Health, Happiness, and Prosperity

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Project Goals

- Explore various global country performance metrics and information
- Compare results between our datasets
- Merge multiple datasets by country to compare & contrast different aspects of well-being
- Focus on how healthcare impacts quality of life around the world
- Investigate specific factors of healthcare access and how it impacts lives globally

World Happiness Report

The World Happiness Report uses a combination of surveys from the Gallup World Poll as well as statistics from the World Development Indicators and World Health Organization.

- Happiness dataset factors are more general:
  - 'Logged GDP per Capita', 'Social Support', '**Healthy Life Expectancy'**, 'Freedom to Make Life Choices', 'Generosity', 'Perceptions of Corruption'
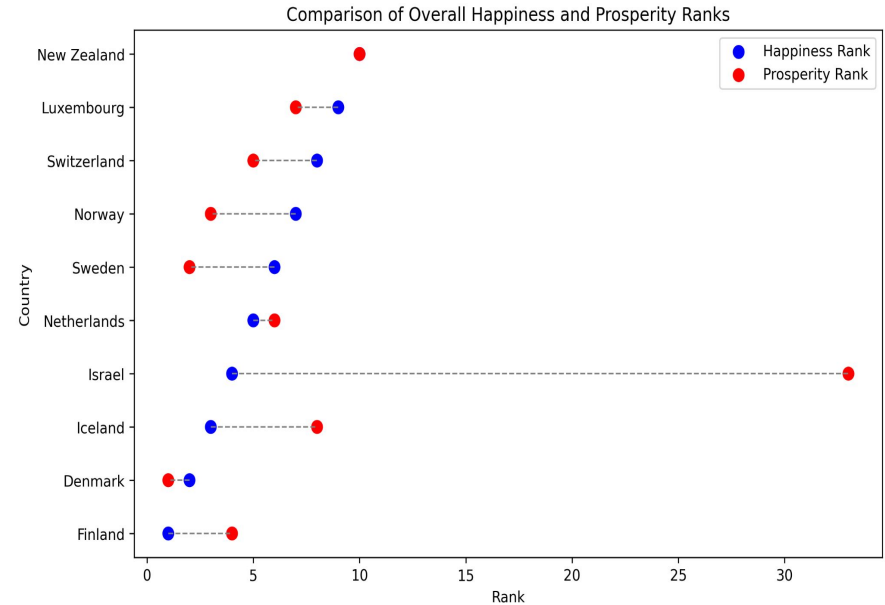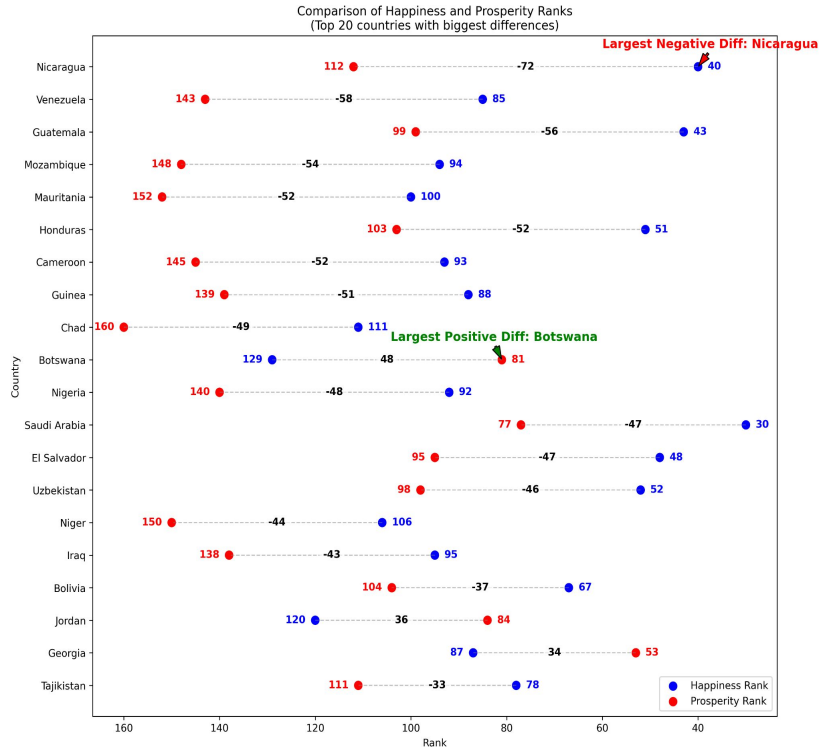- ➔ Comparison to fictional country "Dystopia"

Global Country Development & Prosperity Index

The 2023 Global Country Development & Prosperity Index, produced by the Legatum Institute, uses "67 discrete policy focused elements" which are a combination of expert surveys, various international reporting sources and databases, including the Gallup poll.

- Prosperity Index has a broader range, including a focus on economics. Columns include:
  - 'Safety/Security', 'Personal Freedom', 'Governance',
  - 'Social Capital', 'Investment Environment', 'Enterprise Conditions', 'Market Access/Infrastructure', 'Economic Quality'
  - 'Living Conditions', '**Health**', 'Education', 'Natural Environment'

How do Overall Happiness and Prosperity scores differ?

Comparison of Happiness and Prosperity Ranks
(Top 20 countries with biggest differences)

Comparison of Overall Happiness and Prosperity Ranks

More Datasets

- Global Country Information Dataset 2023
  - https://www.kaggle.com/datasets/nelgiriyewithana/countries-of-the-world-2023
  - "...covering a wide range of indicators and attributes. It encompasses demographic statistics, economic indicators, environmental factors, healthcare metrics, education statistics…"
  - "Multiple data sources"

- Global Hospital Dataset
  - https://www.kaggle.com/datasets/alitaqi000/world-hospital-rankings-2023
  - https://hospitals.webometrics.info/en/world
  - " is a comprehensive collection of information on 20,000 hospitals located across the world"

Data Gathering & Processing

Challenges

- Examining Data Sources:
  - Understanding Surveys, Weighted Data
  - From where is our source sourced?
- Data Cleaning:
  - Missing Values
  - Each Country not in every dataset
  - Normalizing Values
  - "\xa0" - a non-breaking space in Unicode
- Data Integration:
  - Combining Datasets
- Visualization Complexity:
  - Exploring visualization techniques outside of class
  - Customizing for clarity
-

Is Health a Primary Factor?

