 2021, all countries around the world, including Canada, are on the race to get their whole population fully vaccinated in the hopes to end the pandemic. However, given some setbacks such as anti-vaccinees or the rate of mutation of the virus and its different variations, will the COVID-19 pandemic dissipate over time? If so, is there a predictable time frame we can put our hopes onto? This research will explore these questions in hopes of the most factual and accurate answer based on the data visualization and analysis.

**Information About Data Set**

The dataset chosen is called “Provincial Daily Totals” and is in a Microsoft Excel Table Format, found from an online GIS Hub provided by Esri Canada that contains the open data website for many datasets related to COVID-19. The data was collected by Chris North and the link to the data is the following: <https://resources-covid19canada.hub.arcgis.com/datasets/covid19canada::provincial-daily-totals/about/>. The data is stored in a table format with 10855 rows each divided by categorial value of 13 Canadian provinces and territories, for each day, from January 25th, 2020, up to November 24th, 2021. The quantitative values being recorded belong to variables including but not limited to, Total Cases, Total Dose 1 Vaccinated, Total Dose 2 Vaccinated, Total ICU Patients, and Total Hospitalized Patients. These data were used to create the following interactive tableau dashboard.

**Data visualization in Tableau**

Application

Description automatically generated with low confidence

[**https://public.tableau.com/views/a04/COVID-19DATA2020and2021?:language=en-US&publish=yes&:display\_count=n&:origin=viz\_share\_link**](https://public.tableau.com/views/a04/COVID-19DATA2020and2021?:language=en-US&publish=yes&:display_count=n&:origin=viz_share_link)

**Data and Limitations**

The Visualization above includes one interactive map and three Line graphs and one Bar graph. All data is filtered based on interval of dates or month/year intervals, meaning we can look at specific values within a specific timeframe. The map shows an Overview of Total Cases and Total Fully Vaccinated Population of Canada and can be further specified to showing a specific Province/Territory attribute by selecting the desired province or territory. The provinces attribute on the map can also filter the four graphs to show specific data belonging to that selected Province or Territory. The line graphs respectively show Total COVID-19 Cases Per Month in Year 2020 and 2021, Total Hospitalized Patients Per Month in Year 2020 and 2021, and Total ICU Patients Per Month in Year 2020 and 2021. Line graphs were chosen to show counts over time to be able to monitor the progress and the severity of the pandemic situation before and after vaccine and to be able to see the Second and Third Waves of the pandemic happening around December 2020, and April 2021 which were equivalent to the times Canadians went on lockdown after the initial wave of the virus in March 2020. During those two periods, hospitalizations and ICU patients significantly increased as well. Lastly, the bar graph shows the Total New Fully Vaccinated Population Per Month in Year 2021 and is showing the counts of Total Dose 2 variable for each month.

One limitation with this data is the fact that it was not as cleaned up as possible. All data recorded were raw and messy and it was very hard to make sense of the data at first, there were a couple of Null variables that required to be cleaned up and one there problem was that for the first few months this data was being recorded the provinces name were abbreviated where they were not supposed to be, so it was hard to use the province’s full name to filter the data for the map, so I had to use the abbreviations of the provinces instead(which is the same throughout the whole data) in order to be able to present it in a manner which is understandable. It is also repetitive for some values in certain variables, which was why I had to ensure that the data was being filtered accordingly and only certain parts of the variables were used.

**Analysis and Predictions**

Using this data to analyse the question posed, we can conclude that after the vaccines were introduced, the hospitalized and ICU cases dropped significantly despite not having severe lockdowns over that time period. However, we can observe a slight raise in cases during October 2021, which coincides with the time delta and lambda variations of COVID-19 virus were introduced in Canada. This caused all nations to invest in future booster doses of vaccines to immunize the public further. With that being said, the third doses have started to be given to adults who are high-risk or over 70 years of age. The Pfizer vaccine has also been approved for younger children to take, and that will also happen in the next few months. This might be a good sign that cases might decrease down even more significantly. In terms of there being another wave, however, there is a new variation of COVID-19 (Omicron variation) that has begun to spread in the world and could be a cause for the fourth wave of the virus. All of these are hypothesis and predictions and not factual since correlation does not equal causation and hence we cannot know for sure. However, by using this data and its analysis, we could gain a denser and much more efficient understanding of the topic at hand.