Heart Disease around the World

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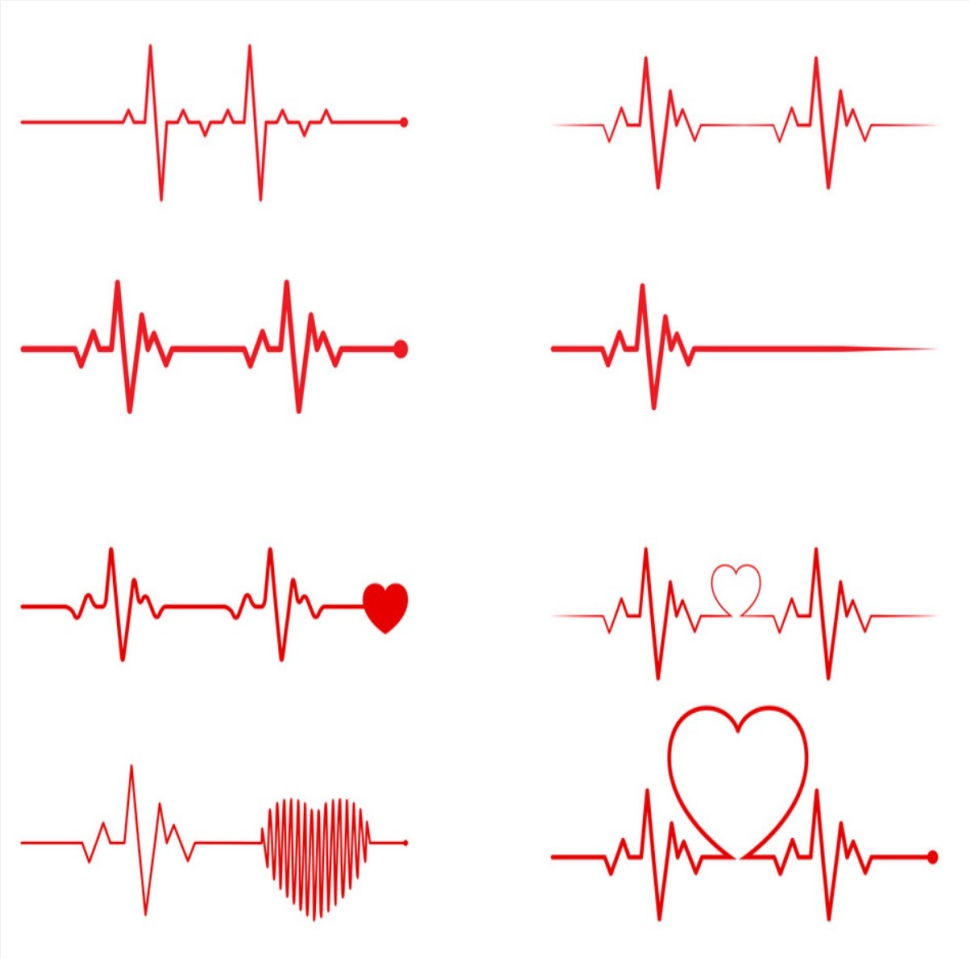

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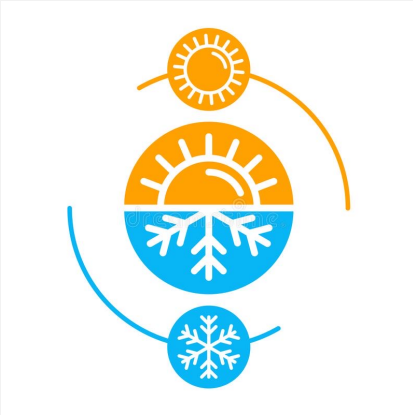
Team 09

Research Idea

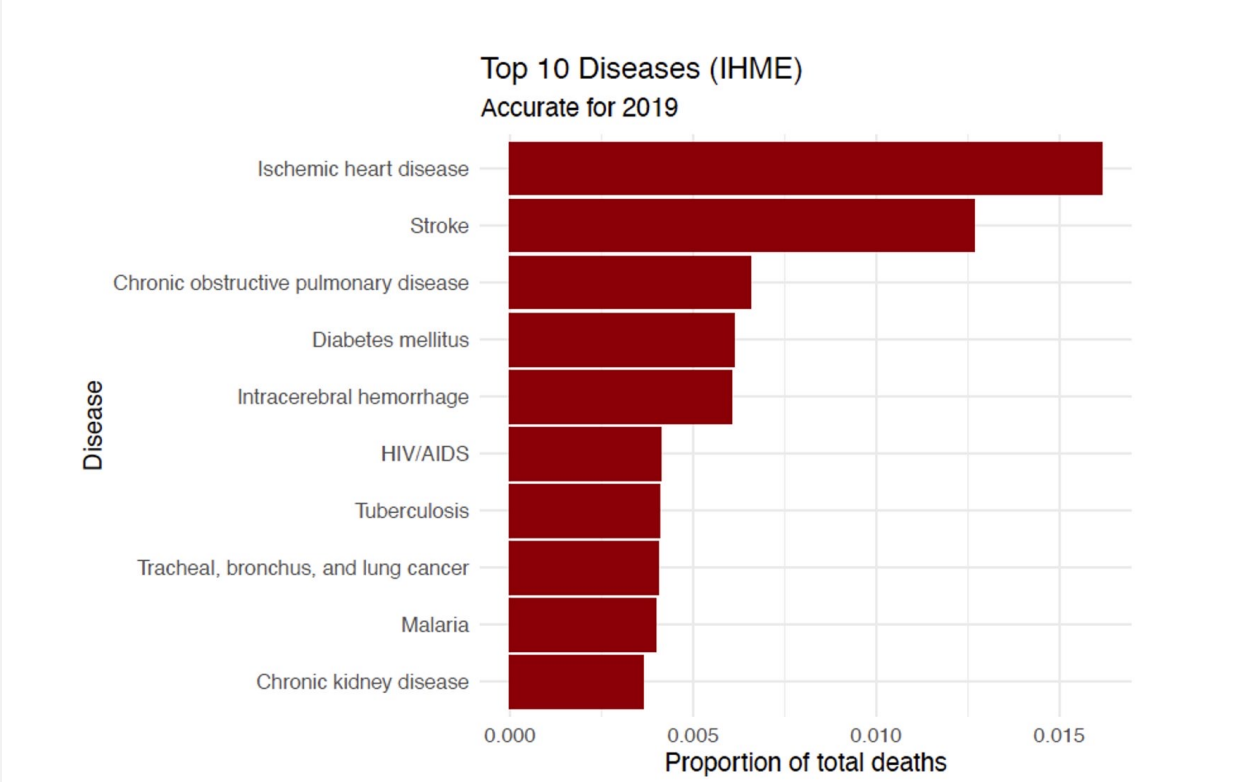
- The goal of our project was to look at mortality due to heart disease from multiple key standpoints:
  - Climate
  - Political Freedom
  - Economic Indicators



- Central question: How is heart disease mortality related to these variables, if at all?
- We also wanted to see if we could make predictions about future heart disease mortality rates.

