1.Goals

Goal: This project investigates whether there is a strong correlation between a country's economic output (GDP) and the life expectancy of its citizens.

Questions to answer:

Has life expectancy increased over time in the six nations?

Has GDP increased over time in the six nations?

Is there a correlation between GDP and life expectancy of a country?

What is the average life expectancy in these nations?

What is the distribution of life expectancy across these nations?

2. Data

Data:

- GDP Data: World Bank national accounts data.
- Life Expectancy Data: World Health Organization (WHO).
- Countries in Scope: There seems to be six countries, Chile, China, Germany, Mexico, the US and Zimbabwe represented in the data.

Data characteristics:

- Annual GDP figures.
- Average life expectancy at birth in years by country.

Data Preparation:

- Load and clean datasets (handle missing values, align years and countries).
- Normalize datasets for data analysis.

3. Analysis

Exploratory Data Analysis (EDA):

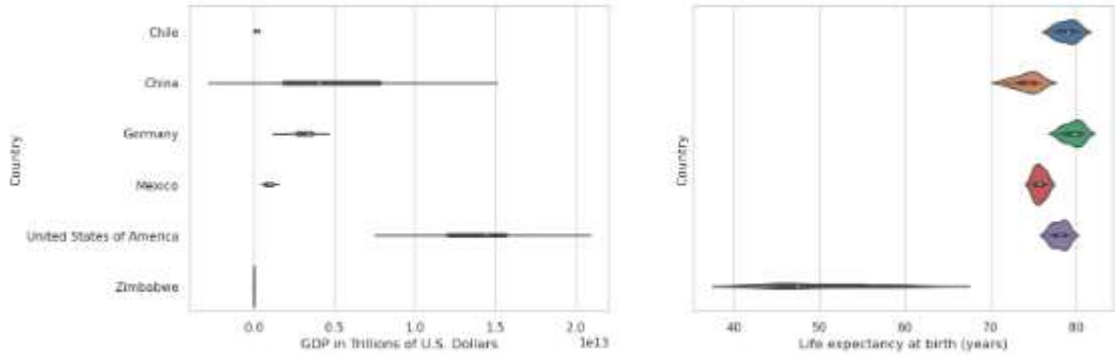
- Visualize life expectancy trends
- Visualize GDP trends

Correlation Analysis:

- Compute correlation coefficients between GDP and life expectancy by country and across all data points.
- Visualize scatter plots.

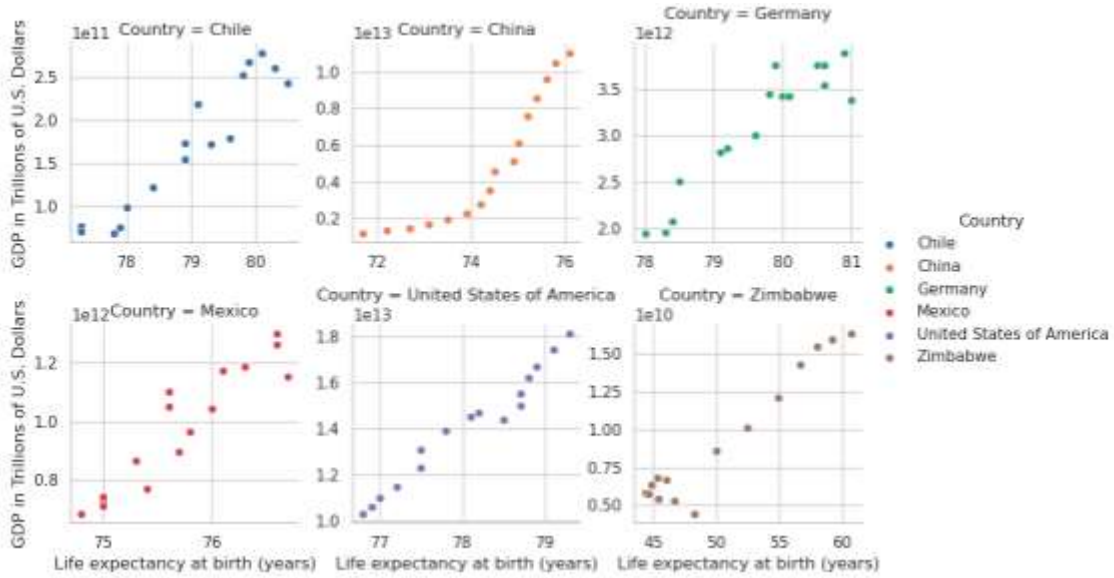
Visualising the relationship between GDP and life expectancy:

The violin plot of GDP vs the life expectancy per country:



In the GDP plot on the left, China and the US display a wide range and Zimbabwe, Chile and Mexico show much shorter ranges. In the LEABY plot, most countries have shorter ranges. However, Zimbabwe has a range from the high 30s to the high 60s.