- Both happiness and prosperity datasets contain one or more columns related to health
- Both have a significant emphasis on economics as well, but in a strong sense, health supersedes economics as an individual
  - Wealth and economic success is meaningless if one is not alive to reap the rewards
  - Likewise, one must be healthy to work productively
  - Better access to healthcare improves upon one's living conditions

This is a heatmap that shows the correlation between health, living conditions, prosperity score, and happiness ladder score

Correlation Heatmap
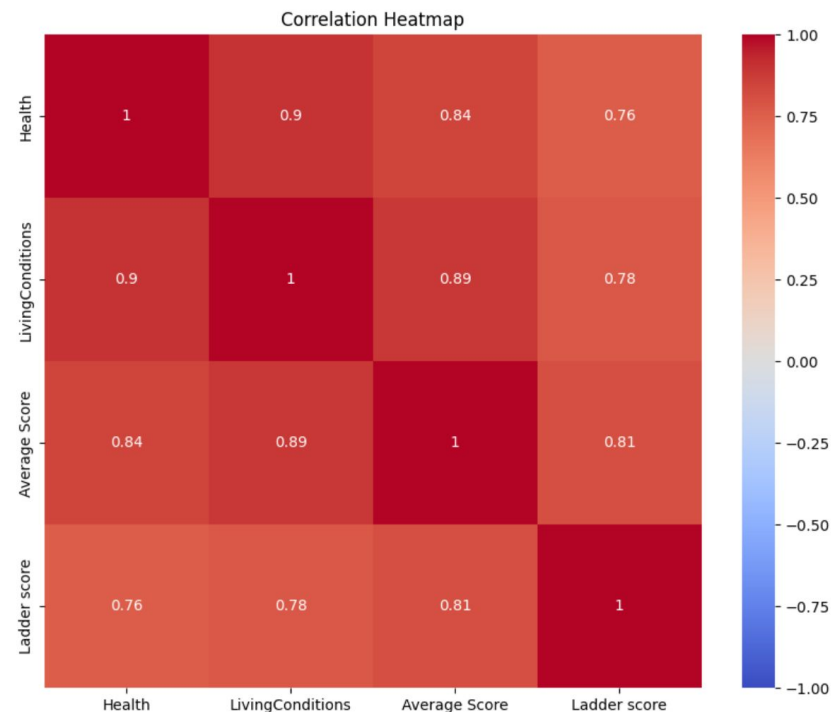
Can Health and Prosperity be related?

This is a line plot that showcases the similarity between Health Score from the Prosperity dataset and Healthy Life Expectancy from the Happiness dataset with Overall Score in the Prosperity dataset.

Health Score and Healthy Life Expectancy vs Overall Prosperity Score
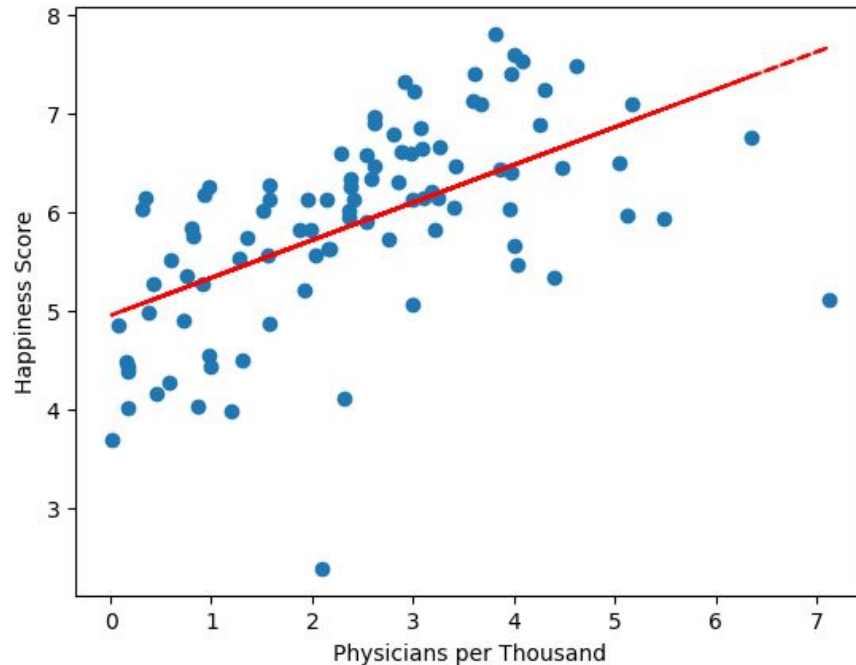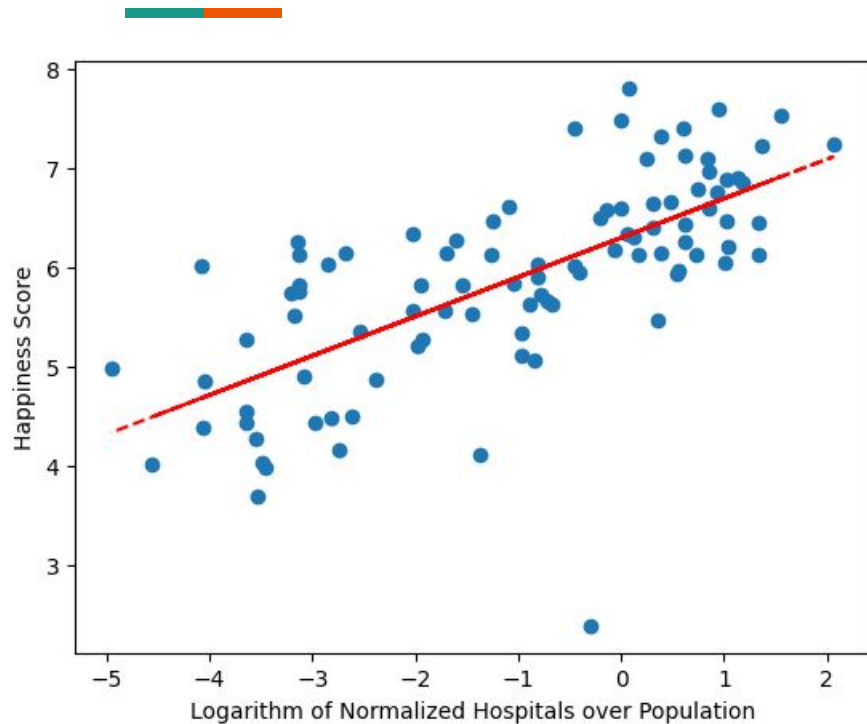
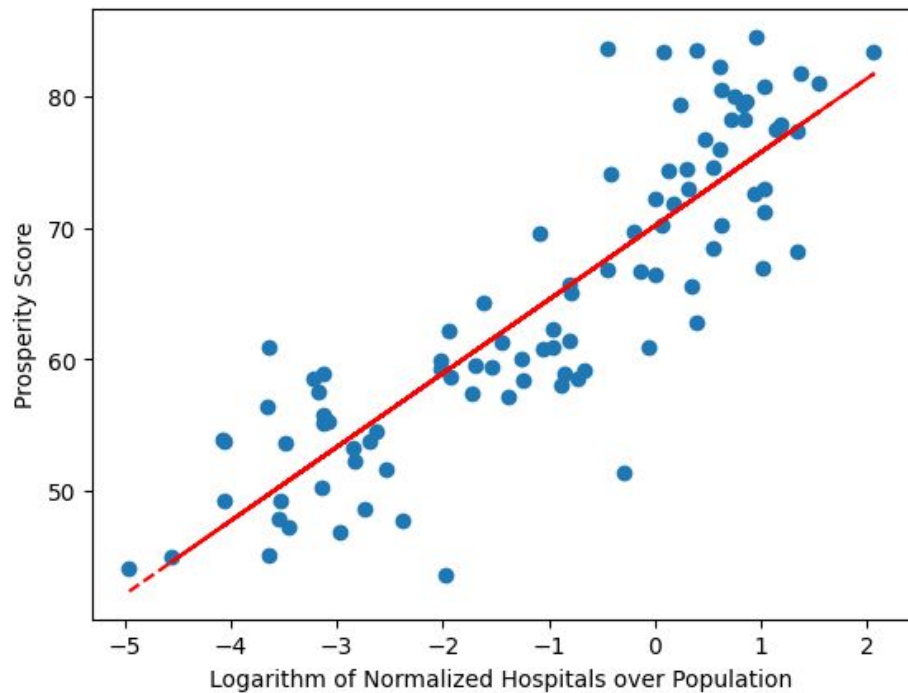# Focusing on Access to Quality Healthcare

Primary Factors:

- Availability of hospitals with sufficient facilities
- Number of physicians per thousand people

Lack of access impacts primary healthcare outcomes, such as life expectancy, infant mortality, and maternal mortality. We were able to gather these measurements and the physicians per thousand from the global information dataset. From the global hospital rankings, we grouped them by country and divided the count by the population to calculate the relative access to quality facilities.

