Analyzing the Impact of COVID-19 Vaccination Rates on Case Trends in Maryland

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12/4/2024

Columns in the Dataset

The dataset included critical columns such as **Date**, **County**, **Total Cases**, **Vaccination Rates**, and **Cumulative COVID-19 Cases**. These columns were essential for addressing the research questions, particularly in analyzing infection trends over time and exploring the relationship between vaccination rates and case numbers across counties. Nonessential columns, such as demographic details or private information, were excluded from the analysis to prioritize privacy and streamline the dataset for the research objectives. By focusing only on the relevant data, the analysis remained precise and effective in answering the posed questions.

Calculations and Filters

To gain meaningful insights, specific calculations and filters were applied to the data. The calculation of **Daily New Cases** involved subtracting the total cases of the previous day from the current day's total, creating a derived column that effectively tracked infection rate changes over time. Filters were used to isolate data from Maryland counties and remove incomplete or irrelevant records. Additionally, different tables were created to summarize average daily new cases by date and county. This approach enabled a more granular analysis of how infection rates varied across different geographic regions and time periods.

Measures of Central Tendency

Measures of central tendency, including the mean and median, were used to summarize the data. The **mean daily new cases** highlighted overall trends, showing an initial spike during the early pandemic followed by a steady decline as vaccination efforts increased. The **median daily cases** supported this observation, confirming that most days had significantly fewer cases than the early peaks. These measures provided key insights into how vaccination and public health measures reduced transmission, helping to establish a clear narrative of the pandemic's progression.

Measure of Spread

The analysis also utilized the **standard deviation** to measure the spread of daily new case counts. During the early stages of the pandemic, a high standard deviation reflected significant variability, with sharp increases and decreases in daily cases. Over time, as vaccination rates rose and public health measures stabilized transmission, the spread narrowed, indicating more consistent and controlled case trends. This reduction in variability highlighted the effectiveness of vaccination campaigns and other mitigation strategies in managing the pandemic.

Visualizations

Various visualizations were used to present the data effectively. A **stacked area chart** tracked the trend of daily new cases over time, illustrating the spikes, fluctuations, and eventual decline in infection rates. A **line chart / combo chart** compared cumulative cases and vaccination rates across counties, revealing geographic disparities in vaccination efforts and case totals. Additionally, a **scatter plot** demonstrated the relationship between vaccination rates in the population of MD, showcasing the correlation between higher vaccination coverage and lower case numbers. These visual tools provided an accessible and engaging way to interpret the findings, making the analysis clear and impactful.

Conclusion

In summary, the analysis successfully addressed the research questions and provided a detailed understanding of the trends in daily COVID-19 cases and vaccination rates across Maryland counties. I found that in the short-term aspect vaccines can be a cause of disease spread because of it having small traces of it in the vaccine. But in the long run with the way it diminishes the existence of the disease cases, it definitely appears to be worth every cent. The findings emphasized the significant role of vaccination efforts in reducing transmission and controlling the spread of the virus. By leveraging key statistical measures, calculations, and visualizations, the study revealed valuable insights into the pandemic's evolution and highlighted the importance of sustained public health interventions. These results can serve as a foundation for future research and inform strategies for managing infectious diseases effectively.

My dataset link:
https://docs.google.com/spreadsheets/d/1065QmPp9WVuWthEXGDSKlVhKK2G5EtPl2NklnN5LstM/edit?usp=sharing