# Impact of Vaccination on COVID-19 Mortality Rate in the United States

## Overview

This study analyzes the impact of COVID-19 vaccinations on mortality rates across different U.S. states. The research aims to identify correlations between vaccination rates, COVID-19 cases, and deaths, providing insights into the effectiveness of vaccination programs.

## Data Sources

* **COVID-19 Cases & Deaths:** Retrieved from [USA Facts](https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/)
* **Vaccination Data:** Sourced from [Our World in Data](https://ourworldindata.org/us-states-vaccinations) and [USA Facts](https://usafacts.org/visualizations/covid-vaccine-tracker-states/)
* **State-wise Population Data:**
  + **2020 Census:** [State.1KeyData](https://state.1keydata.com/state-population.php)
  + **2021 Estimates:** [World Population Review](https://worldpopulationreview.com)

## Methodology

1. **Data Collection:**
   * Gathered daily COVID-19 case, death, and vaccination data in CSV format.
   * Compiled datasets into an Excel file with separate sheets for cases, deaths, and vaccinations.
2. **Data Processing:**
   * Summed cumulative values for total cases, vaccinations, and deaths per year.
   * Sorted data by highest and lowest values to identify trends.
3. **Analysis & Correlation:**
   * Compared states with the highest mortality rates against those with the highest vaccination rates.
   * Calculated **correlation coefficients** between:
     + Vaccination rates vs. mortality rates
     + Vaccination rates vs. COVID-19 cases
4. **Results Interpretation:**
   * Identified patterns demonstrating the effectiveness of vaccinations in reducing COVID-related deaths.

## Key Findings

* **New York** was among the top three states with the highest COVID-19 deaths in 2020, but after the introduction of vaccines, mortality rates declined significantly.
* **Vermont**, the most vaccinated state in 2021, recorded the **lowest mortality rate**, indicating a strong correlation between vaccination and lower death rates.
* **Statistical Correlation:** Higher vaccination rates generally resulted in **lower COVID-19 mortality rates and fewer severe cases**.

## Conclusion

Vaccinations played a crucial role in reducing COVID-19 mortality rates across the United States. Promoting widespread vaccination efforts can be an effective strategy for pandemic control.

## References

* “New York Braces for Another Lockdown as COVID Cases Surge.” The Real Deal New York, 19 Nov. 2020. [Read Here](https://therealdeal.com/2020/11/19/real-estate-braces-for-new-restrictions-as-virus-cases-surge/)
* “Understanding How COVID-19 Vaccines Work.” Centers for Disease Control and Prevention, 24 Feb. 2022. [Read Here](https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html)