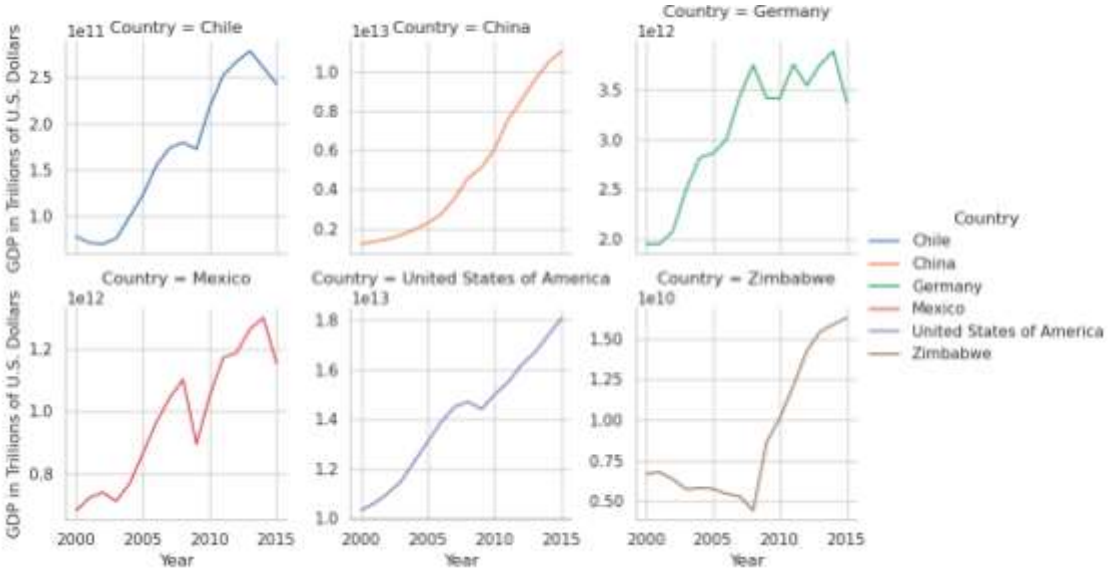
Scatter plot of GDP vs life expectancy:



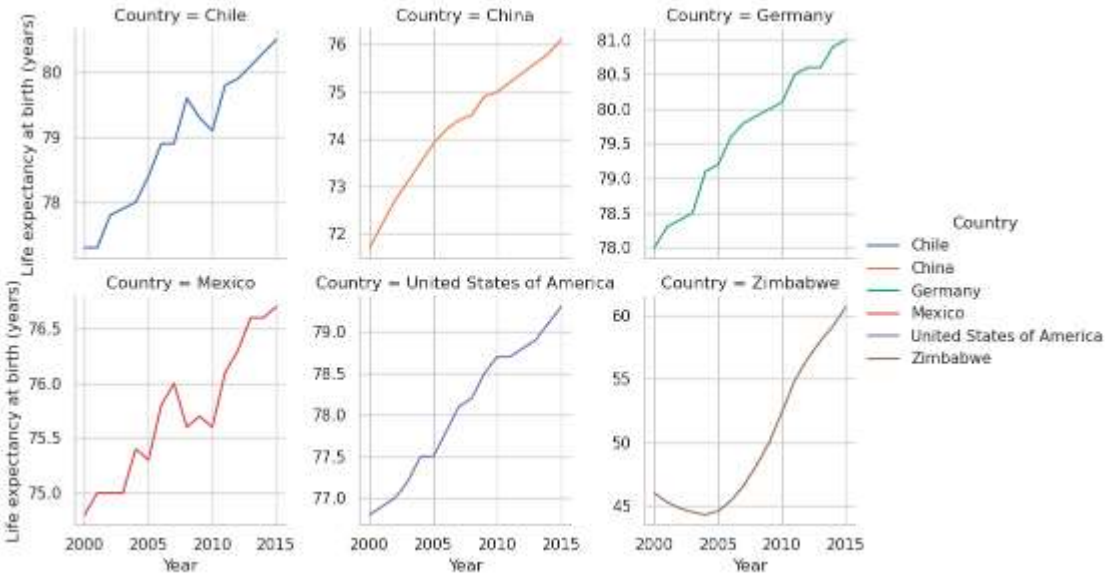
Countries are broken out into each scatter plot by facets. Looking at the individual countries, such as the US, Mexico and Zimbabwe have linear relationships between GDP and life expectancy. China on has a slightly exponential curve and Chile's looks

a bit logarithmic. In general, an increase in GDP and life expectancy can be seen, this shows a positive correlation.

