COVID-19 EXPLORATORY ANALYSIS

By: Simon Aytes

Contents

1. The Data

What data are being used?

Data Overview

- COVID-19 data sourced from ECDC
  - Collected from 12/31/2019 until 12/14/2020
    - 350 days in total
    - 61,900 total observations
  - Includes data from 214 total countries and territories
    - After data cleaning, preparation, and outlier removal, only 178 countries and territories remained

Visualization Overview

- All visualizations shown in this presentation were created by me in R using RStudio
  - Only exception: HDI Chart on Slide 15
- Tables were created in PowerPoint using data from RStudio
- Libraries used:
  - ggplot2
  - dplyr
  - tidyverse
  - rworldmap

2. The Impact

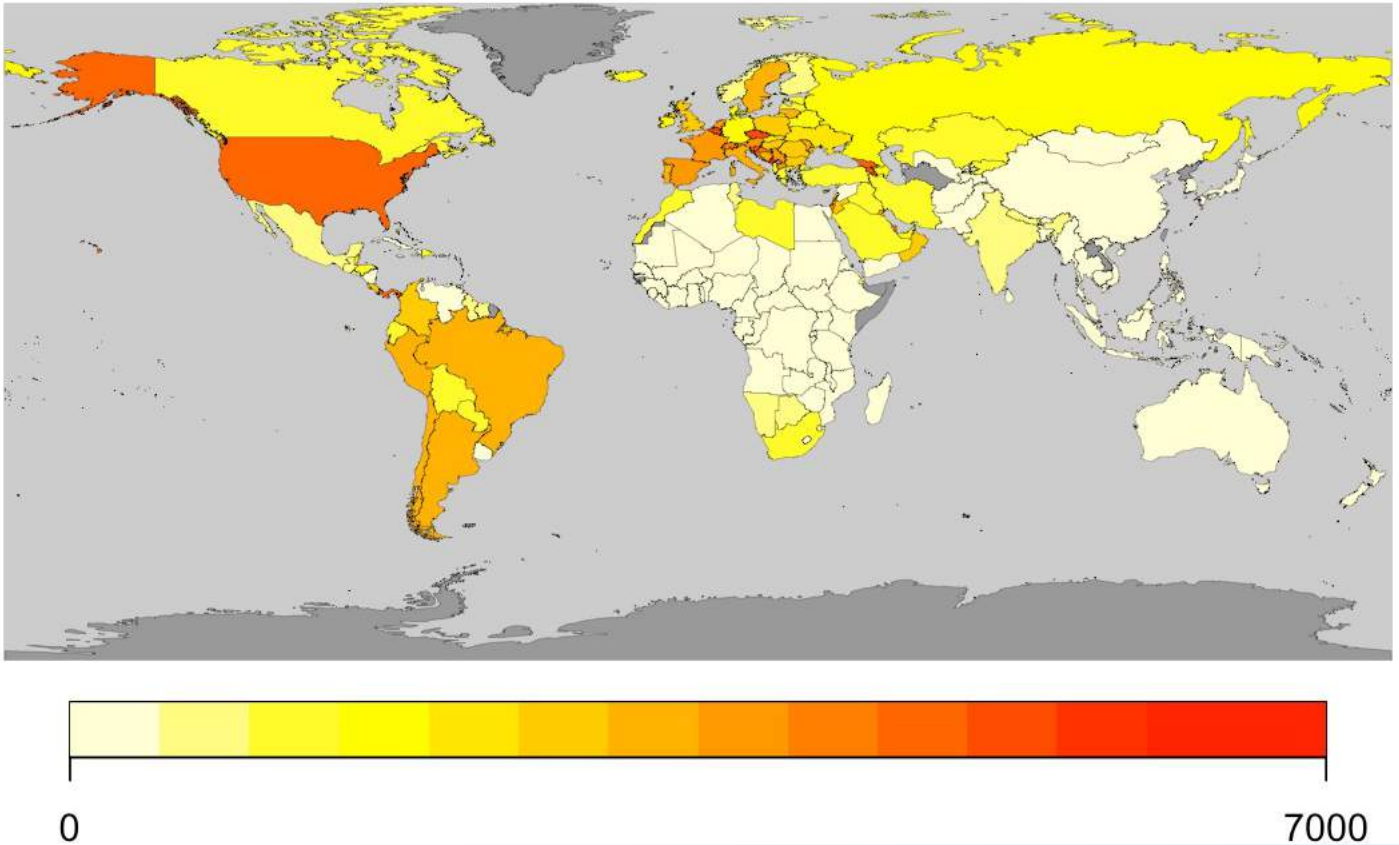
What does this data look like on a global scale?