Overall Happiness Score over Healthcare Access Metrics

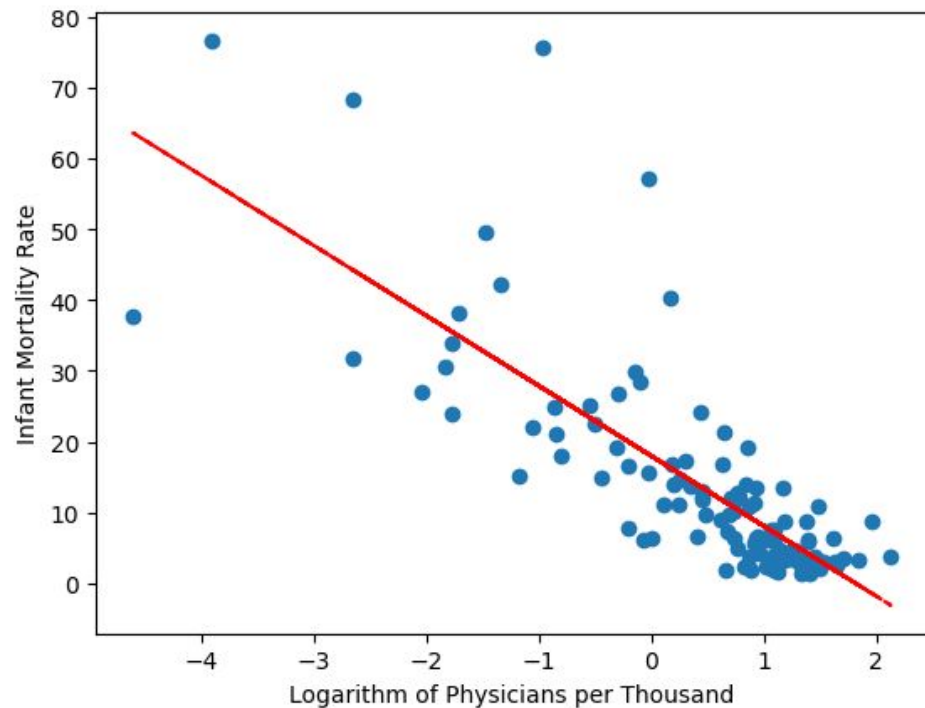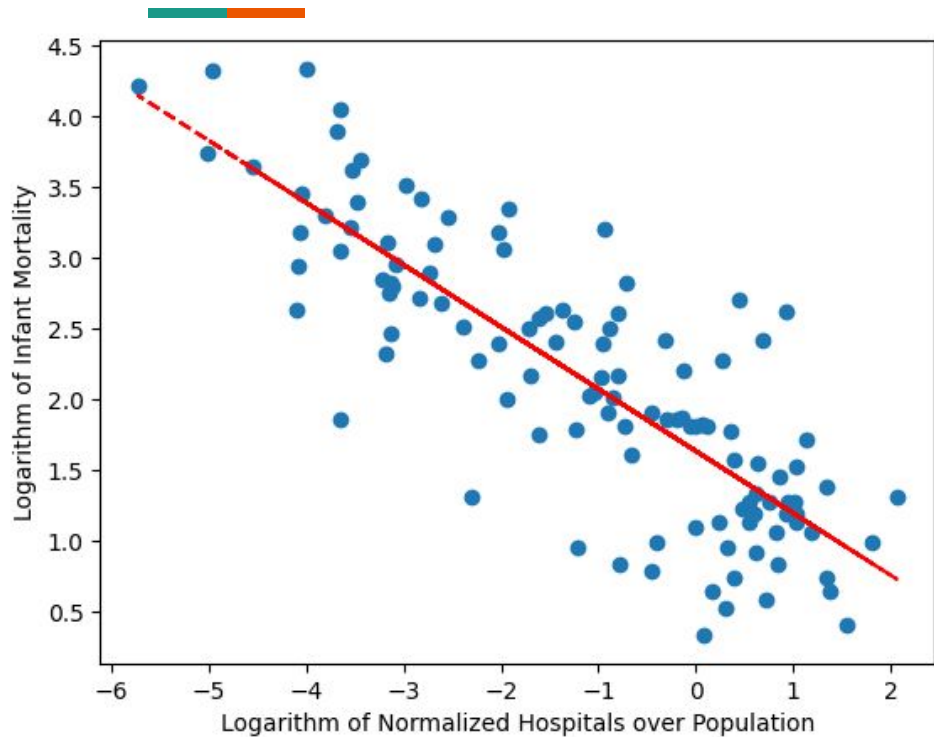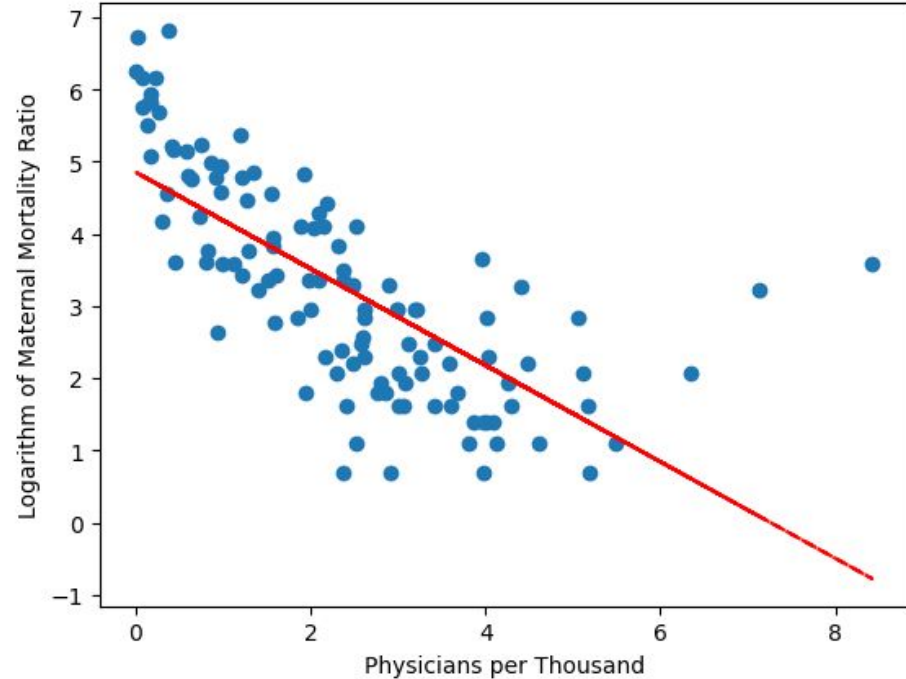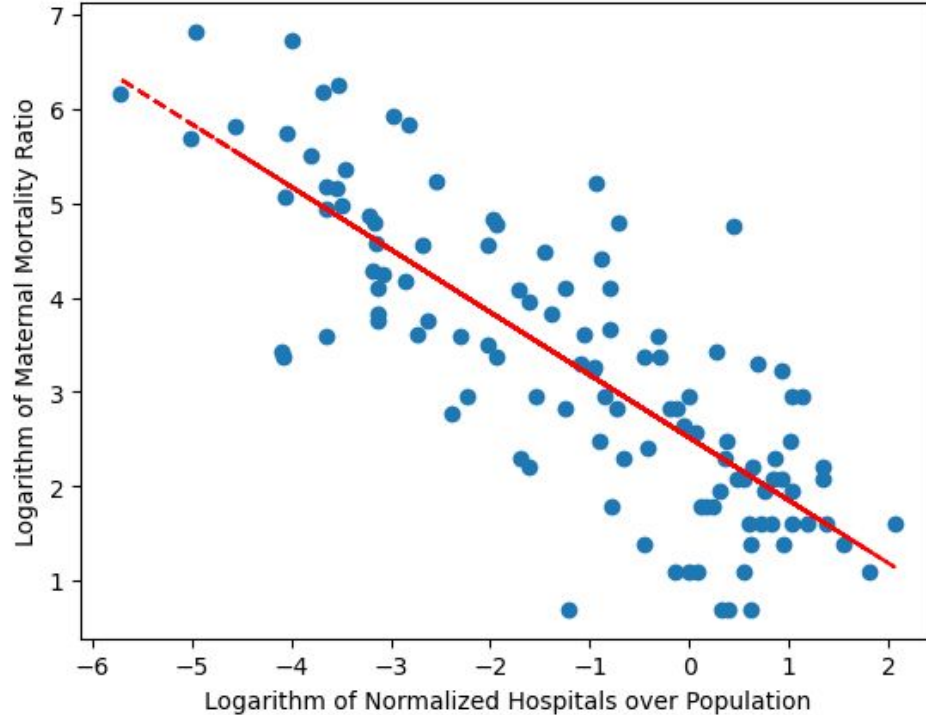# Overall Prosperity Score over Healthcare Access Metrics
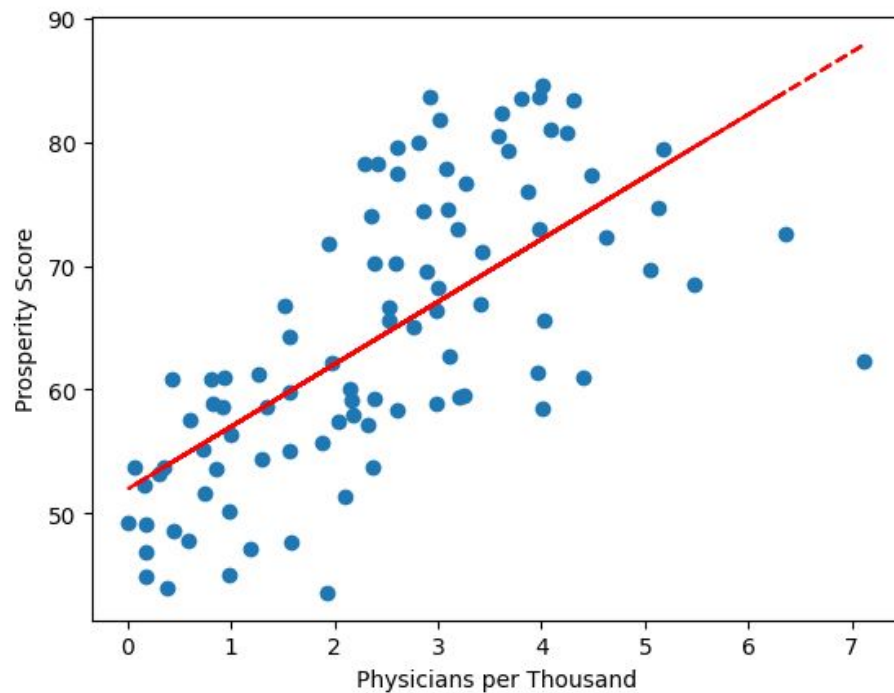
Measurable Outcomes

