RELATIONSHIP BETWEEN GDPS PER CAPITA AND LIFE EXPECTANCY

By: Ftalew Dagnaw, GRAPH Student
Date: October 20, 2025
As part of the GRAPH WORKSHOP 2 | AI-Assisted Data Analysis Practice with Julius & Cursor | AIW 2025 Q4

1. Introducton:

Economic development and population health are deeply interconnected. One of the most widely used indicators of economic prosperity is GDP per capita, which represents the average economic output per person. Higher GDP per capita is often associated with better living standards, improved access to healthcare, greater investment in education, better nutrition, and improved infrastructure all of which contribute to enhanced population health outcomes.

A particularly strong indicator of population health is life expectancy, which reflects the average number of years a person is expected to live. Numerous studies have shown that countries with higher GDP per capita tend to have higher life expectancy, especially at lower income levels where small economic gains can lead to substantial improvements in health and longevity. However, at higher income levels, the benefits of economic growth on life expectancy tend to plateau, indicating diminishing returns.

This exercise explores the relationship between GDP per capita and life expectancy using Gapminder's data repository (https://gapminder.org/data) as the primary data source. The analysis aims to visualize and interpret the global pattern of this relationship in 2020.

2. Methods:

The dataset was obtained from Gapminder's open data repository, which provides country-level statistics on GDP per capita and life expectancy. The year 2020 was selected to reflect the most recent available global data. The analysis involved the following steps:

1. Data retrieval and preparation: GDP per capita (in USD) and life expectancy data for 2020 were extracted
2. Exploratory data analysis: A scatter plot was created to visualize the relationship between GDP per capita and life expectancy, using a logarithmic scale for GDP to better capture variation at lower income levels.
3. Visualization of spatial distribution: A world map was produced to illustrate life expectancy and GSDP Per capita across countries.
4. Statistical assistance: The AI platform Julius AI was used to support data analysis and visualization, including generation of scatter plots and model fitting.

Figure.1 : World map of GDP per capita by country in 2020

The GDP per capita map shows significant variation globally, with higher values concentrated in North America, Western Europe, and parts of the Middle East and Oceania.

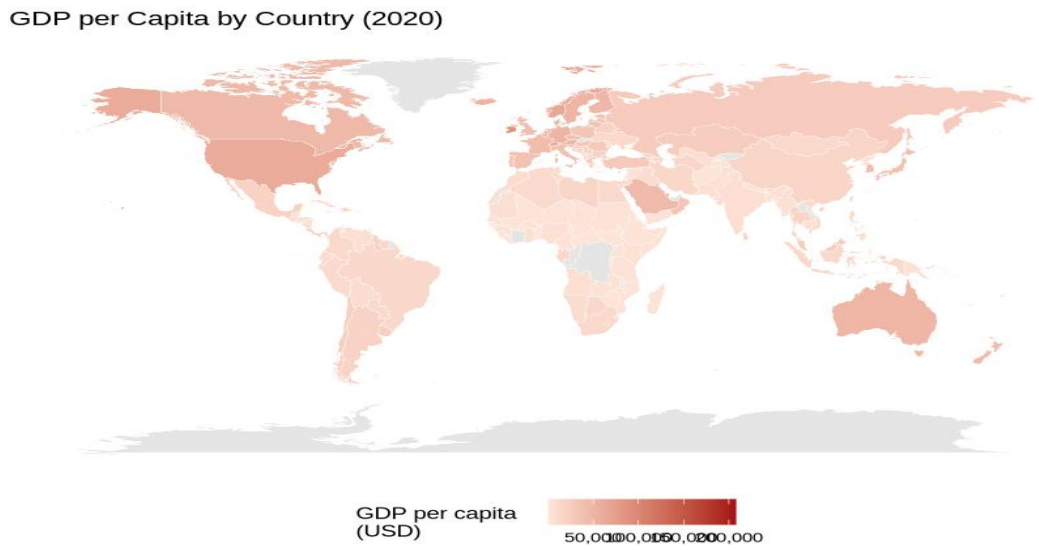
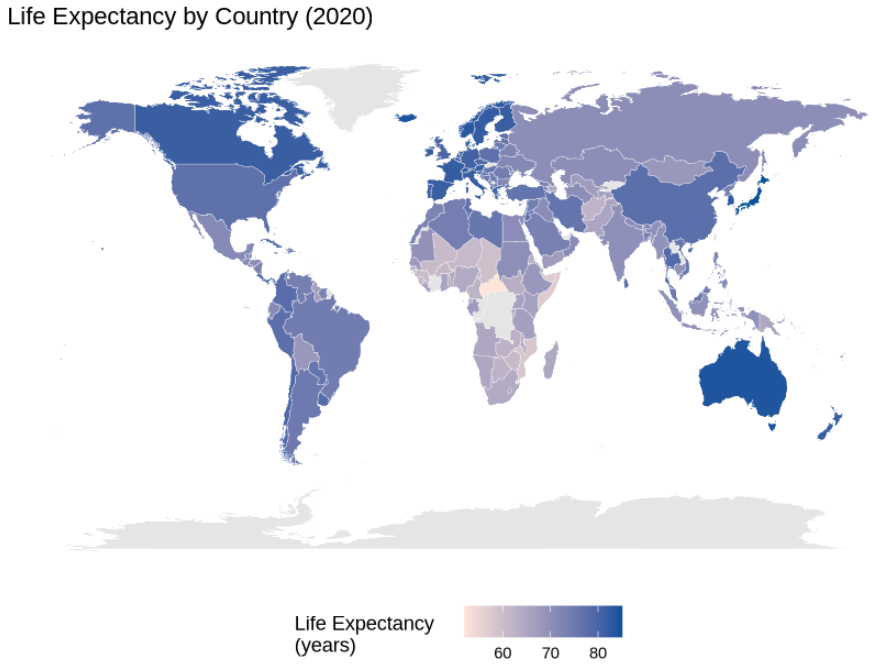