Line graphs:



Another aspect explored in greater detail was the use of faceted line charts by country. In these individual plots, each country has its own y-axis, this allows for easier comparison of the shape in GDP over the years without the same scale. This method makes it easier to see that all the countries have seen increases. In the chart above, the other country's GDP growth appear modest compared to China and the US but all of the countries did experience growth since the year 2000.



Like the previous breakdown of GDP by country, the plot below breaks out life expectancy by country. Chile and Mexico seemed to have dips in their life expectancy around the same time which can be investigated further.

This type of plotting is useful because many of these nuances were lost when the y axis was shared among the countries. Also, the seemingly linear changes initially appeared to be smooth but were not as smooth for some of the countries.

Conclusions:

This project was able to make quite data visualizations with the data even though there were only 96 rows and 4 columns.

The project was also able to answer some the questions that were asked in the beginning:

- Has life expectancy increased over time in the six nations?

Yes, Zimbabwe has the greatest increase.

- Has GDP increased over time in the six nations?

GDP has increased for all countries, especially for China.

- Is there a correlation between GDP and life expectancy of a country?

Yes, there is a positive correlation between GDP and life expectancy for countries.

- What is the average life expectancy in these nations?

Average life expectancy was between mid to high 70s for the countries except for Zimbabwe which was 50.

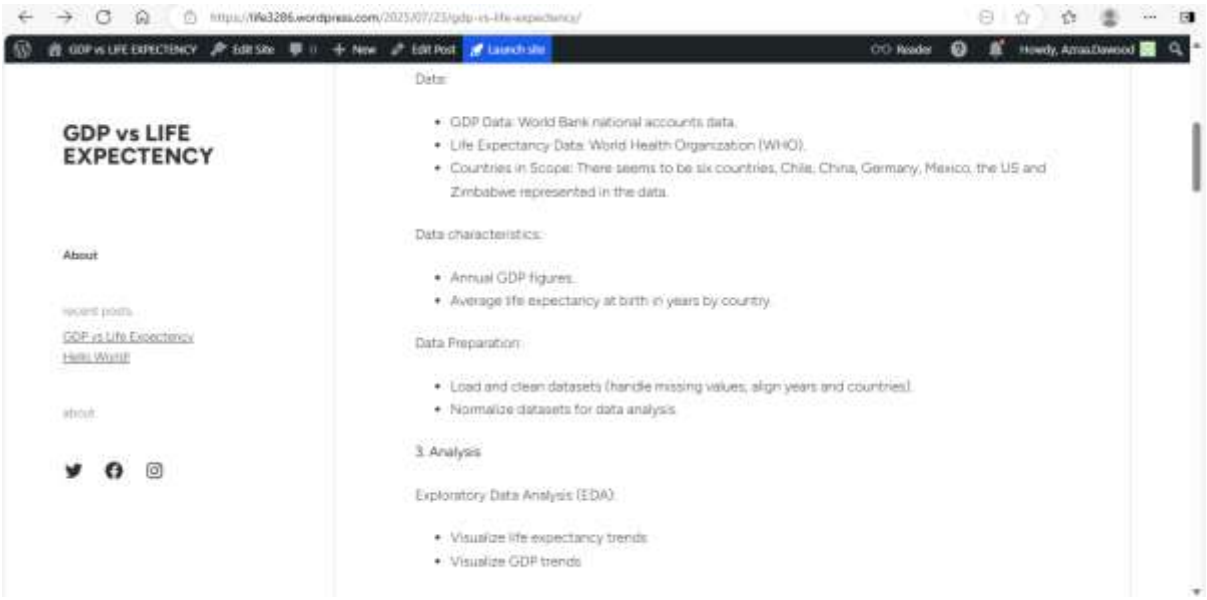
- What is the distribution of that life expectancy?