- How is access to quality healthcare borne out in the data?
- We chose the following primary factors of public health:
  - Infant mortality rate
  - Maternal mortality ratio
  - Life expectancy
- We compared these first to our measures of healthcare access, which are the most directly linked in practice, as well as the happiness and prosperity scores
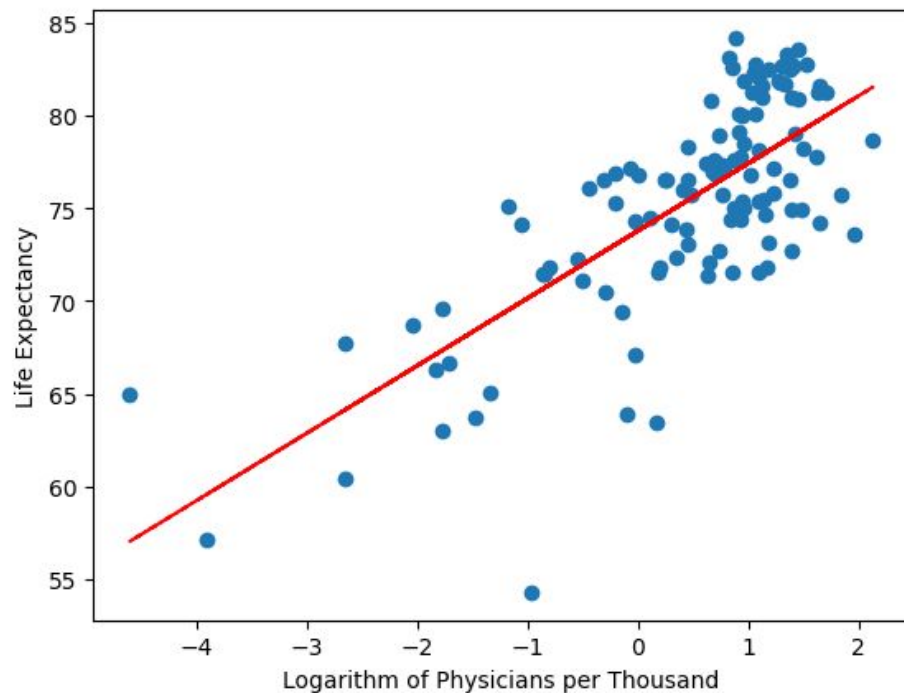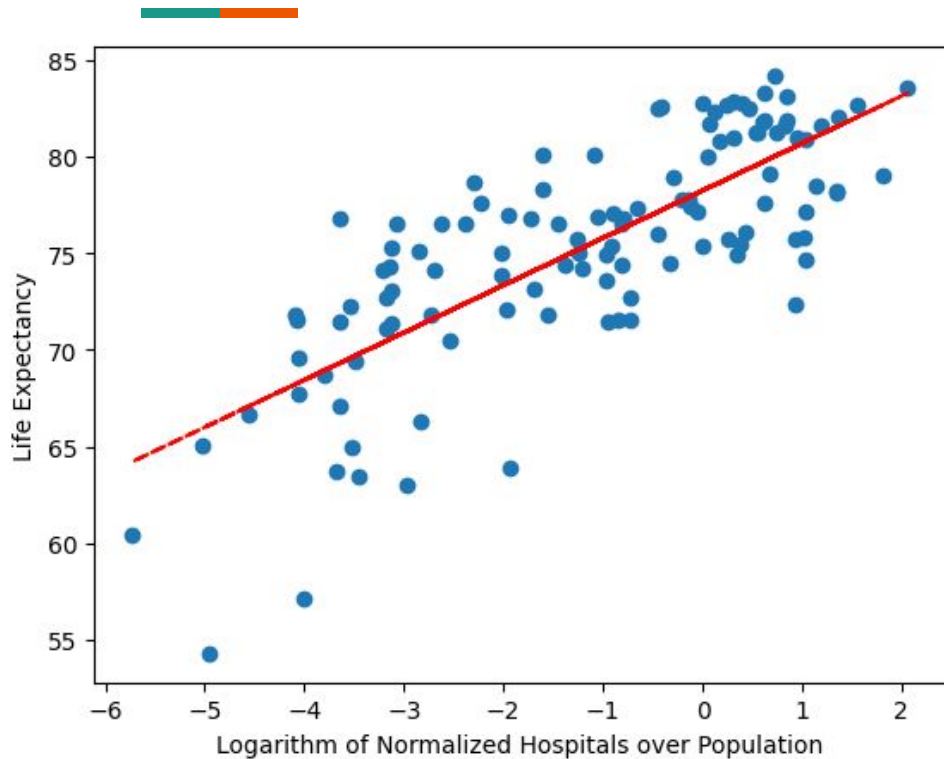
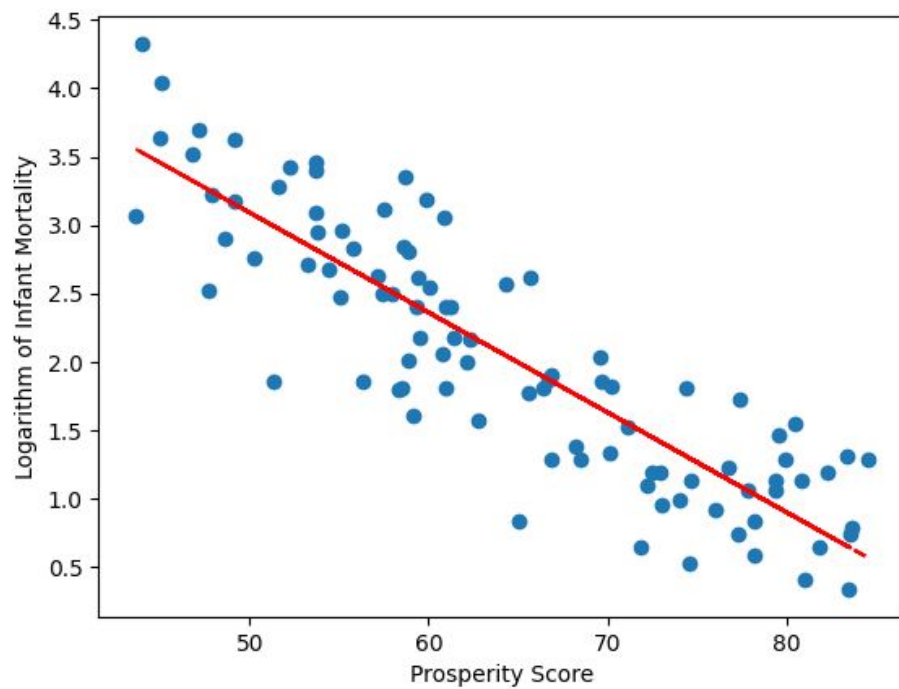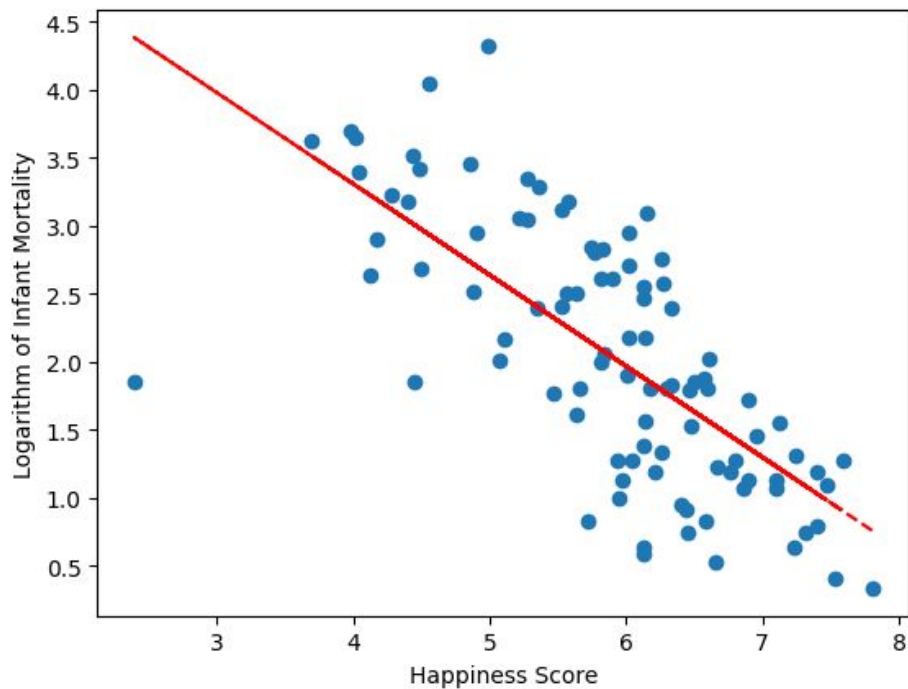# Infant Mortality Rates over Healthcare Access Metrics