Figure.2 : World map of life expectancy by country in 2020

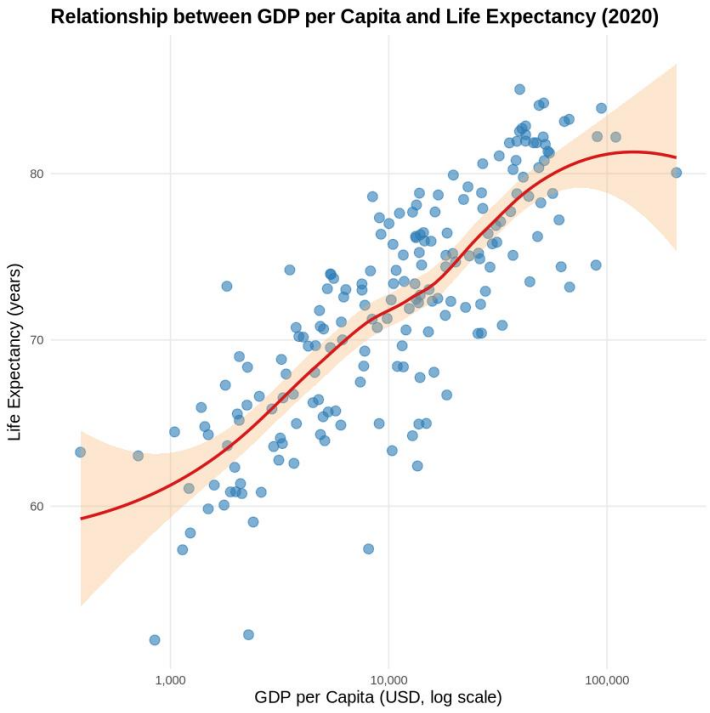
The life expectancy map reveals similar geographic patterns, with higher life expectancy in developed regions.



a. Data Overview

The GDP per capita dataset contains 193 countries with data from 1800 to 2040+, measured in USD.
The life expectancy dataset contains 194 countries with data spanning the same time period, measured in years.
Both datasets were successfully subset to 2020, with 193 countries having complete data for both indicators

Figure 3: Scatter plot showing the logarithmic relationship between GDP per capita and life expectancy.



3. Interpretation:

The scatterplot reveals a strong positive relationship between GDP per capita and life expectancy in 2020. Key observations:

Logarithmic relationship: The relationship is strongest at lower GDP levels, where small increases in GDP per capita are associated with substantial gains in life expectancy

Diminishing returns: At higher GDP levels (above ~$20,000), additional wealth produces smaller improvements in life expectancy, suggesting a plateau effect

Strong correlation: Countries with higher economic output consistently show higher life expectancy, indicating that economic development is closely tied to health outcomes

Range: Life expectancy ranges from approximately 55 to 85 years, while GDP per capita spans from under $1,000 to over $100,000

This pattern suggests that economic resources enable better healthcare, nutrition, sanitation, and living conditions that directly impact longevity, though the benefits level off once basic needs are met.

My Refection:

As a statistician and Public Health specialist with extensive experience of M&E, such use of Generative with no code data analysis has huge implications in maximizing the utilization of data in short time to facilitate the timely decision making in the Health sector. In our context, there are huge data set from multiple data sources that such platforms motivate me to apply it in my current role at Ministry of Health. Very helpful and feel encouraged.! I will also go further exercise to deepen my knowledge.

What was difficult? Navigating the setting up of the Julius AI for the first time some how time taking.

What was surprising? I am surprised how LLM reached to the level of simplifying data analysis task shortly.

What did you learn? How data analysis become much much easier with LLM and the importance of basis statistical background and coding to fully utilize the LLM gifts.