71,503,614

Confirmed Global COVID-19 Cases*

* As of 12/14/2020

COVID-19 Cases per 100k (World)



Data From: ECDC, 2020

COVID-19 Cases (World)

Region	Confirmed Cases	Avg. Cases per 100k	% of Total Cases*
Africa	2,372,038	262	≈ 3.32%
Americas	30,766,915	1,328	≈ 43.03%
Asia	16,781,265	1,089	≈ 23.47%
Europe	21,298,140	2,907	≈ 29.79%

* Percentages may not add to 100% as Oceania and outliers omitted from results

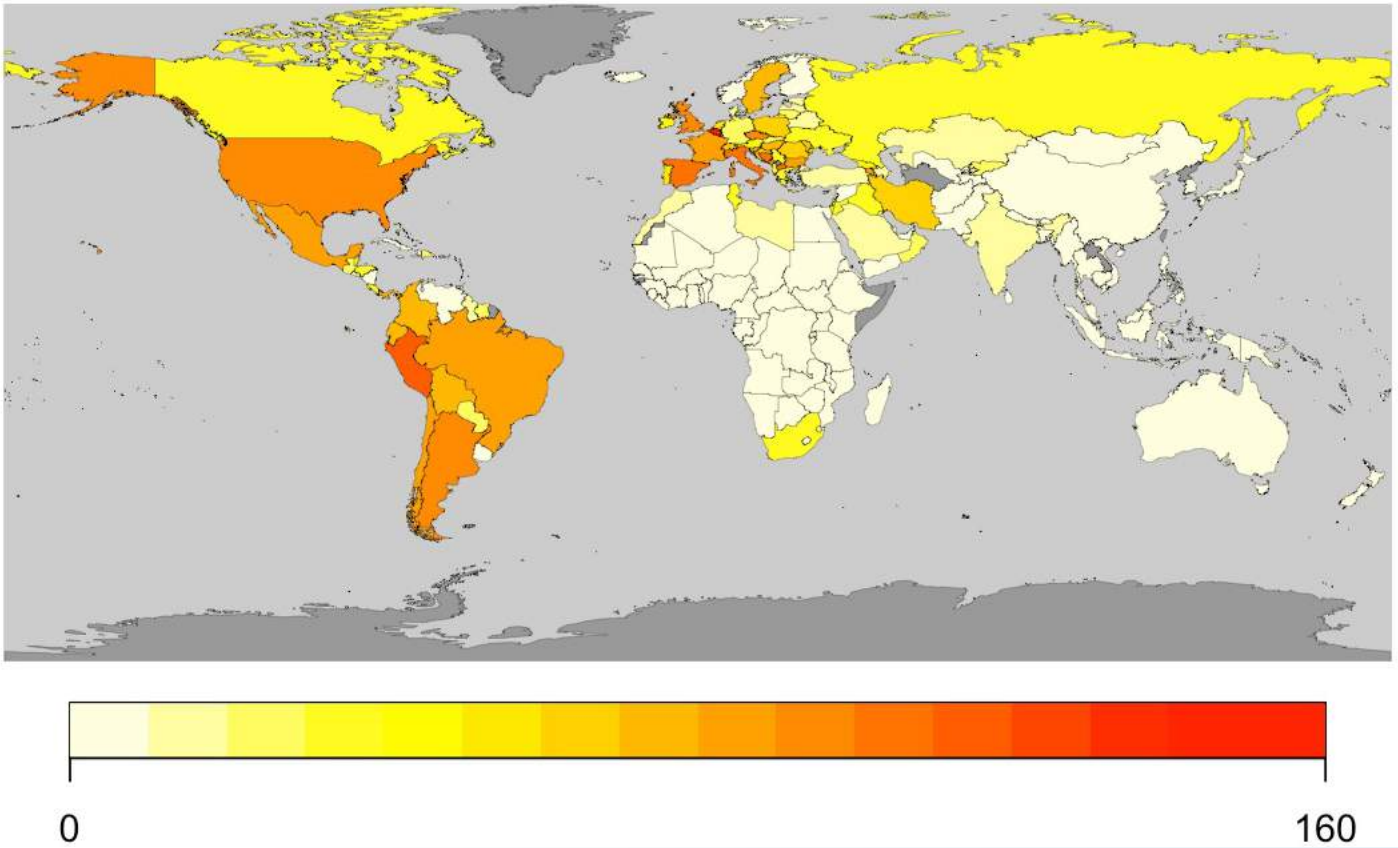
Data From: Author

1,612,833

Confirmed Global COVID-19 Deaths*

* As of 12/14/2020

COVID-19 Deaths per 100k (World)