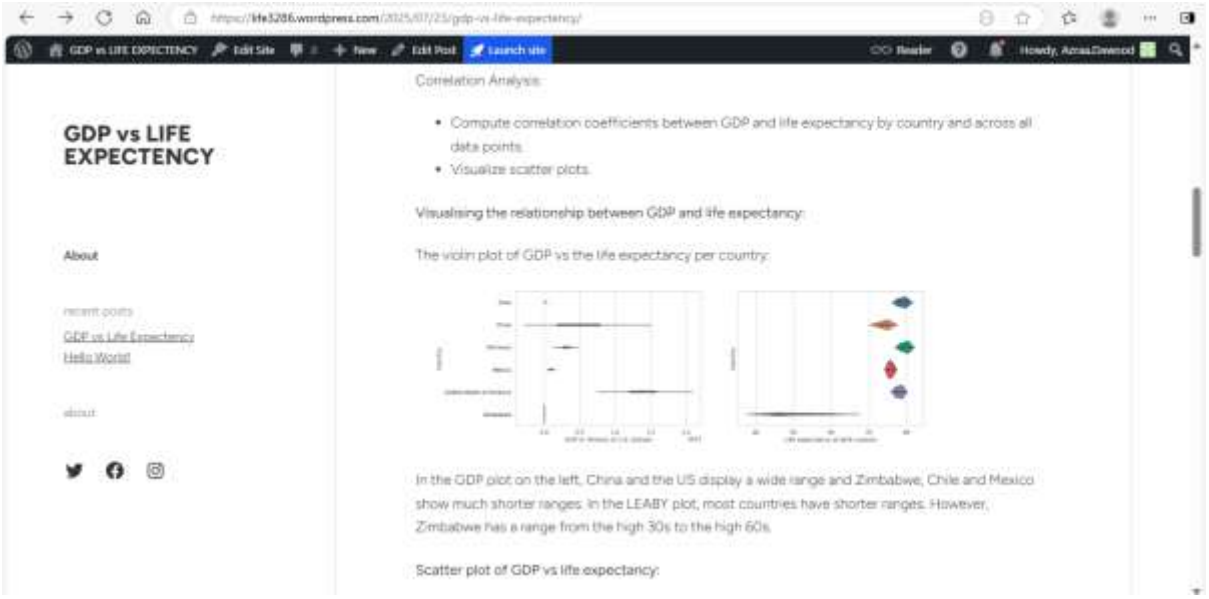
The life expectancy had a left skew or most of the observations were on the right side.

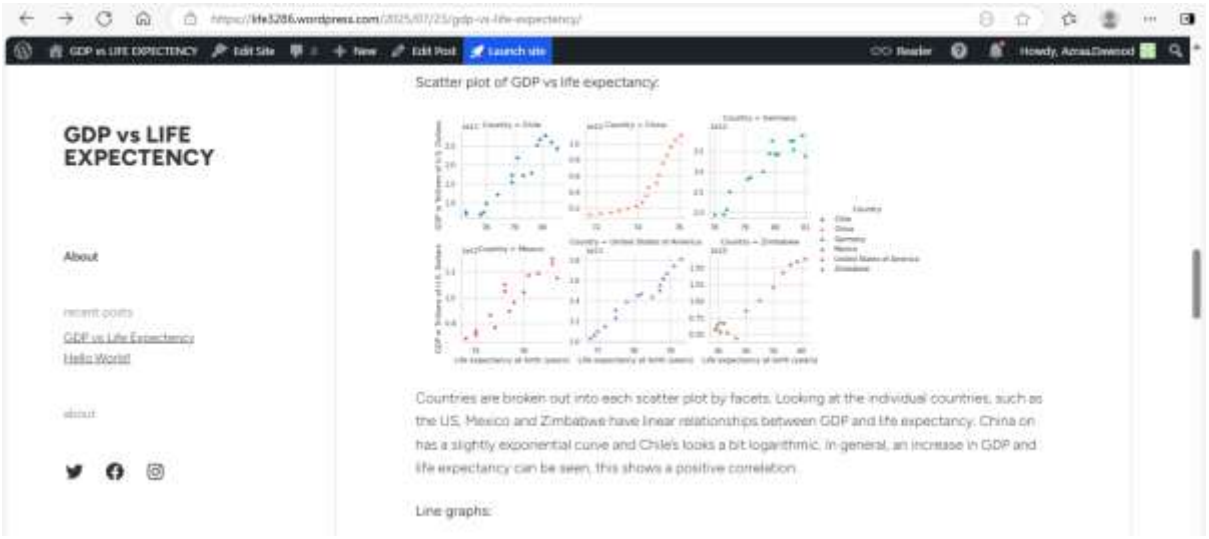
Overall, the analysis supports the hypothesis, which is that economic development is linked to better health outcomes.

