**Dataset Description**

The dataset utilized in this project captures the daily dynamics of COVID-19 in Ghana, including key variables necessary for epidemiological analysis. Each record corresponds to a specific date, tracking figures on confirmed cases, recoveries, deaths, and active cases. The dataset provides cumulative and daily counts for each category, enabling insights into how the pandemic evolved.

Key variables in the dataset include:

1. **date:** Date of data collection in "mm/dd/yyyy" format.
2. **cumulative\_confirmed:** Total confirmed cases since the onset of the pandemic.
3. **cumulative\_recovered:** Total number of recoveries as of each date.
4. **cumulative\_death:** Total number of COVID-19-related fatalities.
5. **confirmed:** Newly confirmed cases per day.
6. **recovered:** New daily recoveries.
7. **death:** New daily fatalities.
8. **active\_cases:** Active cases are calculated as cumulative confirmed cases minus recoveries and deaths.

The availability of both daily and cumulative statistics makes this dataset ideal for time-series analysis, trend visualization, and policymaker decision support.

**Key Visualization Features**

The Shiny web application allows dynamic interaction and visual exploration of the dataset using the following chart types:

1. **Cumulative Cases Plot:**  
   This plot provides a time-series view of the cumulative number of confirmed cases, recoveries, and deaths. It helps illustrate the overall progression and severity of the pandemic.
   * **Insight:** Trends reveal distinct waves of infections and recovery phases.
2. **Daily Cases Plot:**  
   This chart visualizes the daily fluctuations in new cases, recoveries, and fatalities.
   * **Insight:** Highlights sudden spikes in cases, which may correlate with testing surges or super-spreader events.
3. **Active Cases Plot:**  
   Displays the daily count of active cases remaining in the healthcare system.
   * **Insight:** Provides a snapshot of healthcare system stress over time.
4. **Recovery & Death Rate Plot:**  
   This plot calculates and displays the recovery and death rates as percentages of cumulative confirmed cases.
   * **Insight:** A rising recovery rate with a declining death rate indicates improved patient outcomes and possible healthcare enhancements.
5. **Case Composition Plot:**  
   A polar bar chart visualizing the proportions of active cases, recoveries, and deaths as of the latest available date.
   * **Insight:** Offers a comprehensive understanding of case distributions, showing whether the country is in recovery, crisis, or stabilization mode.

**Data Manipulation and Visualization Techniques**

Key libraries used for processing and visualization include:

1. **dplyr:** For efficient data wrangling tasks such as computing recovery and death rates.
   * Example: mutate() was used to calculate recovery and death rates dynamically.
2. **ggplot2:** Core plotting package for producing layered, aesthetic visualizations.
   * Multiple plots (line plots, bar plots, and polar plots) were created to present data insights.
3. **lubridate:** Simplified the conversion and handling of dates to ensure time-based plotting.
4. **Shiny Application:** Provided an interactive UI, allowing users to switch between visualisation options seamlessly.

**Insights and Usage**

This application enables stakeholders, including public health officials, researchers, and citizens, to gain timely insights into Ghana’s COVID-19 trends. Decision-makers can identify critical periods requiring policy interventions, while researchers can use these visual trends for further epidemiological modelling. Moreover, the public can better understand the progression of the pandemic through user-friendly visual analytics.

The application effectively demonstrates how interactive dashboards can facilitate informed decision-making during public health crises by employing clean visualisation strategies and data manipulation techniques.

<https://emmanuel64.shinyapps.io/shiny/>