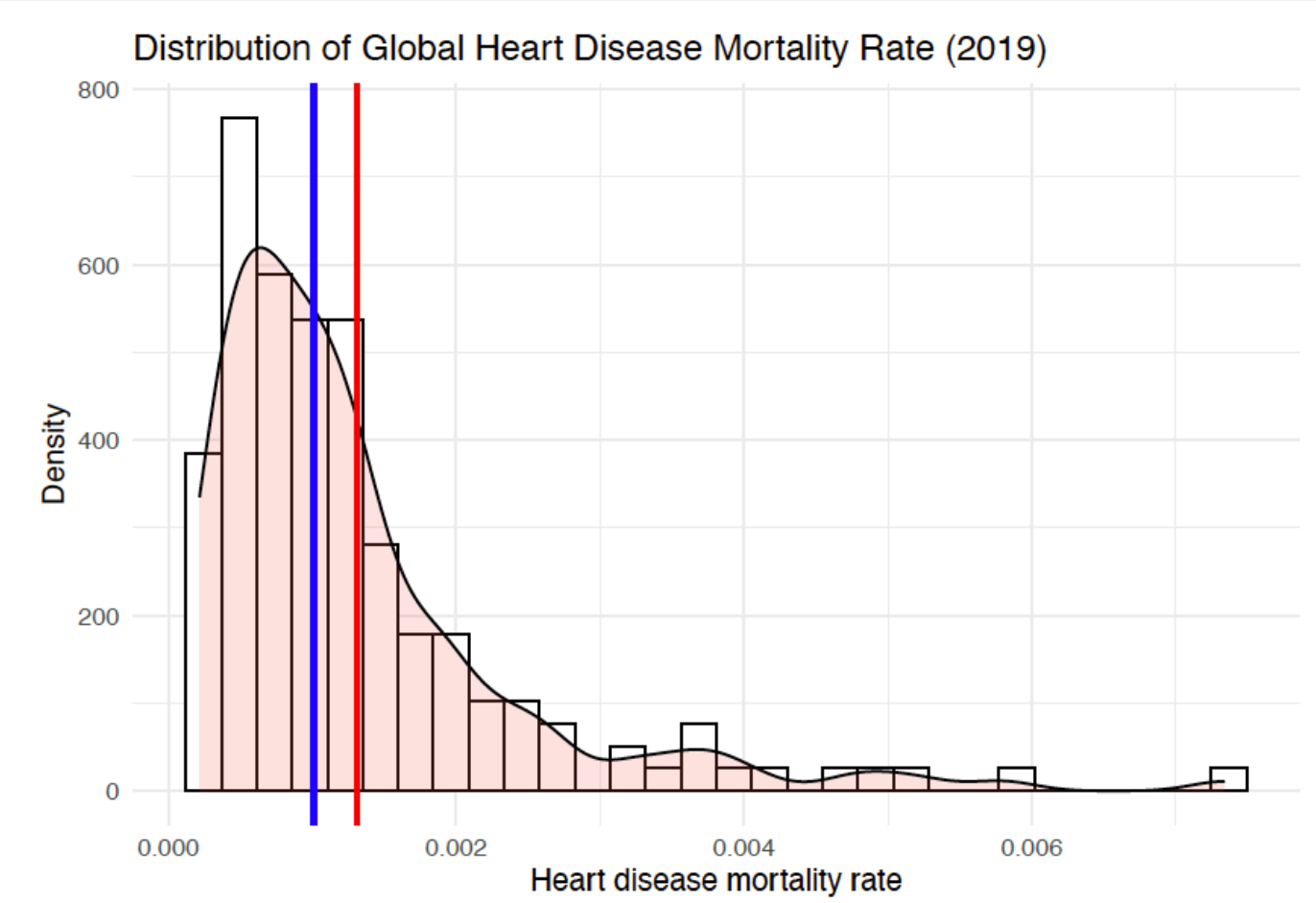
Which disease is the deadliest?

- We first looked at cause of death data from the Institute for Health Metrics and Evaluation (IHME)
- The goal was to find the disease responsible for the most mortality in the world
- Found that ischemic/coronary heart disease is the #1 killer:
  - Responsible for around 1.6% of all deaths in 2019

