

COVID-19 Data Analysis Report

Overview of Morbidity and Mortality by Date and Region

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Metro College of Technology

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Prepared by: Mentenot Alemu

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Executive Summary

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has significantly impacted global health and economies since its emergence in December 2019. This report aims to provide a comprehensive analysis of COVID-19 data to understand trends in morbidity and mortality, regional impacts, and key indicators such as the Case Fatality Rate (CFR) and Recovery Rate. Using data sourced from Kaggle, this analysis identifies high-impact areas and offers actionable recommendations for health authorities, policymakers, and researchers.

Key Findings:

- Global trends show varying impacts across regions, with some countries experiencing significantly higher morbidity and mortality rates.
- The analysis reveals that certain regions, particularly those with higher CFRs, require targeted medical support and resources.
- Recovery rates offer insights into the effectiveness of response measures, highlighting areas with successful intervention strategies.

Recommendations:

- Health authorities should prioritize support in regions with high CFRs.
- Policymakers should implement targeted lockdowns and travel restrictions in areas with high confirmed cases.
- Further research is needed to understand the factors contributing to high CFRs and low recovery rates in specific regions.

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1. Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, first emerged in Wuhan, China, in December 2019. It quickly spread globally, leading to widespread illness, significant mortality, and substantial disruption to daily life and economies worldwide. The World Health Organization (WHO) declared COVID-19 a global pandemic in March 2020.

COVID-19 is primarily transmitted through respiratory droplets, with symptoms ranging from mild respiratory issues to severe acute respiratory distress and death. The rapid spread and high transmissibility of the virus overwhelmed healthcare systems globally, leading to varying impacts across different regions and countries.

Purpose of the Report: This report aims to provide detailed insights into the COVID-19 pandemic through data analysis. By examining the data, we aim to understand trends in morbidity (incidence of disease) and mortality (death rates), identify regions most affected by the pandemic, and analyze key indicators such as the Case Fatality Rate (CFR) and Recovery Rate. The goal is to offer actionable insights and recommendations for health authorities, policymakers, and researchers to better manage and mitigate the impact of the pandemic.

Objectives:

- **Trend Analysis:** To observe and analyze the trends in confirmed COVID-19 cases, deaths, and recoveries over time.
- **Regional Impact:** To assess the impact of COVID-19 across different regions, focusing on morbidity and mortality rates.
- **High Impact Areas:** To identify regions and countries with the highest number of confirmed cases and deaths.
- **Effectiveness of Interventions:** To evaluate the effectiveness of interventions through key indicators such as CFR and Recovery Rate.

To achieve these objectives, Tableau was used for analyzing and displaying the data, providing visual insights and facilitating a more intuitive understanding of the pandemic's impact.

2. Problem Statement

The COVID-19 pandemic has presented numerous challenges and raised several critical questions regarding its impact and management. This analysis seeks to address the following key questions to gain a deeper understanding of the pandemic's dynamics:

2.1. Regional Impact:

- How has COVID-19 affected different regions in terms of morbidity and mortality?
- Which regions have experienced the highest rates of confirmed cases, deaths, and recoveries?
- What are the regional disparities in the impact of COVID-19, and what factors contribute to these differences?

2.2. Trends Over Time:

- What trends in morbidity and mortality can be observed over time from the beginning of the pandemic to the present?
- How have the rates of confirmed cases, deaths, and recoveries changed over different periods?
- What patterns can be identified in the data that may indicate the effectiveness of various public health measures and interventions?

2.3. High Impact Areas:

- Which regions and countries contribute most to the high number of confirmed cases and deaths?
- What characteristics do the most affected areas share, and how can this information be used to inform public health strategies?
- How can targeted interventions be implemented in high-impact areas to mitigate the spread of the virus and reduce mortality rates?

By answering these questions, the analysis aims to provide valuable insights into the pandemic's progression, identify areas in need of targeted interventions, and offer recommendations to improve response strategies and health outcomes.

3. Dataset Description

The dataset used for this analysis was sourced from Kaggle and includes comprehensive COVID-19 data with 35,156 data entries and 10 columns:

- **Date:** The date of the record.
- **Country/Region:** The country or region where the data was recorded.
- **Confirmed:** The total number of confirmed COVID-19 cases.
- **Deaths:** The total number of deaths due to COVID-19.
- **Recovered:** The total number of recoveries from COVID-19.
- **Active:** The total number of active COVID-19 cases.
- **New cases:** The number of new confirmed cases on that date.
- **New deaths:** The number of new deaths on that date.
- **New recovered:** The number of new recoveries on that date.
- **WHO Region:** The World Health Organization region classification.