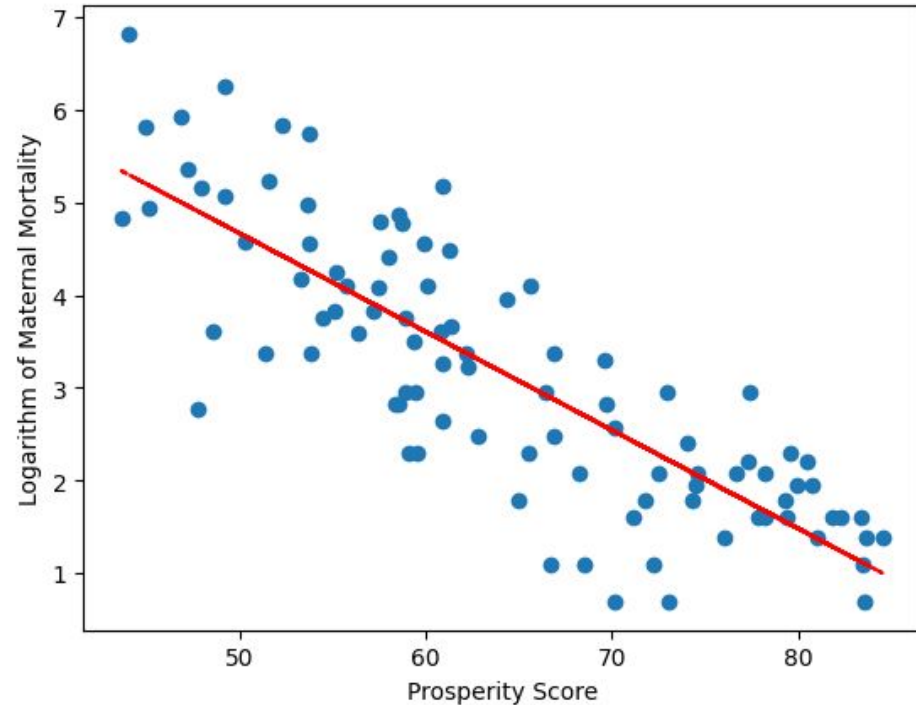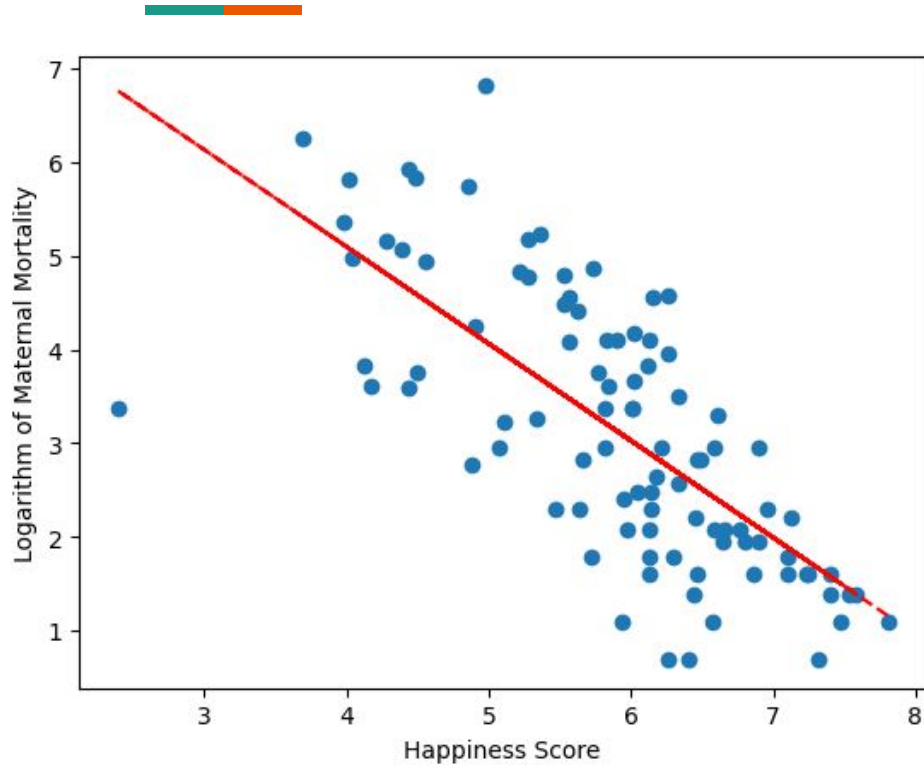# Maternal Mortality Rates over Healthcare Access Metrics