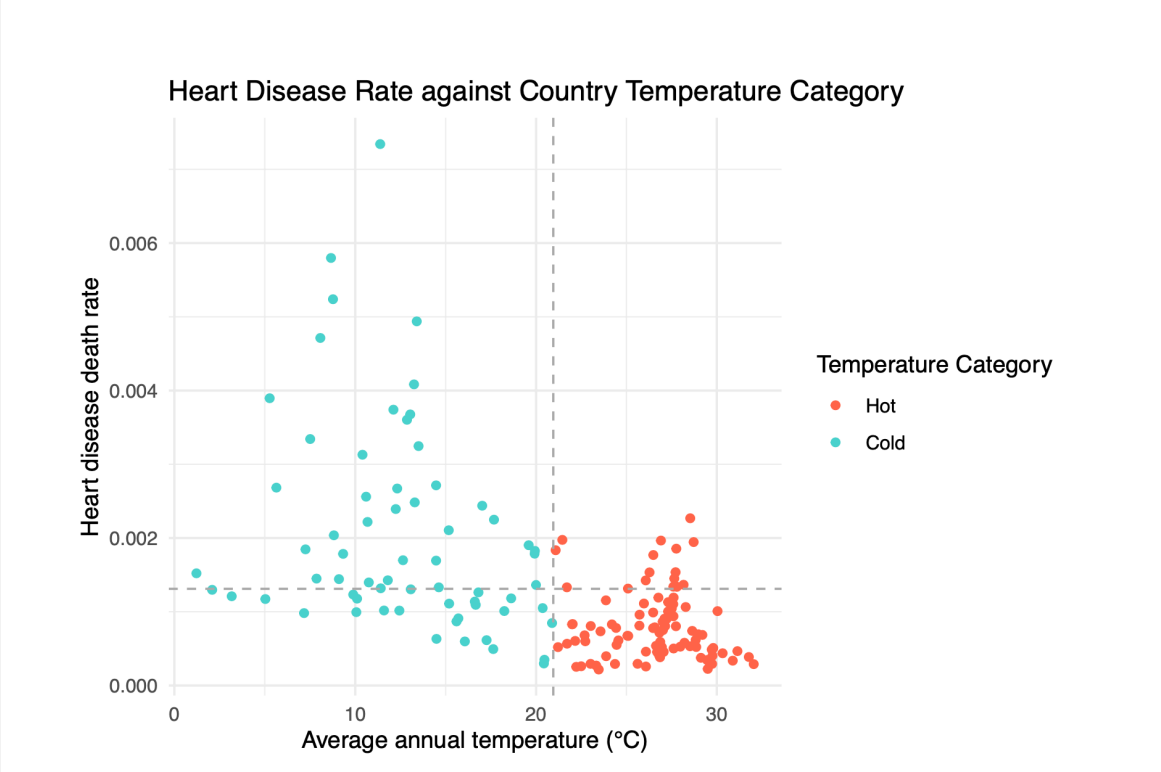


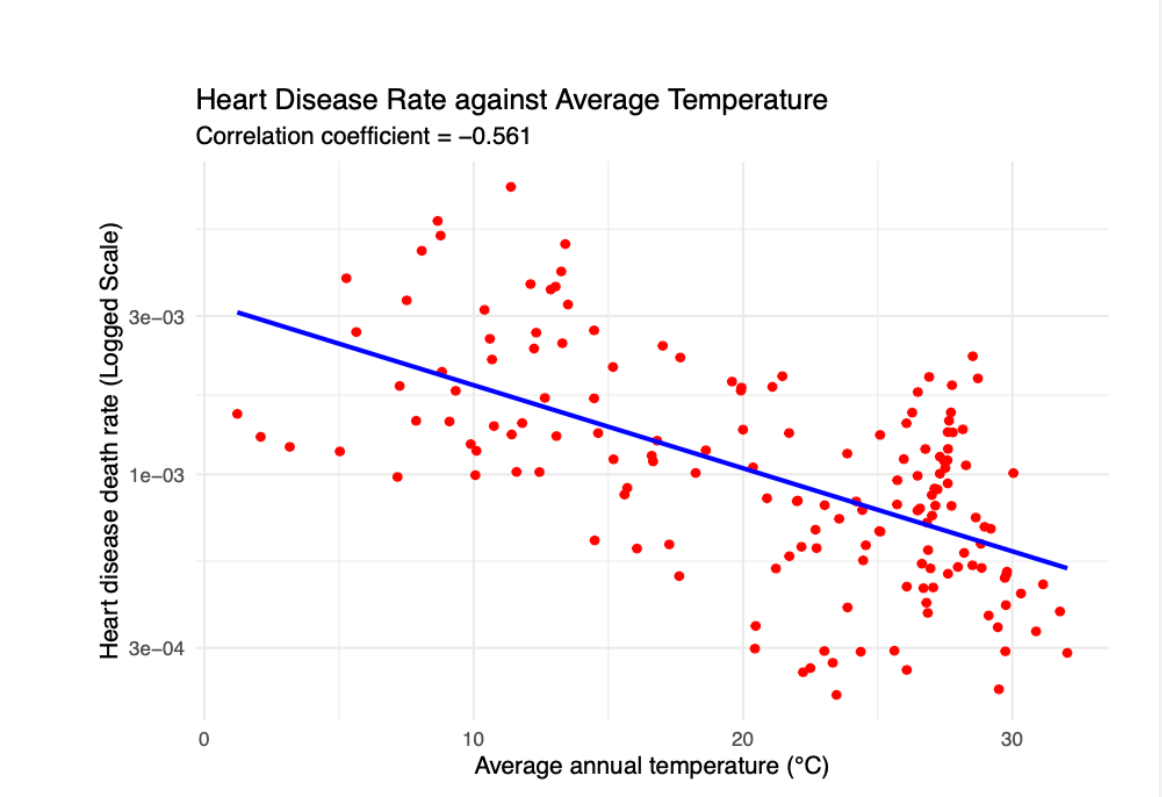
Heart Disease Mortality Distribution

- Distribution of mortality is heavily right-skewed (positive skewness)
- Mean > Median > Mode
- Lower rates of heart disease mortality are more common than higher rates
- Note: We define mortality rate as total deaths due to heart disease divided by population



Heart Disease and Average Annual Temperatures





Cold countries exhibit higher mortality rates than hot countries

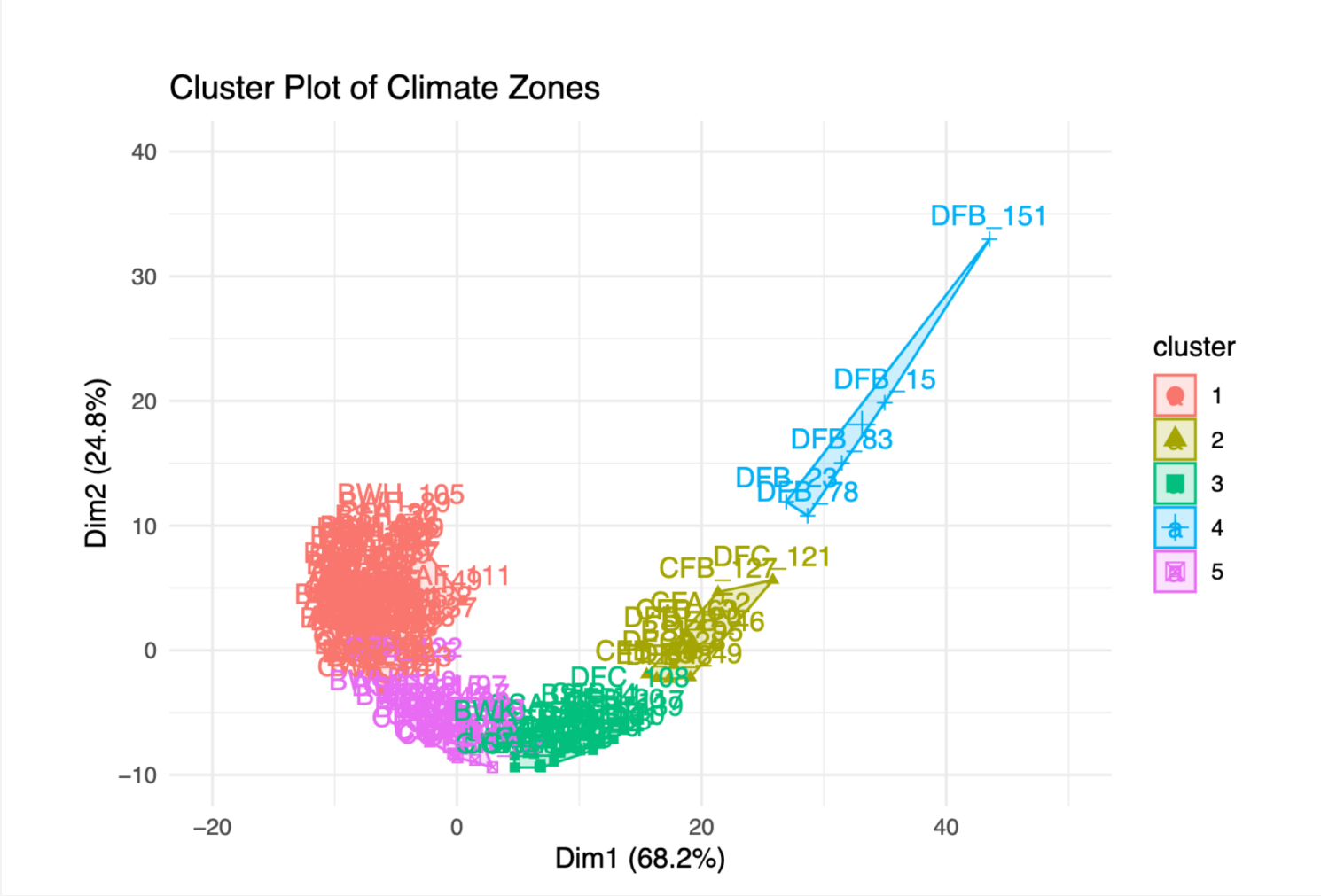
Linear regression showed that about 56.1% of the variation in death rate could be explained by average annual temperature

What about Heart Disease and Climate?