Data From: ECDC, 2020

COVID-19 Deaths (World)

Region	Confirmed Deaths	Avg. Deaths per 100k	% of Total Deaths*
Africa	56,168	4	≈ 3.48%
Americas	784,020	35	≈ 48.61%
Asia	290,122	10	≈ 17.99%
Europe	477,988	53	≈ 29.64%

* Percentages may not add to 100% as Oceania and outliers omitted from results

Data From: Author

3. The Question

What can we try to answer given this information?

“

What relationship exists, if any, between a country’s Human Development Index (HDI) and their response to the COVID-19 pandemic?

Human Development Index (HDI)

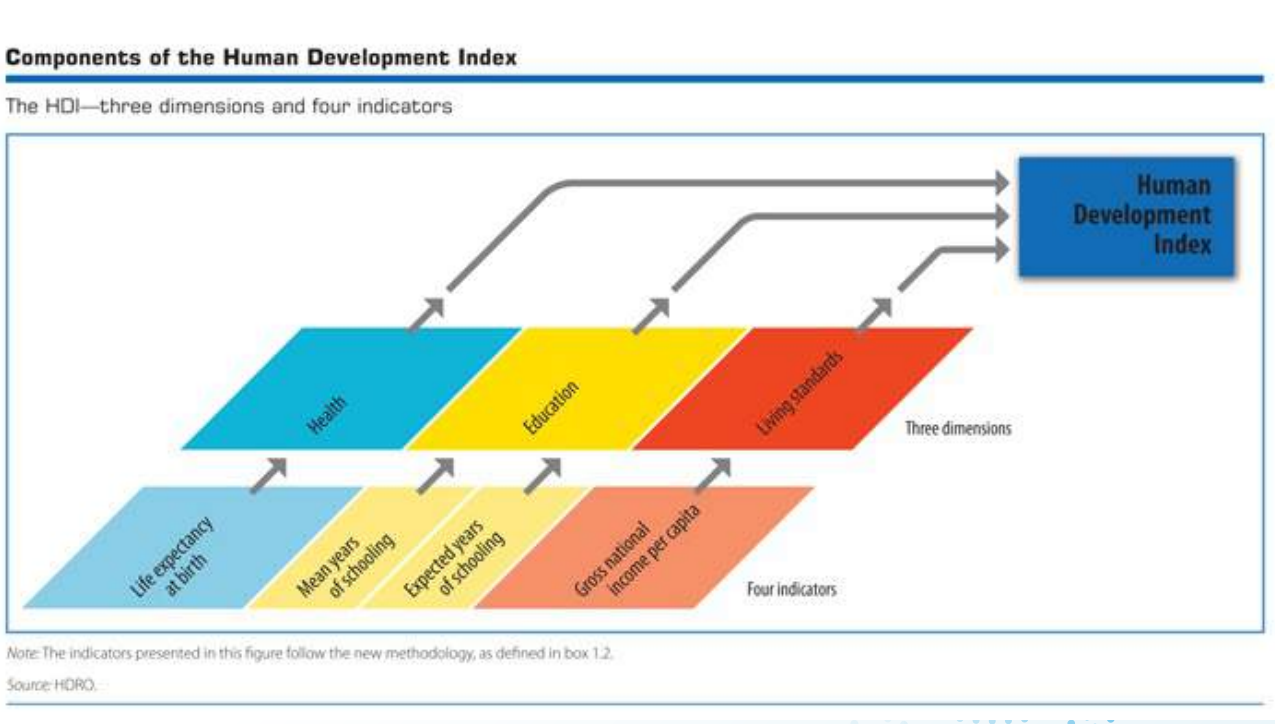


Image Source: [Link]

HDI – Insight

So, what does this all mean?

- According to the components of HDI, the highest scoring countriess are assumed to have:
  - Reasonably educated population (Education)
  - Higher life-expectancy (Health)
  - Reasonable average wages (Living Standards)
- Scoring:
  - 1 (Highest): High level of economic development
  - 0 (Lowest): Low level of economic development

Why HDI and not GDP?