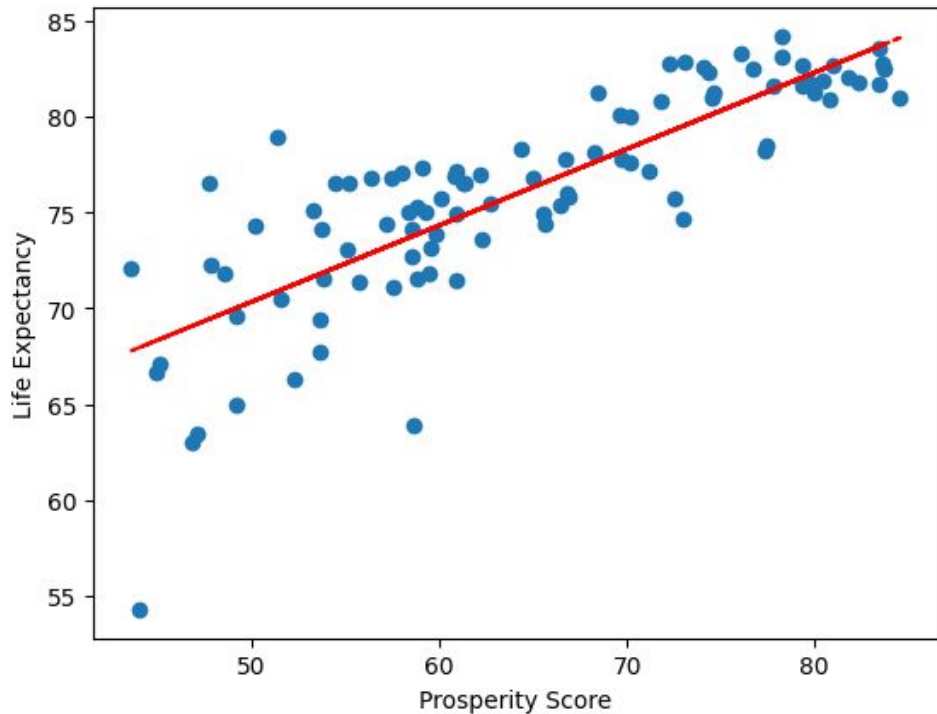# Healthy Life Expectancy over Healthcare Access Metrics

Infant Mortality Rates over Overall Happiness & Prosperity Scores

Maternal Mortality Rates over Overall Happiness & Prosperity Scores

Healthy Life Expectancy over Overall Happiness & Prosperity Scores
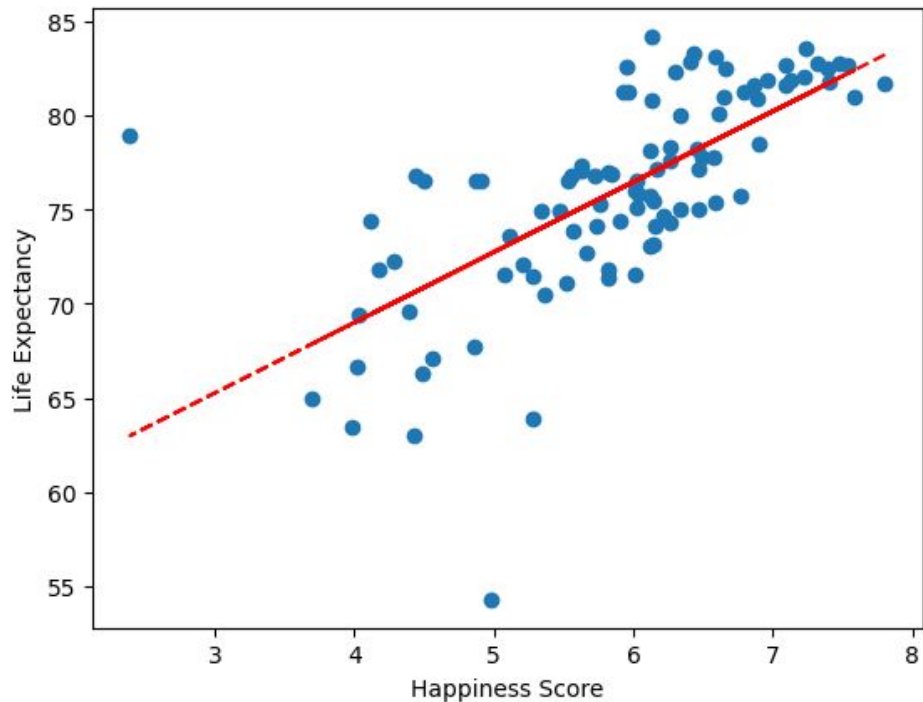
Outliers & Commonalities