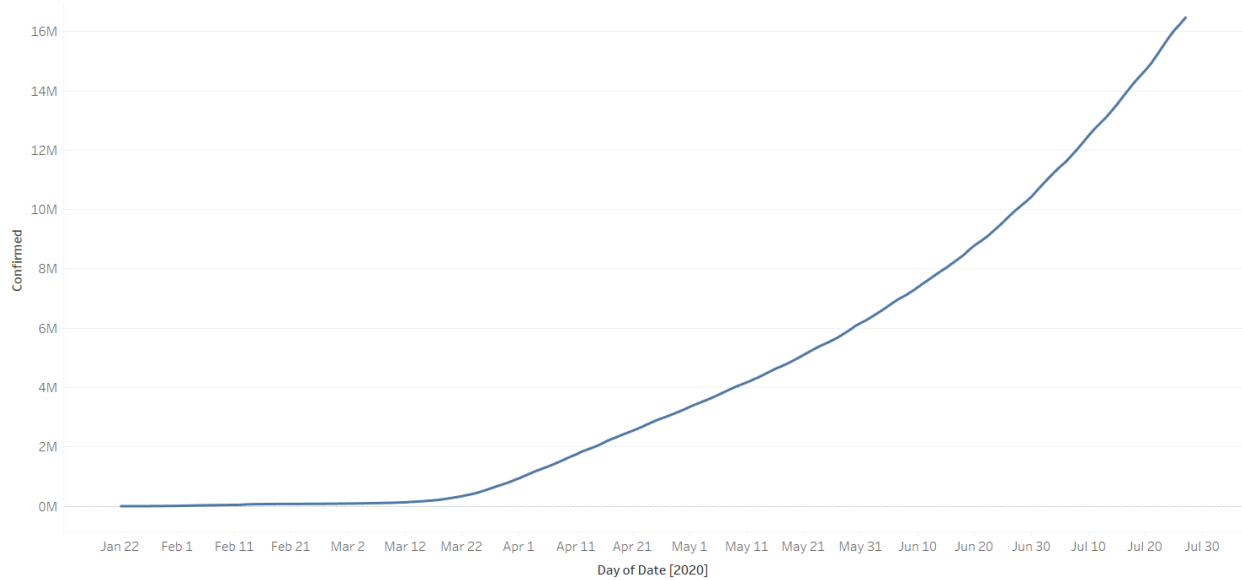
4. Data Cleaning and Preparation

Steps Taken:

- **Missing and Duplicated Values:** There were no missing or duplicated values in the dataset.
- **Aggregating Data by Region:** Data was aggregated by region to provide a higher-level view of the pandemic's impact across different WHO regions.
- **Calculating Metrics:** Created calculated fields for critical metrics:
 - **Case Fatality Rate (CFR):** $\text{SUM(Deaths)/SUM(Confirmed)} \times 100$
 - **Recovery Rate:** $\text{SUM(Recovered)/SUM(Confirmed)} \times 100$