Perks of using HDI over GDP:

- HDI takes more than just money into account
  - Education
  - Life expectancy
  - GDP Per Capita
- GDP only measures income
  - Puts developing countries at a disadvantage
  - Place excessive weight on income

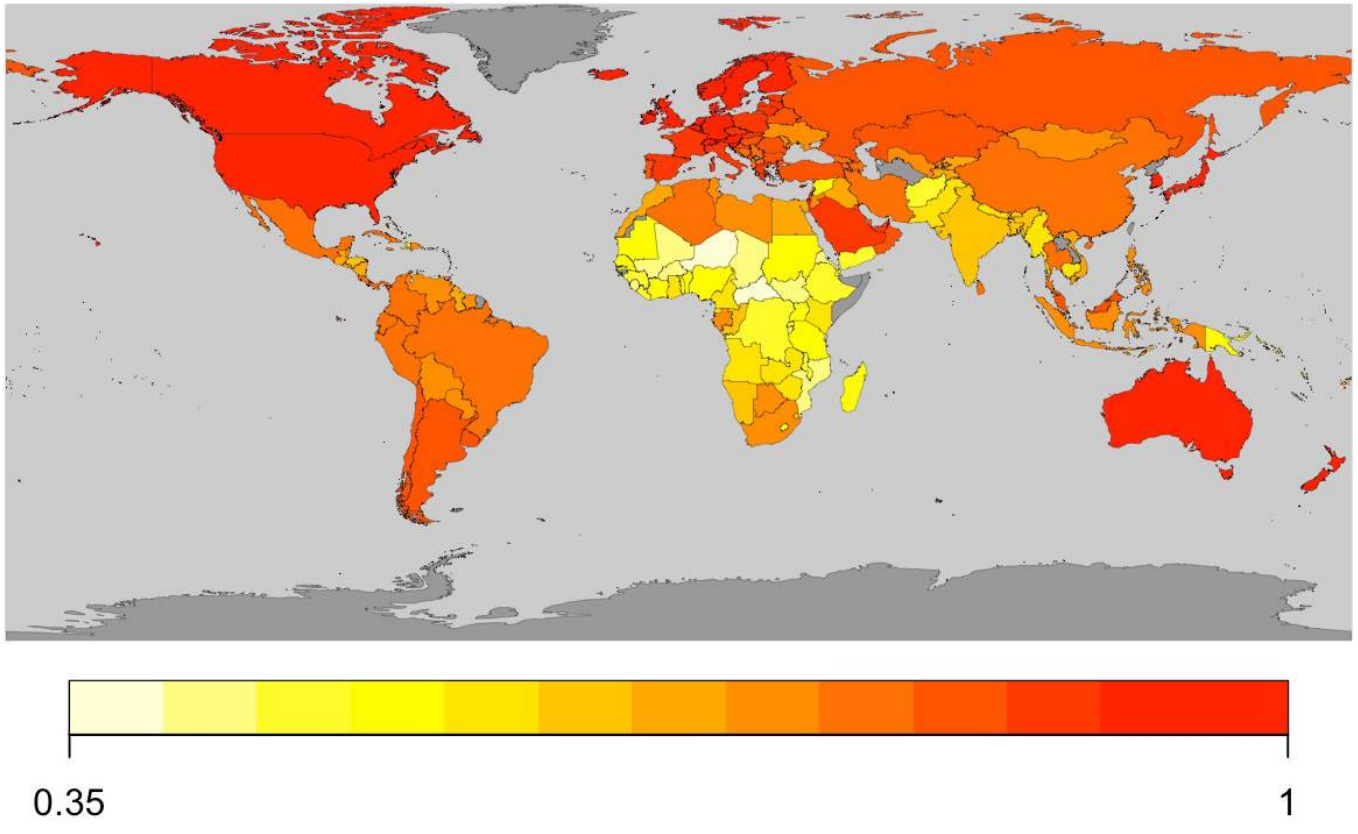
“

HDI paints a better picture of how effective a country’s response to a pandemic could be, in terms of mitigation measures

Mitigation Measures

- **Public Knowledge**
  - *Education: public knowledge needs public understanding*
- **Lockdowns**
  - *Living Standards: only those who can afford to can stay home can reasonably do so*
- **Hygiene**
  - *Health/Living Standards: access to running water, financial ability*
- **Travel Restrictions**
  - *Living Standards: tourism-dependent economies could collapse*

