

Life Expectancy and GDP per capita Analysis_ Amsayaw Tefera_ October _21_ 2025

This assignment explores the **relationship between economic prosperity and health outcomes** by analyzing two key global development indicators:

REPORT: RELATIONSHIP BETWEEN LIFE EXPECTANCY (LEX) AND GDP PER CAPITA (2020)

1. DATA OVERVIEW

- GDP per Capita Dataset: 193 countries with data from 1800-2100
- Life Expectancy Dataset: 194 countries with data from 1800-2100
- Analysis Year: 2020
- Countries with complete data in 2020: 193

2. DESCRIPTIVE STATISTICS (2020)

GDP per Capita:

- Minimum: \$387 (Burundi)
- Median: \$12,408
- Mean: \$19,943
- Maximum: \$207,845 (Qatar)

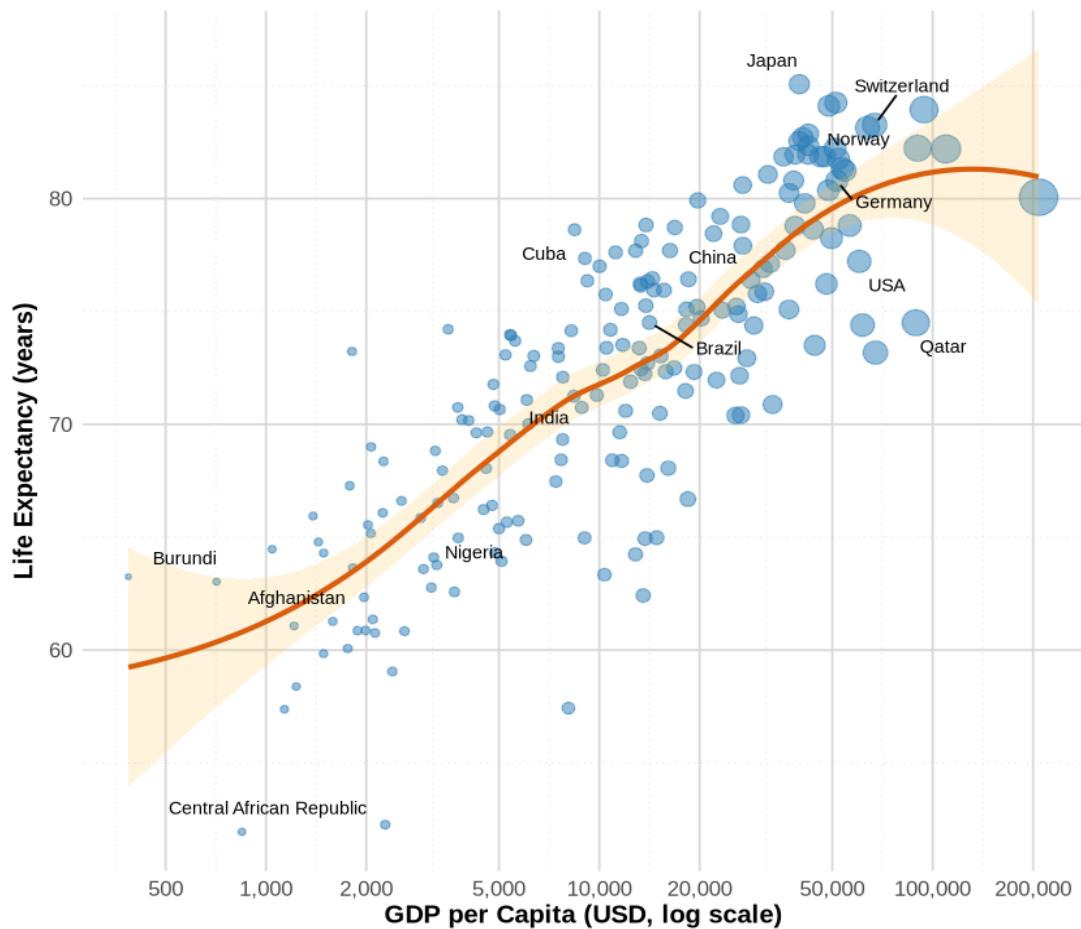
Life Expectancy:

- Minimum: 51.95 years (Central African Republic)
- Median: 72.70 years
- Mean: 72.06 years
- Maximum: 85.07 years (Hong Kong)

3. STATISTICAL RELATIONSHIP

GDP per Capita vs Life Expectancy (2020)

Each point represents a country | Logarithmic scale for GDP



Data sources: Gapminder | n = 193 countries

- Pearson Correlation: 0.6205 (strong positive correlation)
- R-squared (log-linear model): 0.6678

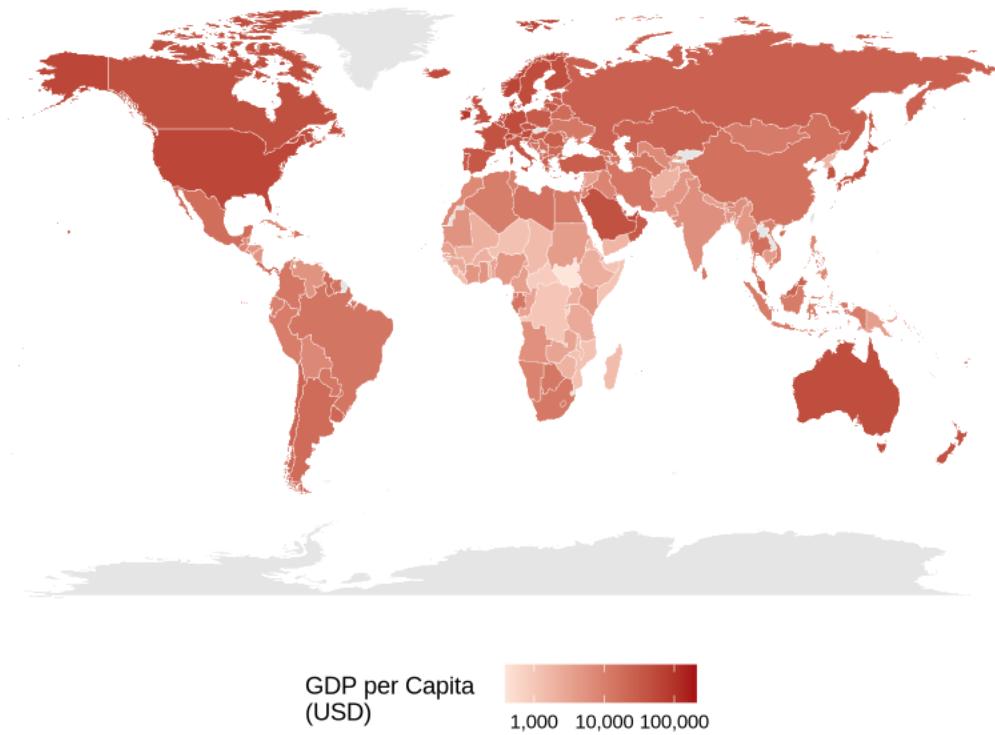
Interpretation: This means 66.78% of the variation in life expectancy can be explained by GDP per capita

- Regression equation: Life Expectancy = $28.25 + 10.87 \times \log_{10}(\text{GDP per Capita})$
- Statistical significance: p-value < 2.2e-16 (highly significant)

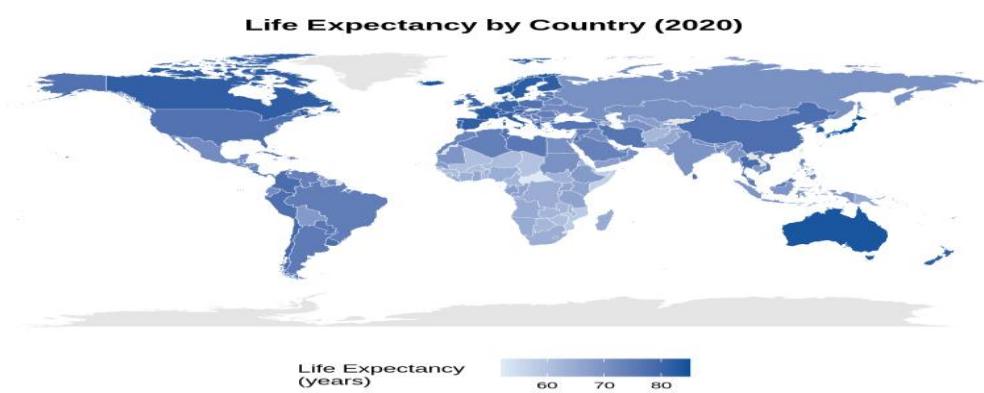
4. KEY FINDINGS

GDP per Capita Map:

GDP per Capita by Country (2020)



Life Expectancy Map:



a) Strong Positive Relationship:

- Countries with higher GDP per capita tend to have higher life expectancy
- The relationship is logarithmic: gains in life expectancy diminish at higher GDP levels

b) High Performers (High GDP & High Life Expectancy):

- Switzerland: \$67,022 GDP, 83.27 years
- Austria: \$52,148 GDP, 81.76 years
- Iceland: \$51,241 GDP, 84.25 years
- Ireland: \$90,137 GDP, 82.23 years

c) Low Performers (Low GDP & Low Life Expectancy):

- Burundi: \$711 GDP, 63.03 years
- Central African Republic: \$847 GDP, 51.95 years
- Congo, Dem. Rep.: \$1,044 GDP, 64.47 years

d) Notable Outliers:

- Oil-rich nations with high GDP but lower life expectancy:
 - Qatar: \$88,988 GDP, 74.5 years
 - UAE: \$67,384 GDP, 73.18 years
 - Saudi Arabia: \$44,279 GDP, 73.5 years
- Countries achieving high life expectancy despite lower GDP:
 - Cuba: \$8,429 GDP, 78.62 years
 - Jordan: \$9,057 GDP, 77.35 years
 - Jamaica: \$9,208 GDP, 76.36 years

5. INTERPRETATION

The analysis reveals a strong positive relationship between economic prosperity and health outcomes. However, the logarithmic nature of this relationship suggests that:

- At lower income levels, increases in GDP have substantial impacts on life expectancy
- At higher income levels, additional wealth yields diminishing returns in longevity
- Beyond approximately \$30,000-40,000 GDP per capita, other factors (healthcare systems, lifestyle, social policies) become more important determinants of life expectancy

The outliers demonstrate that GDP is not the sole determinant:

- Some wealthy nations (particularly oil-dependent economies) underperform on health
- Some middle-income countries (like Cuba) achieve exceptional health outcomes through effective public health systems and social policies

6. RECOMMENDATIONS

For Policymakers:

1. Economic Development Priority: For low-income countries, economic growth should remain a priority as it strongly correlates with improved health outcomes
2. Healthcare Investment: Middle-income countries should focus on healthcare infrastructure and public health systems to maximize health gains from economic growth
3. Beyond GDP: High-income countries should focus on healthcare quality, preventive care, and social determinants of health rather than purely economic growth
4. Learn from Outliers: Study successful middle-income countries (e.g., Cuba, Costa Rica) to understand how effective healthcare systems can achieve high life expectancy with moderate resources

For Researchers:

5. Further Investigation: Examine the specific factors that allow some countries to outperform their income level (healthcare spending, universal coverage, education)
6. Temporal Analysis: Investigate how this relationship has evolved over time and whether it's changing in the modern era
7. Regional Variations: Conduct region-specific analyses to understand local factors affecting the GDP-health relationship

For International Organizations:

8. Targeted Aid: Focus development assistance on countries in the low GDP, low life expectancy quadrant where interventions can have maximum impact
9. Best Practice Sharing: Facilitate knowledge transfer from high-performing middle-income countries to others at similar economic levels
10. Holistic Development: Promote development strategies that balance economic growth with investments in health, education, and social infrastructure

7. CONCLUSION

While GDP per capita is a strong predictor of life expectancy, explaining about 67% of the variation across countries, the relationship is complex and non-linear. The most effective development strategies will combine economic growth with targeted investments in healthcare and social systems, particularly for low and middle-income nations.

What Was Easy?

Data structure, problems and statistical methods we applied are not complex

What Was Difficult?

Inconsistency naming and understanding mapping results

What Was Surprising?

Some results are apart from real world problems

What Did I Learn?

AI is very super data analyst assistance in the world. Before analysis understanding the business, problems and data cleaning and checking with real world problems is very helpful.