5. Analysis and Key Indicators

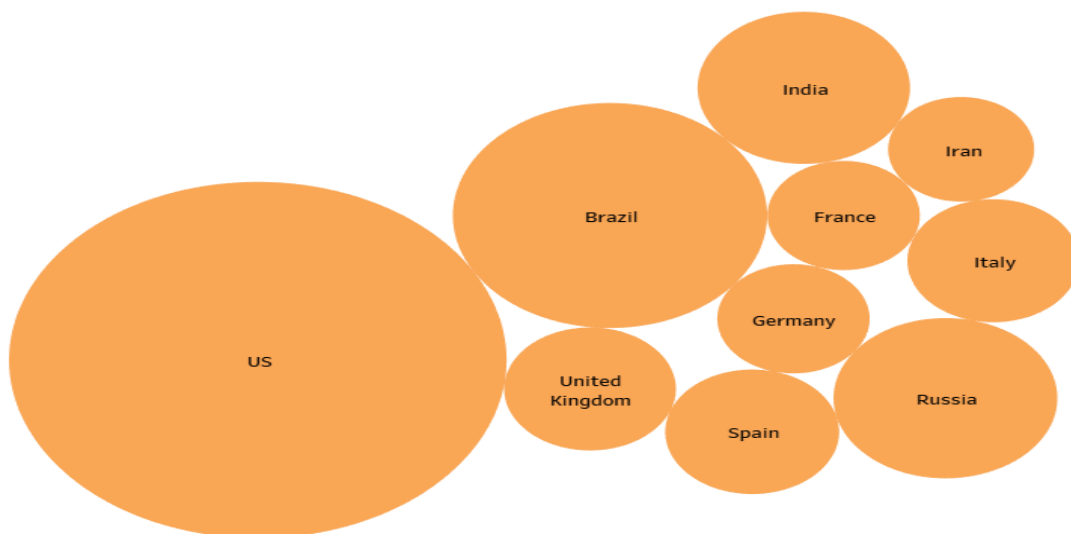
5.1. Overview of Confirmed Cases



Trend of confirmed COVID 19 from Jan to July 2020

- **Trend Analysis:** The trend of confirmed COVID-19 cases from January to July 2020 shows a steady increase, with some regions experiencing sharp spikes.

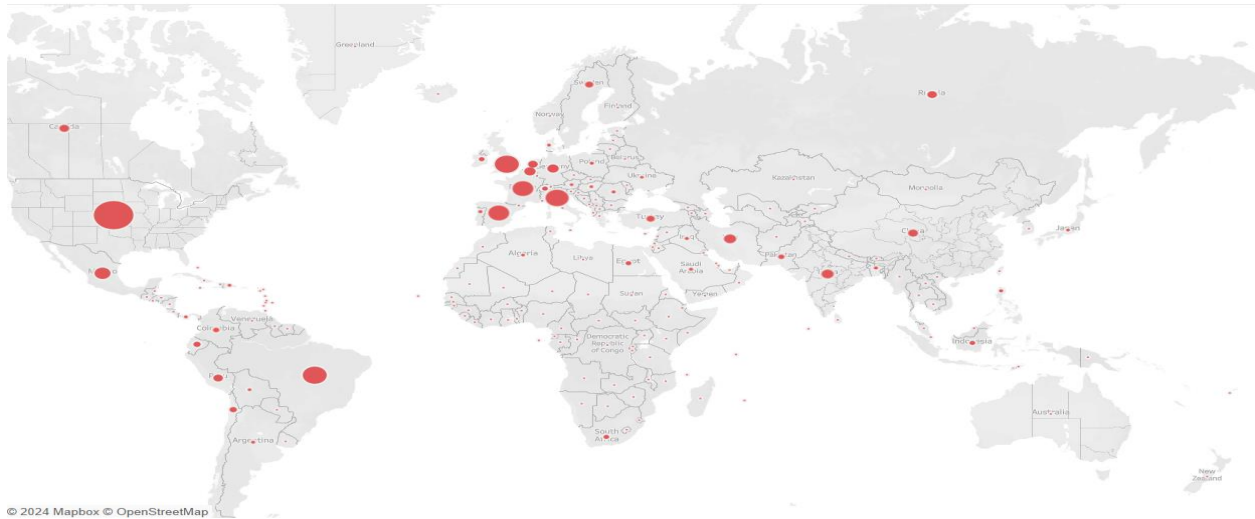
Top 10 Contributors of Confirmed Cases



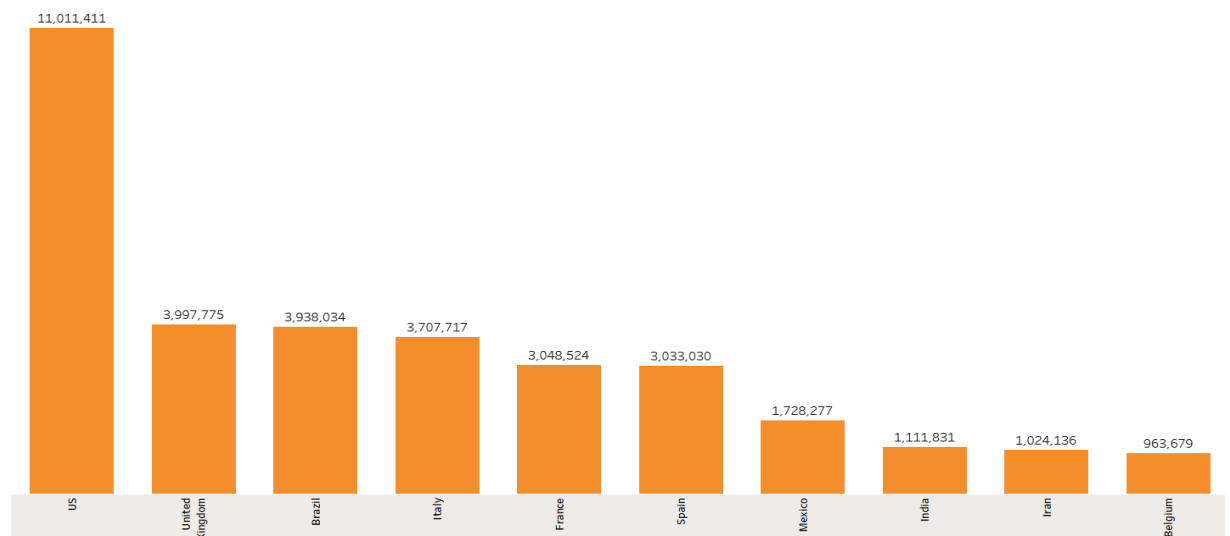
- **Top Contributors:** The top 10 contributors of confirmed cases globally include countries like the United States, Brazil, India, and Russia, which together account for a significant portion of the global case count.