Human Development Index (HDI) of the World, 2018



Data From: Our World in Data, 2018

HDI – Initial Observations

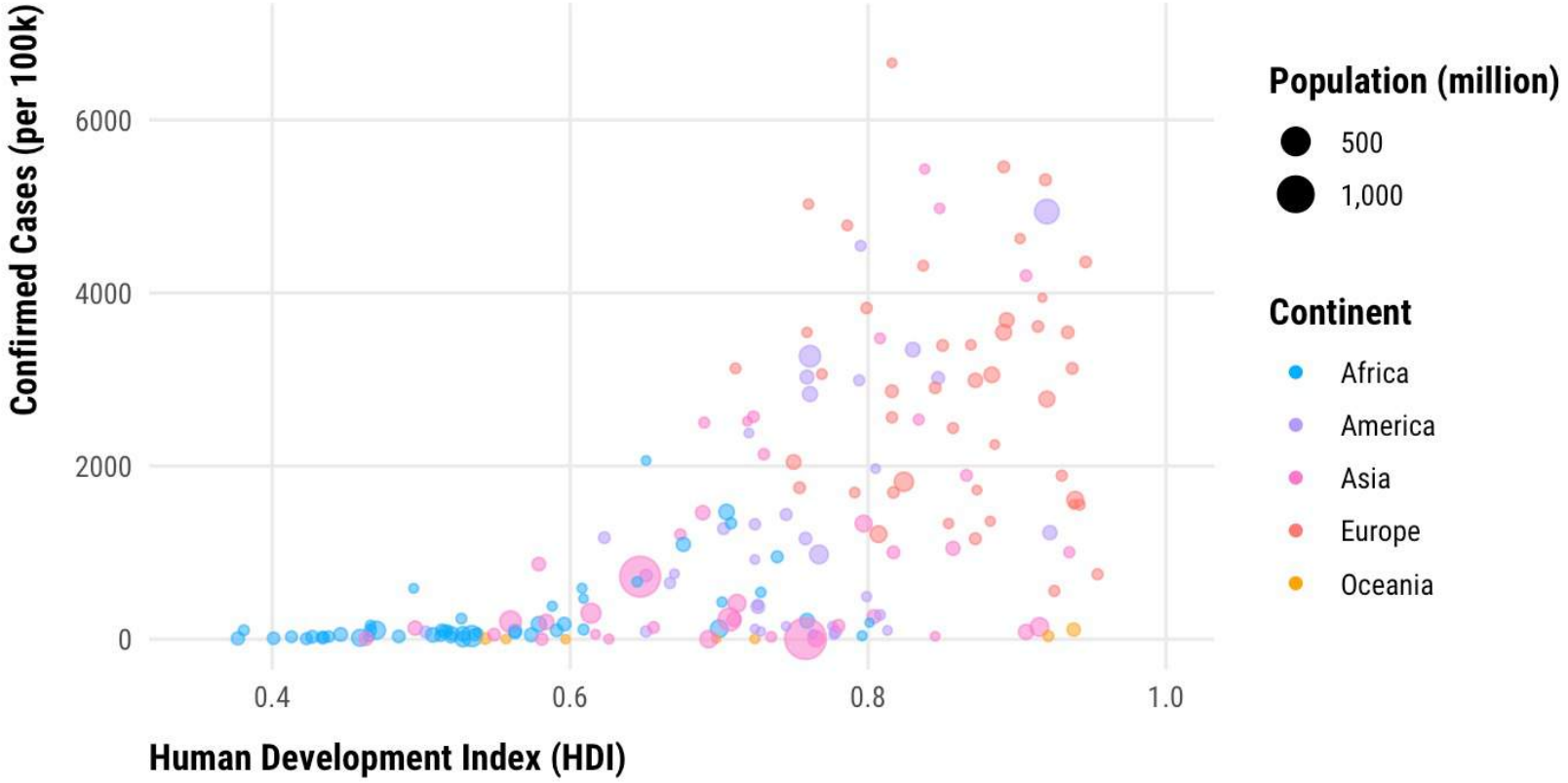
- Major economic powers come out on top
  - Australia, USA, China, EU Member Countries
- Developing countries among lowest scores
  - West, Central, and East Africa
  - India, Pakistan, Afghanistan
- Highest Scores
  - Australia (0.94), USA (0.92)
- Lowest Scores
  - Niger (0.38), Central African Republic (0.38)

4. The Relationship

How exactly are COVID-19 Cases related to HDI, if at all?