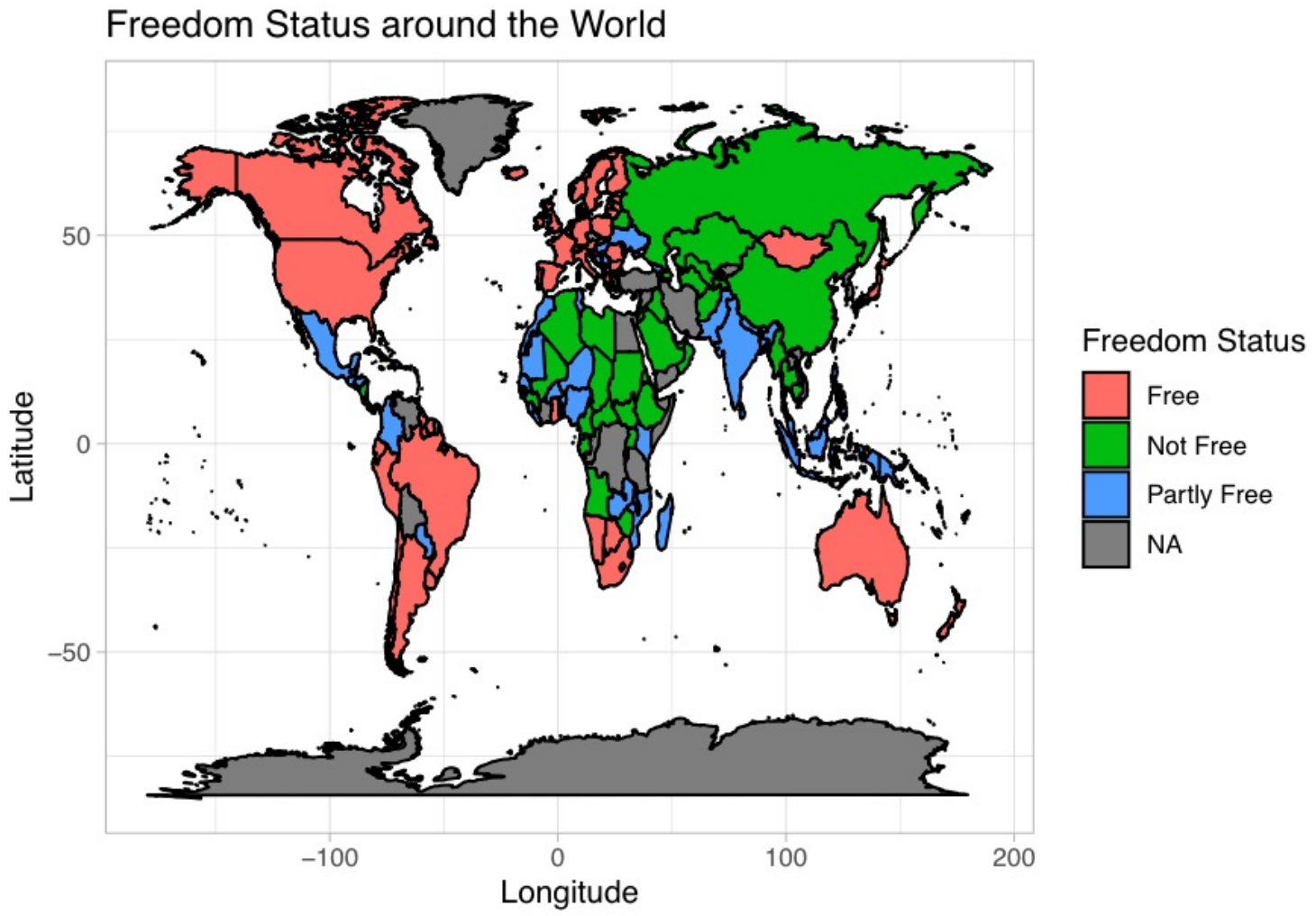
- Variables used were:
  - Climate zone codename (label) from Köppen classification (18 total)
  - Average annual temperature
  - Mortality rate

- Most clusters had a mixture of different climate zones, but cluster 4 was an exception

- Regions with a DFB climate (cold continental without dry season) showed higher rates of mortality than other regions