5.2. Mortality Analysis

Number of Death Distribution across the glob



- **Death Distribution:** Analysis of death distribution across the globe reveals significant disparities, with some countries experiencing higher death tolls relative to their case numbers.



Top 10 Countries with highest Mortality

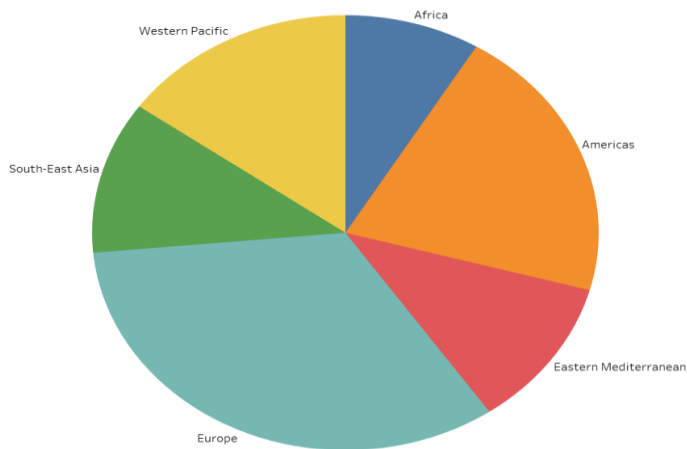
- **Top Mortality Rates:** The top 10 countries with the highest mortality rates include Italy, Spain, and the United Kingdom, highlighting regions where the healthcare systems were overwhelmed.

5.3. Recovery Analysis

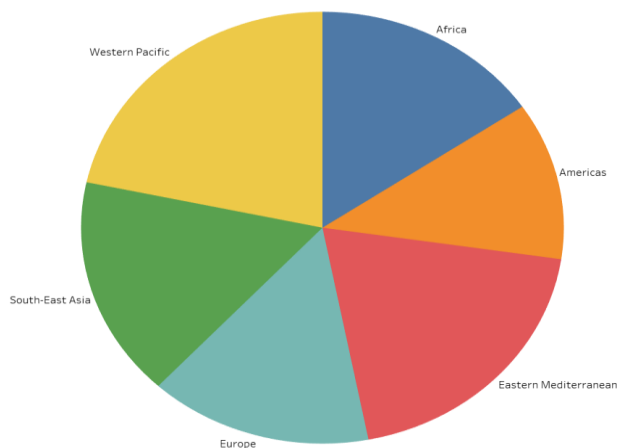
- **Recovery Rates:** Overview of recovery rates by region shows variability, with some regions achieving higher recovery rates due to effective medical interventions and public health strategies.