- There is so much more which could be explored in the data, but we wanted to show some of the interesting groupings of highest and lowest scoring countries across the data
- This helps to illustrate and put names to some of the interesting outliers in otherwise anonymous scatter plots, as well as potentially give insight into regional or cultural similarities

Bottom 30 Countries Overlap in Health Metrics

Physicians per thousand

Infant mortality

Maternal mortality ratio

9

5

6

14

2

5

9

Countries in all three:

Central African Republic
Chad
Eswatini
Guinea
Lesotho
Liberia
Liechtenstein
Nauru
North Macedonia
Palestinian National Authority
Sierra Leone
Somalia
South Sudan
Vatican City

Top 30 Countries Overlap in Health Metrics

Physicians
per thousand

Infant
mortality

Maternal
mortality ratio

10

4

5

13

3

8

6

Countries in all three:

Australia
Austria
Belarus
Czech Republic
Finland
Germany
Iceland
Israel
Italy
Lithuania
Netherlands
Spain
Sweden

Overlap between countries scoring highest in Health and Overall Happiness Score
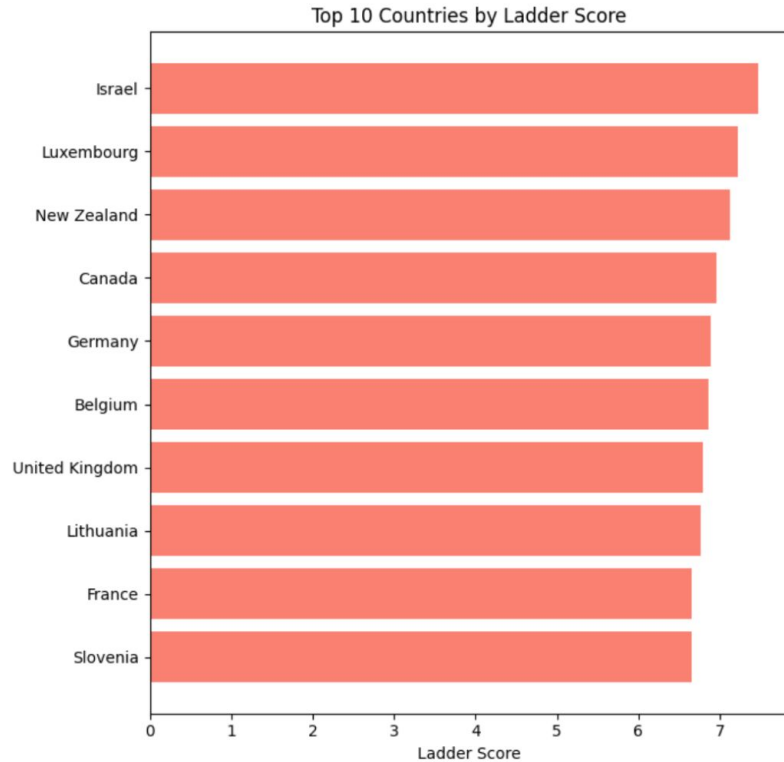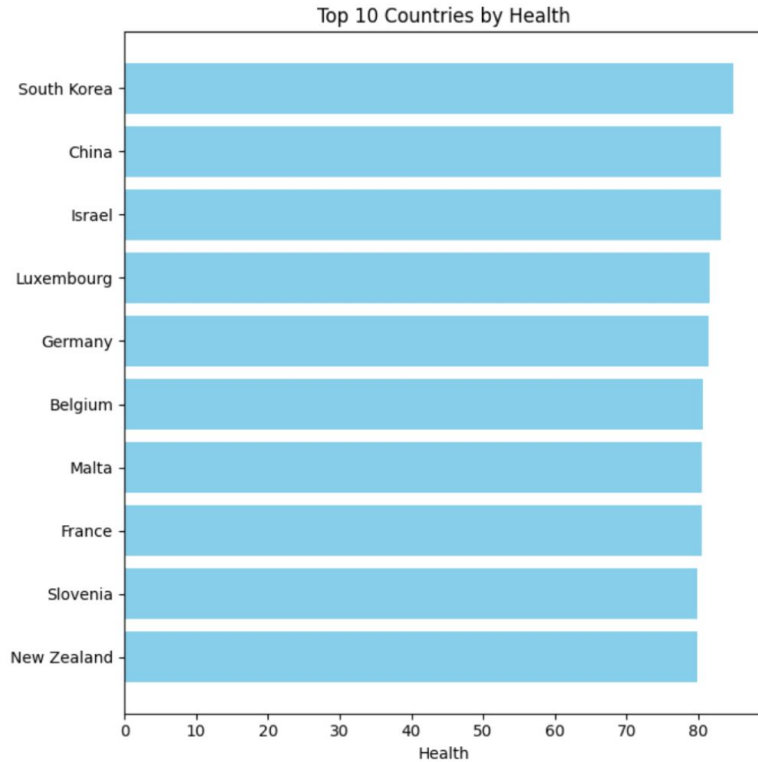
Similarly, we can also see an overlap with countries scoring the highest in health as well as happiness ladder scores. Those countries are **Luxembourg, Germany, Belgium, France, Slovenia,** and **New Zealand.**
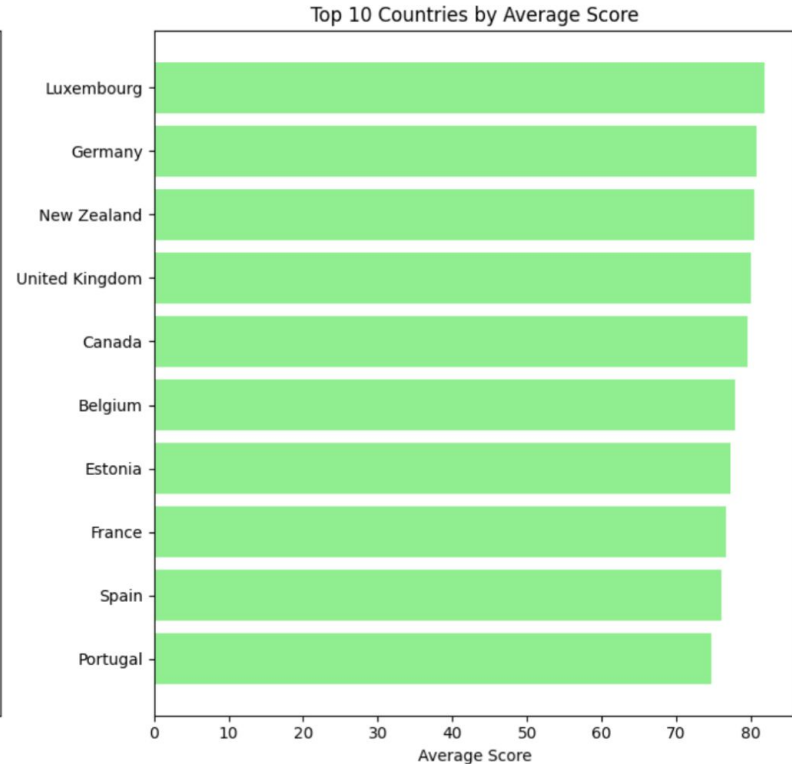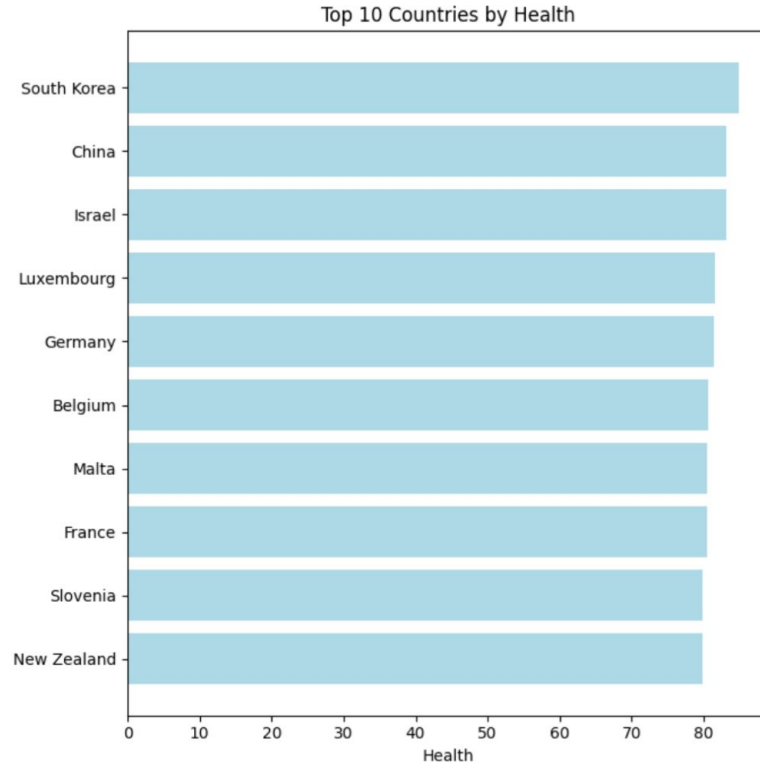
Overlap between countries scoring highest in Health and Overall Prosperity Score