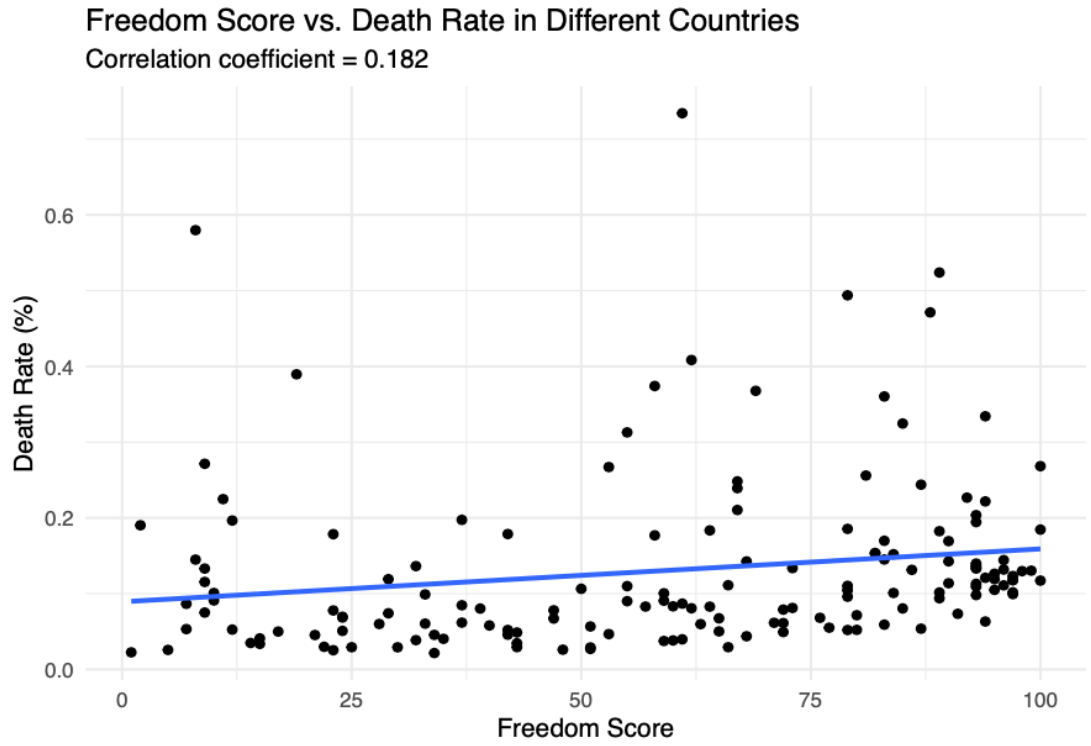


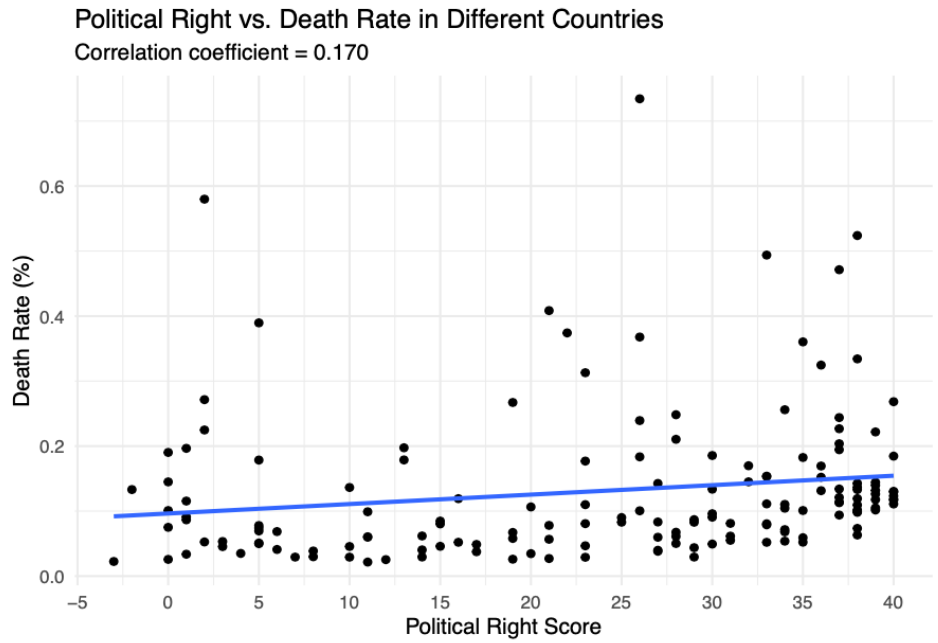
Could Political Freedom be a Factor?

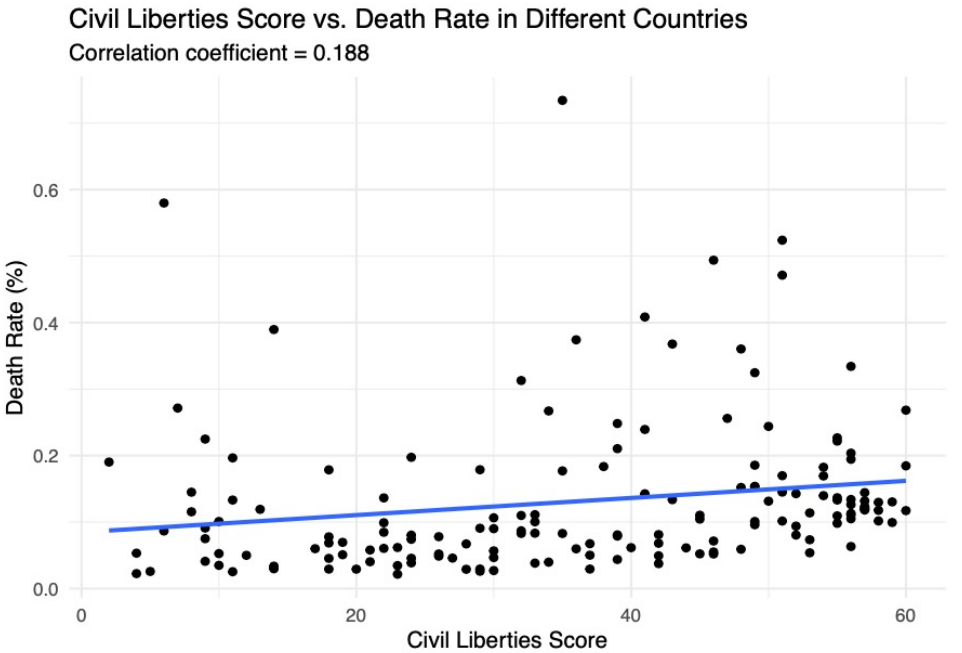


- Freedom score measures access to political rights and civil liberties among **210** countries and territories on a scale of **1** to **100**
- The scores are divided into 3 categories, **“Free”**, **“Partly Free”**, and **“Not Free”**.

