



# Mapping the Pandemic:

**A Statistical Approach to COVID-19**

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# Introduction

This report presents an analysis of the COVID-19 pandemic using data from a provided dataset, which includes information on confirmed cases, recoveries, deaths, and other metrics related to COVID-19 across different countries and regions. The objective of this analysis is to understand the key trends, identify patterns, and present visual insights on the spread and impact of COVID-19 globally.

## 1. Data Preparation and Cleaning:

Before performing the analysis, the following data cleaning steps were taken:

- **Date Formatting:** Standardized various date formats in the dataset to a uniform format.
- **Creating New Features:** Added columns for daily new confirmed cases, growth rates, and mortality rates for more granular insights.
- **Column Update:** Replaced some values in the country column and renamed some columns.

## 2. Key Metrics Defined:

To facilitate better analysis, the following key metrics were defined:

- **New Confirmed Cases:** The number of new confirmed COVID-19 cases reported daily.
- **Growth Rate:** The daily percentage change in confirmed cases compared to the previous day.
- **Mortality Rate:** The percentage of confirmed cases that resulted in deaths.
- **Recovery Rate:** The percentage of confirmed cases that resulted in recoveries.

## 3. Global COVID-19 Trends:

- **Global New Confirmed Cases:** We observed significant spikes in daily new

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confirmed cases during certain periods, correlating with major outbreak waves across regions. The global trend shows a peak in cases in the latter part of the pandemic.

- **Daily New Cases Trend:** The highest number of daily new confirmed cases occurred during the second wave. Major spikes were observed in countries such as the U.S., India, and Brazil.

#### **4. Top 10 Countries by New Confirmed Cases:**

The analysis identified the top 5 countries with the highest cumulative new confirmed cases; USA, India, Brazil, France and Turkey. These countries accounted for a significant percentage of the total confirmed cases globally.

#### **5. Growth Rate Analysis:**

The daily growth rate varied widely among countries. Countries with high population density and insufficient initial response, such as Brazil and India, exhibited higher growth rates during the early stages of the pandemic.

#### **6. Impact of Lockdowns on Cases:**

The implementation of lockdowns had a significant impact on the number of new cases:

- **Before Lockdowns:** Countries experienced rapid daily growth rates in confirmed cases.
- **During Lockdowns:** Most countries observed a flattening of the curve, although the effectiveness varied depending on the timing and strictness of the lockdown measures.
- **After Lockdowns:** Some countries experienced a resurgence in cases (the second wave) due to the premature lifting of restrictions or variants of the virus spreading.

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## 7. Visualizations:

To provide clearer insights into the data, the following visualizations were created:

- **Line Chart:** Showing the trend of daily new confirmed cases globally and per country.
- **Bar Chart:** Displaying the top 5 countries by daily new confirmed cases.

## 8. Insights and Recommendations:

- **Early Intervention is Key:** Countries that acted early with lockdowns and aggressive testing had better outcomes in terms of controlling the spread of the virus.
- **Healthcare Infrastructure:** Strengthening healthcare infrastructure, particularly in underdeveloped countries, could have significantly reduced mortality rates.

## Conclusion:

This analysis highlights the global and country-specific trends of the COVID-19 pandemic, providing valuable insights into how different regions responded to the crisis. By examining key metrics such as daily new cases, growth rates, and mortality rates, we can better understand the spread of the virus and the effectiveness of interventions like lockdowns and vaccinations. This knowledge can help guide future responses to pandemics and improve global public health strategies.

## Future Scope:

Further analysis could include:

- **Comparing Different Variants:** Analyzing the spread and impact of different COVID-19 variants (Alpha, Delta, Omicron, etc.).
- **Vaccine Efficacy:** Investigating the correlation between vaccination rates and the decline in COVID-19 cases and deaths.
- **Economic Impact:** Studying the long-term economic consequences of the pandemic across countries.