Top 10 Countries by Health

Country	Health
South Korea	
China	
Israel	
Luxembourg	
Germany	
Belgium	
Malta	
France	
Slovenia	
New Zealand	

Top 10 Countries by Average Score

Country	Average Score
Luxembourg	
Germany	
New Zealand	
United Kingdom	
Canada	
Belgium	
Estonia	
France	
Spain	
Portugal	

Luxembourg, New Zealand, Belgium, and **France** are among the countries scoring highest in health and prosperity scores. This indicates that health is an important factor that positively influences prosperity.

These bar graphs show an overlap between countries that scored lowest in Health Life Expectancy and Overall Happiness Score

Bottom 10 Countries by Healthy life expectancy

Bottom 10 Countries by Ladder score
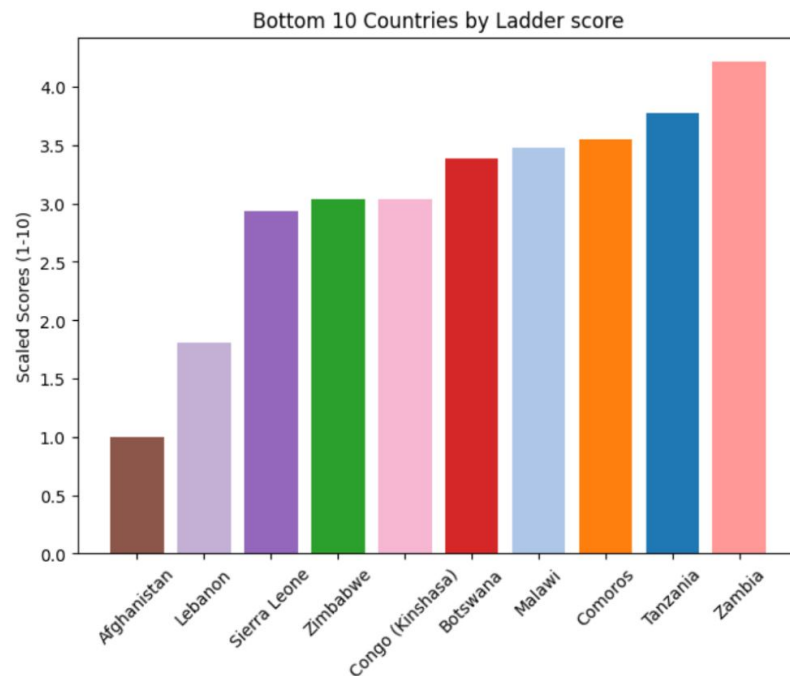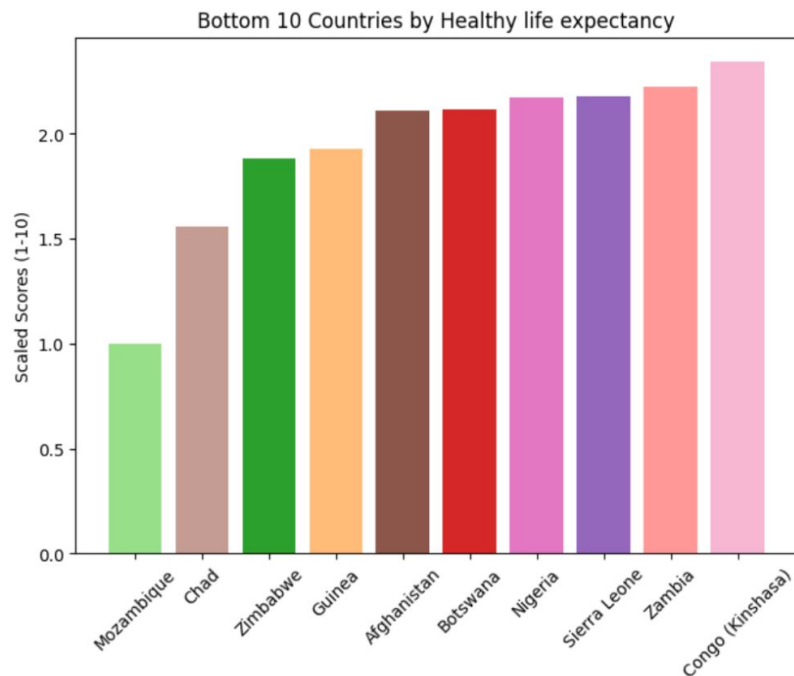
Six out of the ten lowest scoring countries overlapped:

Afghanistan, Botswana, Congo, Sierra Leone, Zambia, and **Zimbabwe.**

Data Sources

- 2023 Global Country Development & Prosperity Index
  - https://www.kaggle.com/datasets/tarktunataalt/2023-global-country-development-and-prosperity-index

- World Happiness Report 2023
  - https://www.kaggle.com/datasets/ajaypalsinghlo/world-happiness-report-2023

- Global Country Information Dataset 2023
  - https://www.kaggle.com/datasets/nelgiriyewithana/countries-of-the-world-2023

- Global Hospital Dataset
  - https://www.kaggle.com/datasets/alitaqi000/world-hospital-rankings-2023