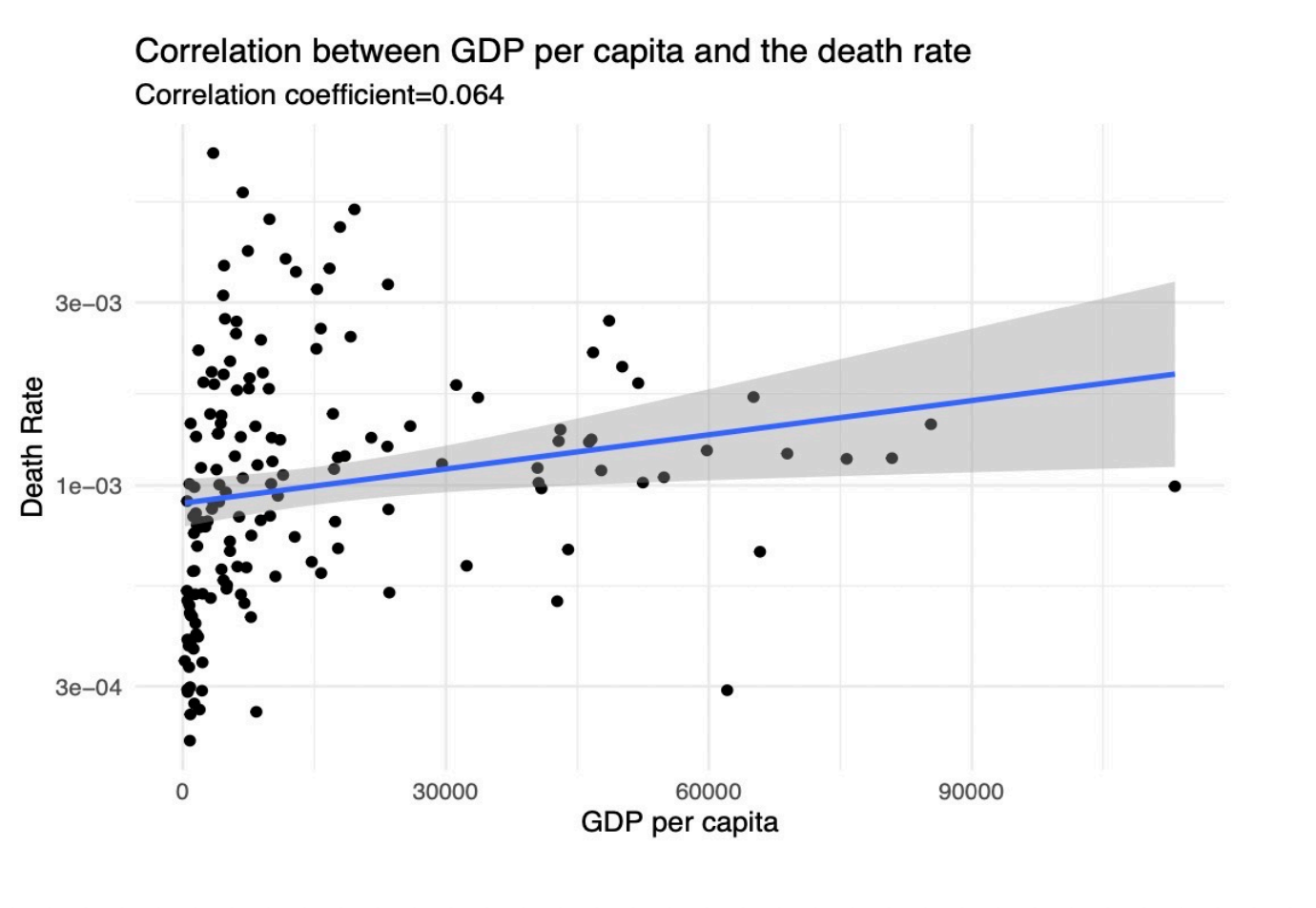
Heart Disease and Political Freedom







Heart Disease and GDP



Correlation coefficient = 0.064

A very low positive correlation

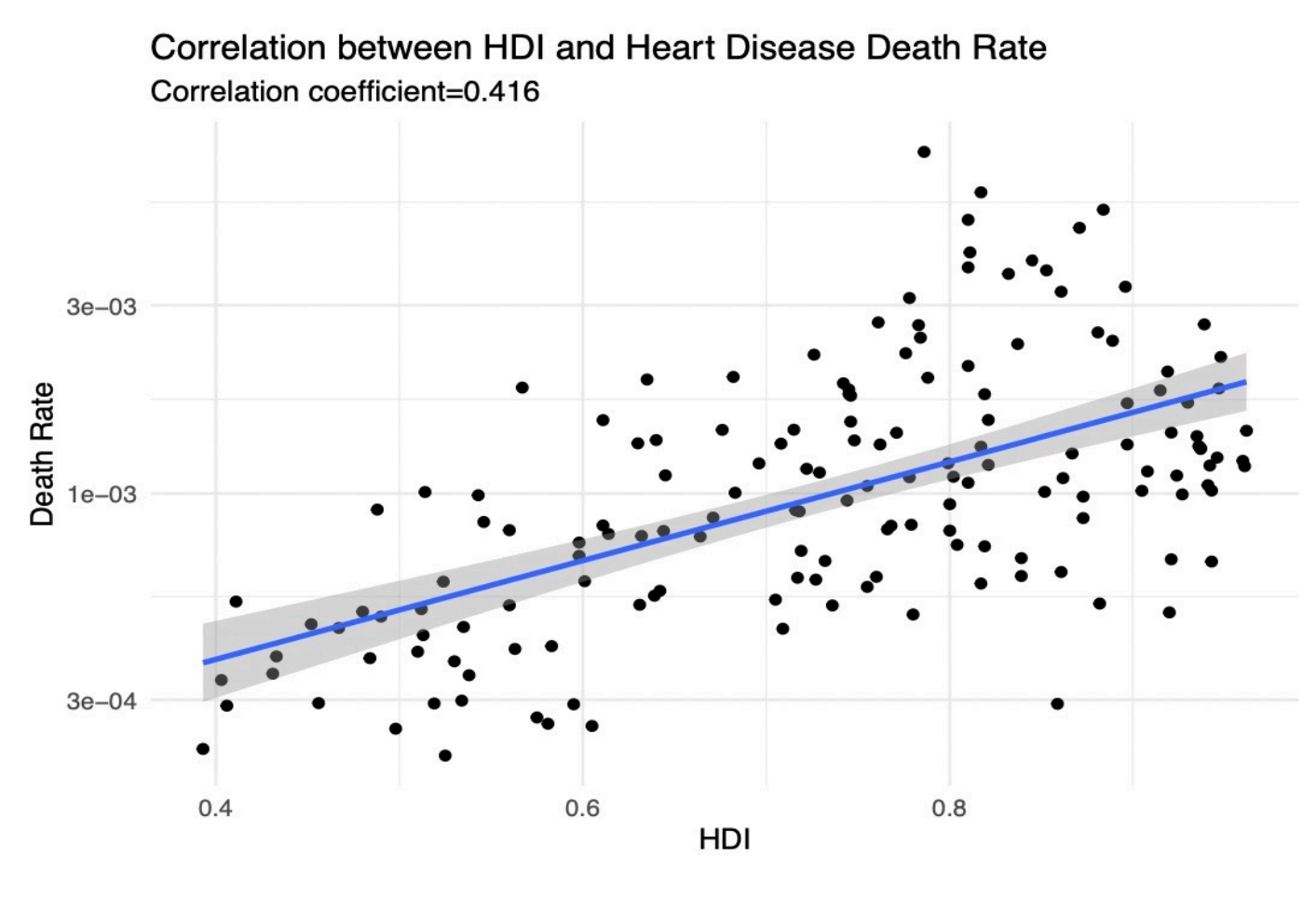
Heart Disease and GDP

Range of GDP per Capita	Correlation Coefficient
0-2500	0.3495849
2,500-5,000	0.04892705
5,000-7,500	0.2945497
7,500-10,000	0.4187217
10,000-15,000	0.1472846
15,000-20,000	0.2134812
20,000-35,000	-0.07328717
40,000-50,000	0.612101
50,000 <	-0.217632

Divided all countries into 9 groups by GDP per capita:

Despite some outliers, in general, there is a weak positive correlation between GDP per capita and death rate.