5.4. Case Fatality Rate (CFR) vs. Recovery Rate

CFR



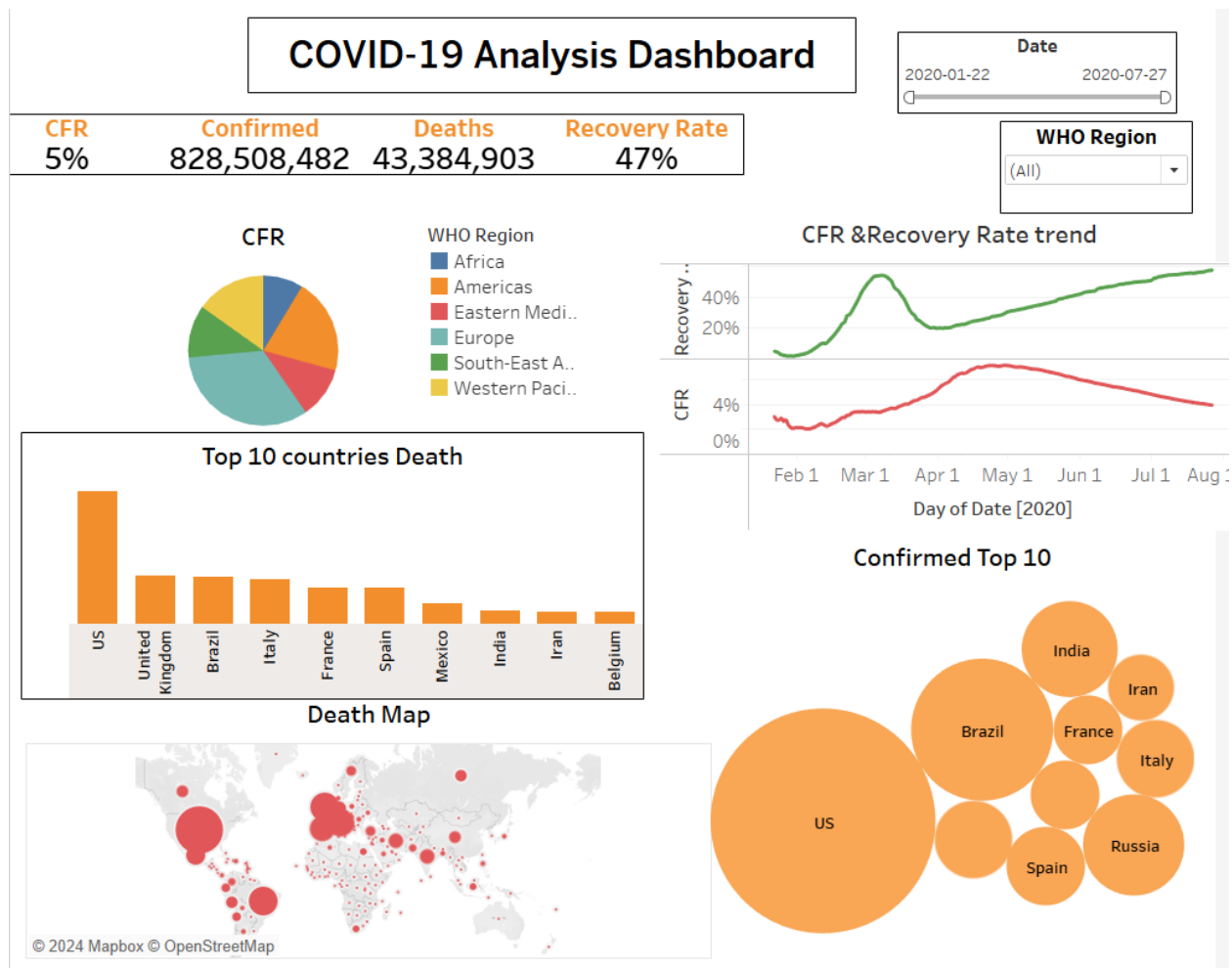
Recovery Rate



- **Comparison Analysis:** A comparison of CFR against recovery rates indicates the effectiveness of response measures over time. Regions with lower CFR and higher recovery rates have demonstrated better management of the pandemic.

6. Key Findings

Summery dashboard of COVID_19 Analysis



- **Trends in CFR and Recovery Rate:** The overall trends in CFR and Recovery Rate provide insights into the effectiveness of response measures over time. Higher recovery rates in some regions suggest successful medical interventions.
- **Regional Disparities:** Significant regional disparities in morbidity and mortality rates highlight the need for targeted interventions. Some regions, particularly in lower-income countries, have faced greater challenges in managing the pandemic.

- **Country-Specific Analysis:** Country-specific analysis helps in understanding and addressing localized outbreaks. Countries with high CFRs require additional support and resources to manage the impact.

7. Recommendations

- **For Health Authorities:** Focus on regions with high CFR for better medical support and resources. Implement strategies to improve healthcare capacity and provide necessary medical supplies.
- **For Policymakers:** Implement targeted lockdowns or travel restrictions in countries with high confirmed cases to control the spread of the virus. Encourage public health measures such as mask-wearing and social distancing.
- **For Researchers:** Conduct further studies on the factors contributing to high CFR and low recovery rates in certain regions. Investigate the role of healthcare infrastructure, population demographics, and other variables.

8. Conclusion

The analysis provides a comprehensive understanding of the COVID-19 pandemic's impact across different regions and over time. By addressing key indicators such as CFR and recovery rates, we can identify high-impact areas and recommend targeted interventions to mitigate the pandemic's effects. Continued monitoring and analysis are essential to adapt strategies and respond effectively to ongoing challenges posed by COVID-19.