**Detailed Scenario-Based Problem Statement: COVID-19 Surveillance and Resource Planning in Afghanistan**

**Background:**

In early 2020, the Ministry of Public Health (MoPH) in Afghanistan faced an unprecedented challenge in dealing with the global COVID-19 pandemic. With limited healthcare infrastructure, a fragmented data ecosystem, and logistical hurdles due to regional instability, the MoPH sought to implement a data-driven surveillance system to monitor the progression of the virus across the country. The primary goal was to **identify patterns in the spread**, assess **public health risks**, and **optimize the allocation of scarce medical resources**, including ICU beds, oxygen cylinders, and medical staff.

By March 2020, Afghanistan began to report its first confirmed COVID-19 cases. Over the next several months, the country saw varying rates of infection and mortality. The dataset provided by the WHO includes weekly records of new cases, cumulative cases, new deaths, and cumulative deaths, offering a chronological view of the epidemic's growth during its early phase.

**Business Objective:**

The MoPH leadership team wants to use the available COVID-19 data to:

* **Visualize the weekly trends of new infections and deaths** to monitor transmission intensity.
* **Identify critical periods (spikes or declines)** that might be associated with public health interventions or failures.
* **Calculate case fatality rate (CFR)** over time to evaluate changes in virus lethality or healthcare system effectiveness.
* **Model cumulative growth curves** to estimate the burden on the healthcare system.
* Use these visual insights to **forecast potential outbreaks**, evaluate the **effectiveness of containment measures**, and plan for **medical resource distribution** in future waves.

**Analytical Focus Areas:**

1. **Epidemic Curve Visualization**:
   * Weekly visualization of new cases and deaths to observe how the outbreak evolved.
   * Highlight periods of sudden surge (e.g., post-May 2020) to assess triggers (e.g., lockdown easing, public events).
2. **Case Fatality Rate Monitoring**:
   * Time series of CFR (cumulative\_deaths / cumulative\_cases) to understand mortality trends and healthcare effectiveness.
3. **Resource Allocation Modeling**:
   * Use cumulative case/death growth to infer when hospitals might have been overwhelmed.
   * Estimate future demand if similar growth patterns reappear.
4. **Data Quality Assessment**:
   * Identify gaps or lags in reporting (e.g., multiple weeks with 0 cases) to highlight surveillance weaknesses.
5. **Policy Impact Analysis (Optional)**:
   * If additional data like lockdown dates were available, correlation could be studied between interventions and trends.