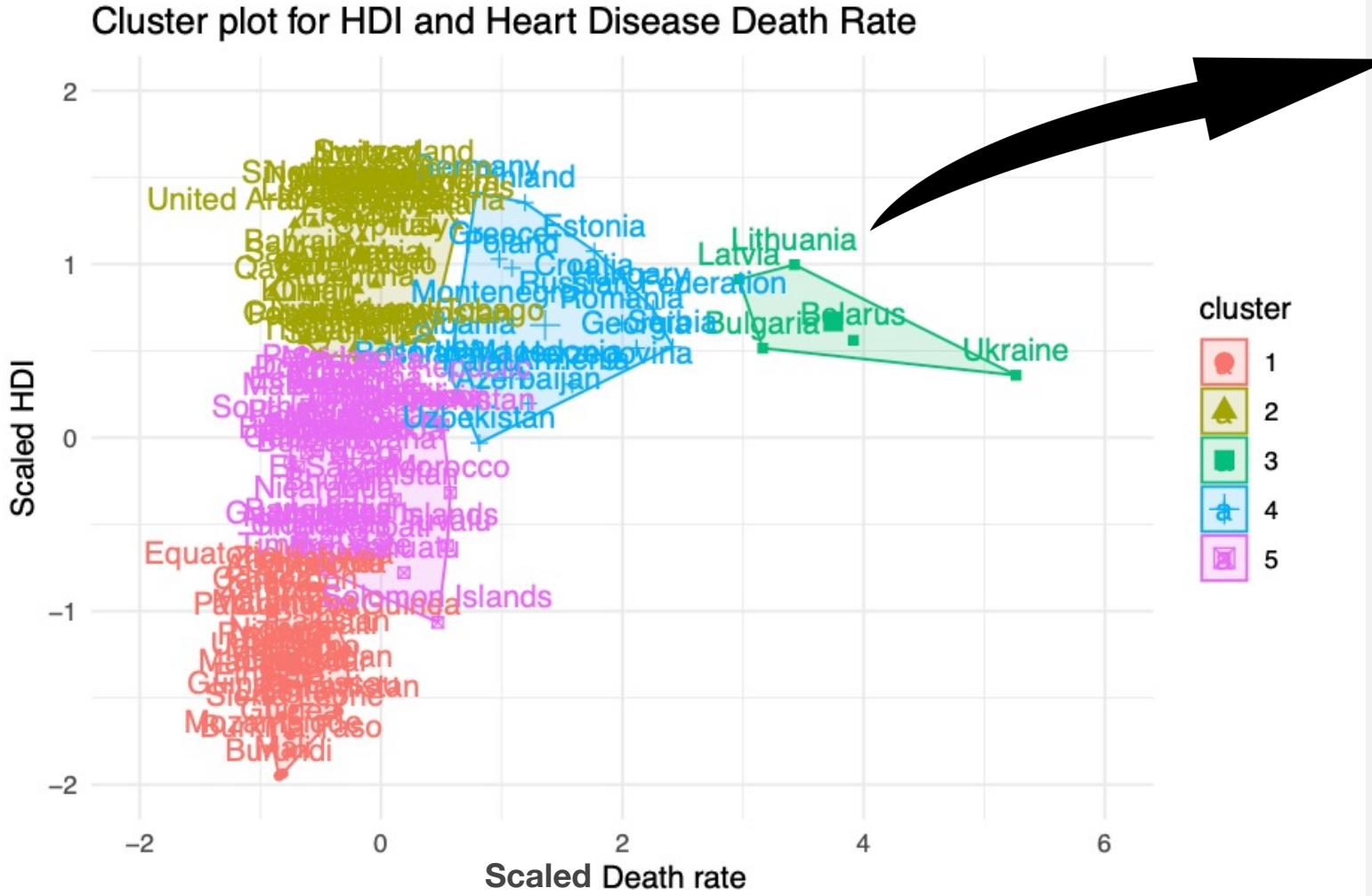
Heart Disease and HDI



Correlation coefficient: 0.416

A Positive correlation

Heart Disease and HDI



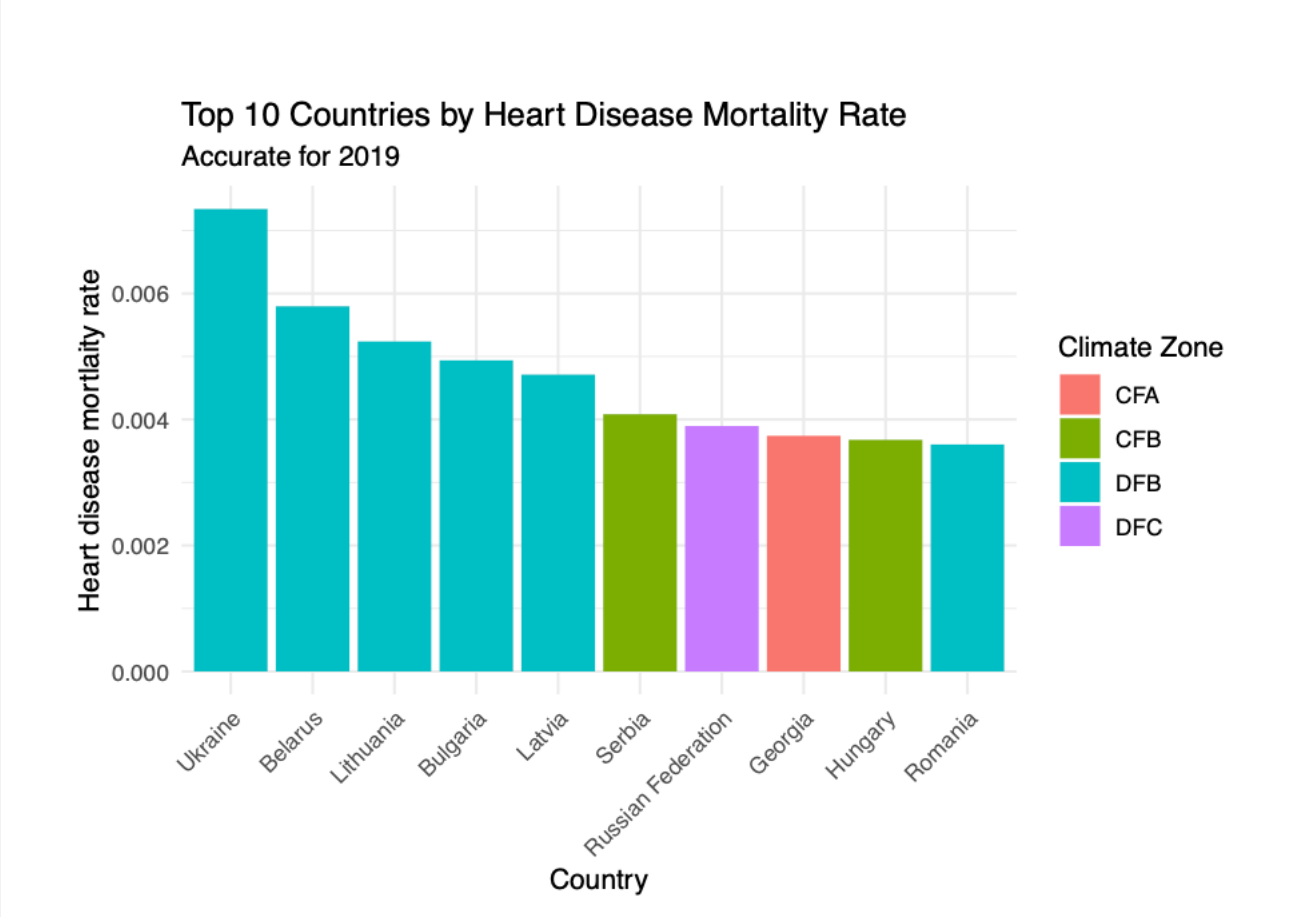
Five countries:

Lithuania
Latvia
Bulgaria
Belarus
Ukraine

Variables used were:

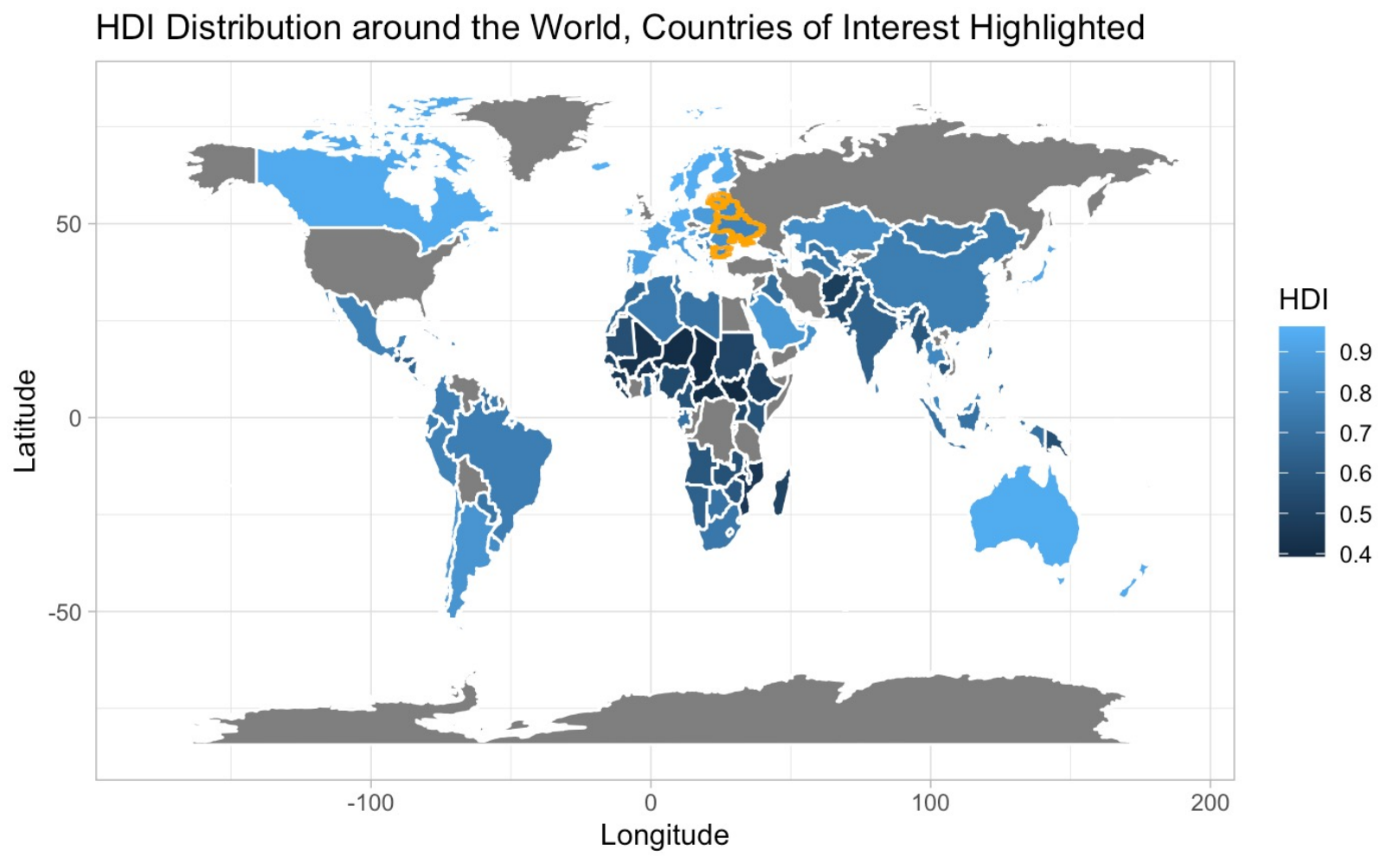
- HDI
- Death Rate

Climate Analysis Key Insight



Countries with the top 5 highest mortality rates have the same climate – DFB (cold continental)

Heart Disease and HDI



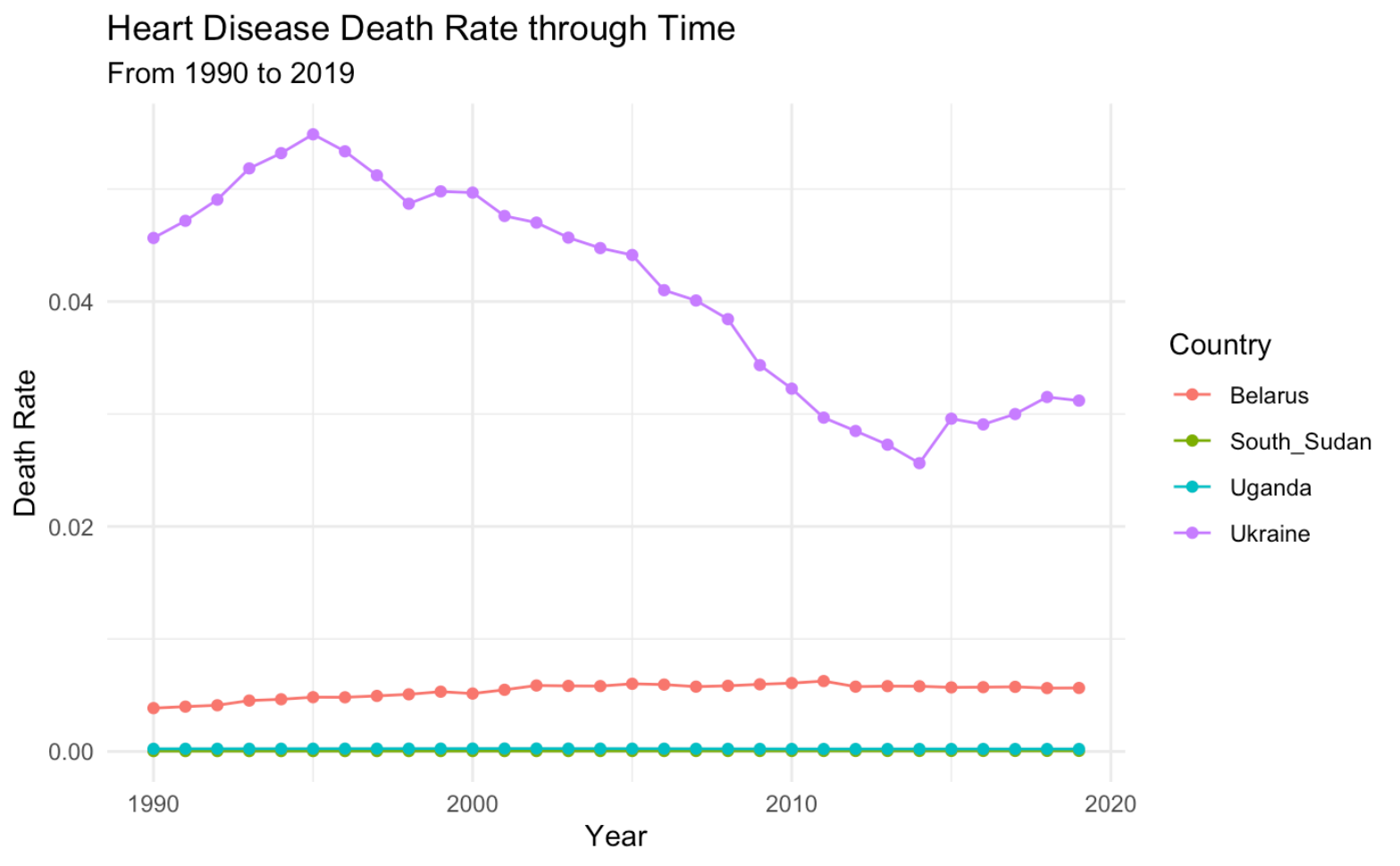
The orange highlight depicts:

Eastern Europe

Most of countries in Eastern Europe have similar :

- **Climate**
- **HDI**
- **Death Rate.**

Time Series Analysis: Recent Trends for Heart Disease



- Two highest death rates: Belarus & Ukraine
- Two lowest death rates: South Sudan & Uganda
- Based on recent trends, mortality levels are projected to remain constant

Conclusions

1. Heart disease is the disease that kills the most people globally based on our most recent data (2019)

2. Countries that suffer from high rates of heart disease mortality are concentrated in Eastern Europe and have a similar climate and HDI.

3. Recent trends from time series analysis suggest that heart disease mortality rates will generally remain constant for the near future

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Q&A