1. Project Title

Analysing the Economic and Geographic Drivers of Global Child Mortality Rate (CMR) Reduction: A Comparative Study (1990–Present)

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2. Introduction and Problem Statement

2.1 Background

The Child Mortality Rate (CMR), specifically the under-five mortality rate, is a critical indicator of global public health, socioeconomic development, and equity. The world has made significant strides in reducing CMR since 1990, but progress is highly uneven, with certain regions and socio-economic groups lagging far behind.

2.2 Problem Statement

While the overall global trend is positive, there is a persistent disparity in CMR across different world regions and income levels. This project aims to conduct a comprehensive data analysis to **quantify the relationship between national economic development (GDP per capita) and child mortality reduction** across different global regions over time. By isolating regional trends and the strength of the GDP-CMR correlation, the analysis will identify which world regions are experiencing accelerated reduction relative to their economic growth, and which are falling behind.

2.3 Project Objectives

- **Primary Objective:** To perform a comprehensive **comparative trend analysis** that evaluates the progress of Child Mortality Rate (CMR) reduction across different global regions and examines its relationship with economic growth (GDP per capita).
- **Specific Objectives:**
    1. Clean and prepare a comprehensive dataset of CMR, GDP per capita, and population figures for global entities.
    2. Use data visualisation to explore the strength of the relationship between a nation’s wealth (GDP per capita) and its success in reducing child mortality.
    3. Quantify the **correlation** between changes in **GDP per capita** and changes in **Child Mortality Rate** for each major world region.
    4. Uncover "high-performing" countries, those that have achieved low child mortality rates despite lower-than-average GDP, to highlight success stories outside of purely economic drivers.
    5. Create an interactive dashboard in Power BI that allows users to explore these trends and relationships over time.

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3. Data & Methodology

3.1 Data Source and Scope

Column Name	Type	Role in Analysis
Entity	Categorical (String)	Primary geographic identifier (Country/Region).
Code	Categorical (String)	ISO Alpha-3 code for country filtering.
Year	Numerical (Integer)	Primary time variable for trend analysis.
Child mortality rate	Numerical	**Dependent Variable (Target).**
GDP per capita	Numerical	**Primary Independent Variable**
Population (historical)	Numerical	Used for calculating relative rates/impact and filtering regions.
World regions	Categorical (String)	Used for *grouping* the analysis.

3.2 Analysis Roadmap (The Full Pipeline)

Phase	Tool	Key Activities
Clean & Transform	**Excel, SQL, Python (Pandas)**	Identify and impute/remove missing values (especially in GDP/CMR). Ensure consistent `Entity` and `World regions` mapping. Use SQL to aggregate data by region/year.
Analyze	**Python (Pandas, Numpy, Matplotlib)**	**Trend Analysis:** Calculate and plot CMR trends over time by region. **Correlation Analysis:** Calculate the Pearson correlation coefficient (r) between log(GDP per capita) and CMR for all countries and for each region.
Visualize	**Power BI**	Build a dynamic dashboard featuring time-series plots, geographic maps, and scatter plots to visualise the correlation strength by region.

Summarize	**Python Notebook/Presentation**	Document findings.

4. Proposed Deliverables

Deliverable	Description	Location
Final Report	Detailed analysis and code in a Python/Jupyter Notebook.	GitHub Repository
Interactive Dashboard	Power BI file with dynamic visualizations and filters.	GitHub (Screenshots) / Power BI Service
Presentation	Slides summarizing the project, key findings, and recommendations.	Portfolio/Presentation