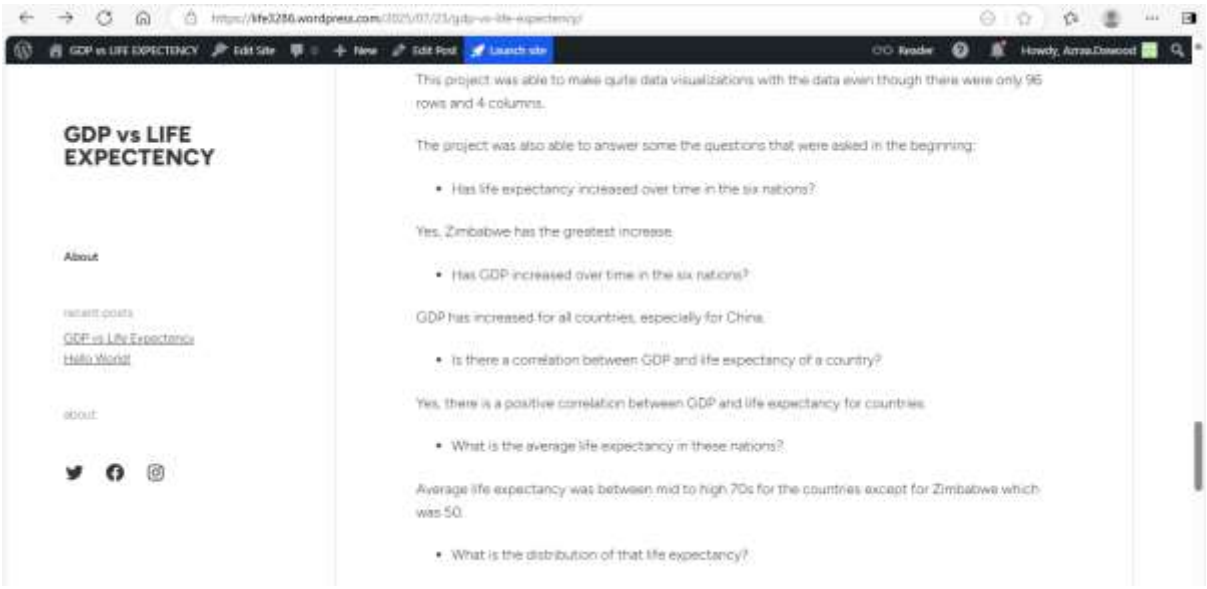
Blog:

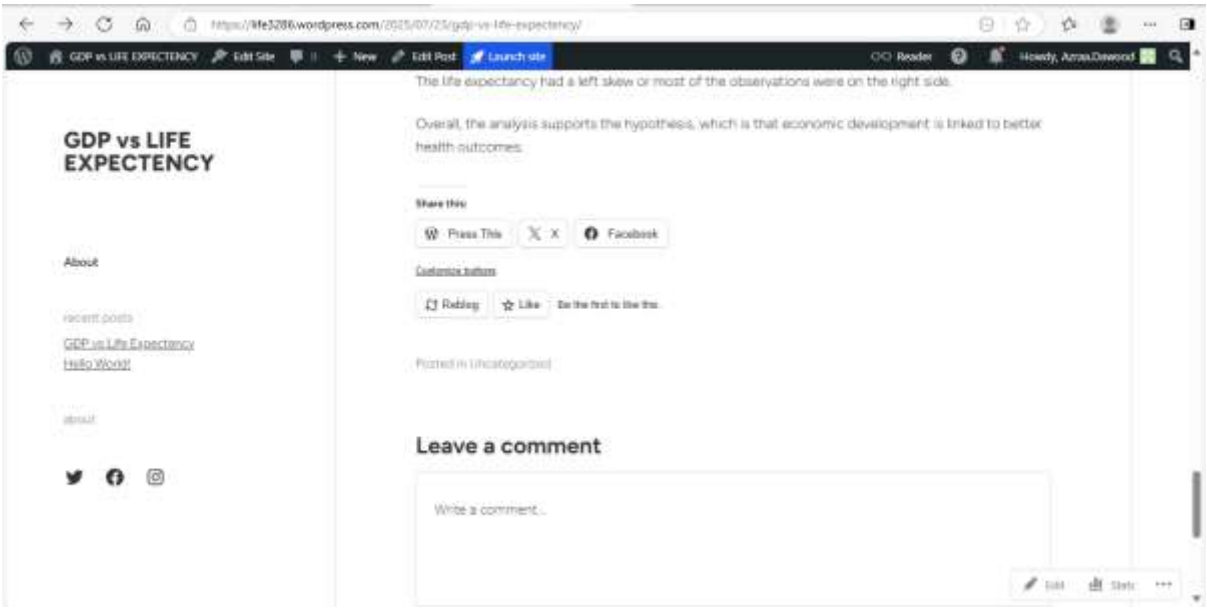
https://life3286.wordpress.com/2025/07/23/gdp-vs-life-expectency/











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https://github.com/azraadawood/GDPvsLifeExpectency