COVID-19 Cases vs. HDI (World)

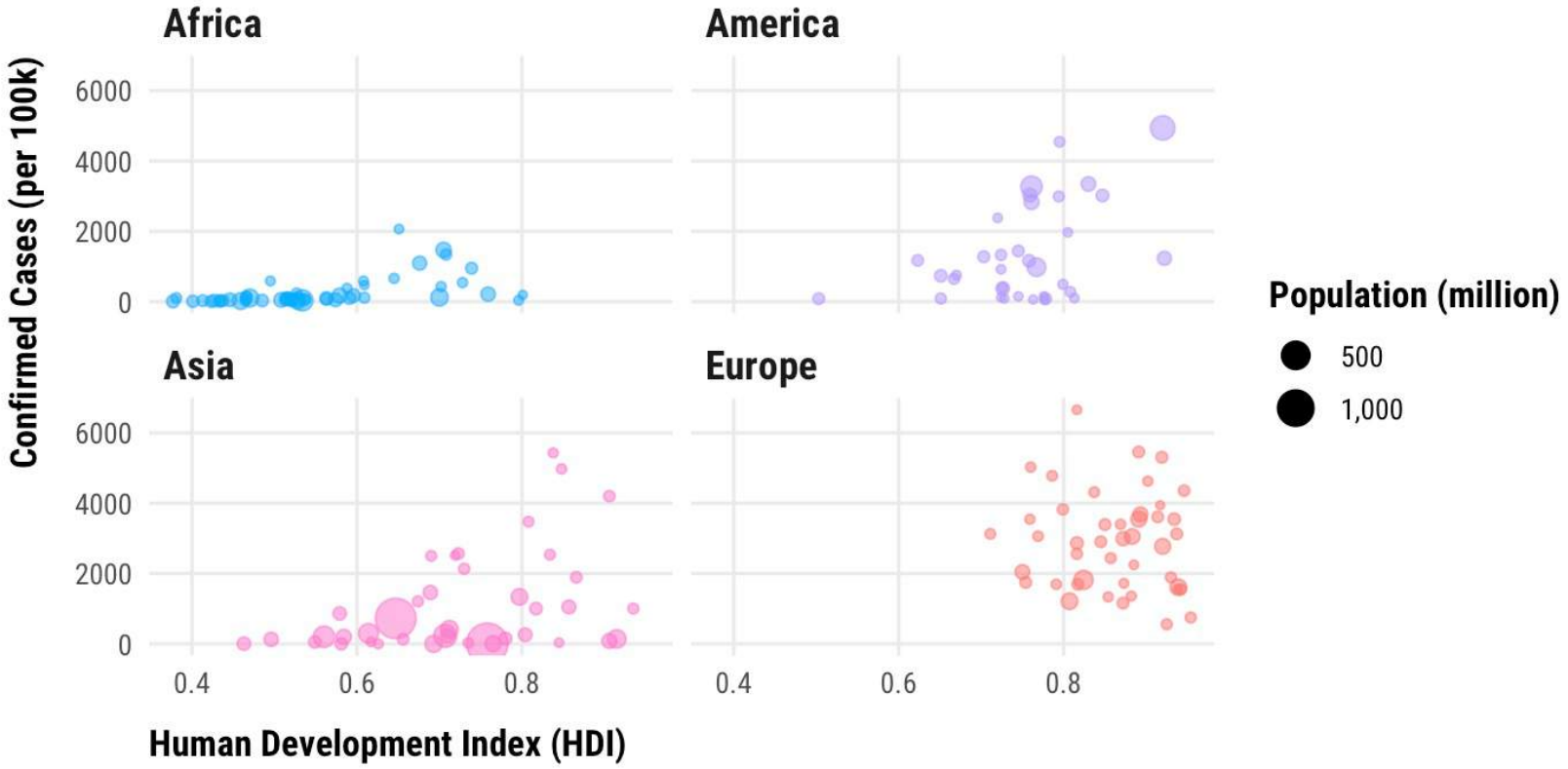
12/31/2019 through 12/14/2020



Source: ECDC, Our World in Data

COVID-19 Cases vs. HDI (By Country)

Average HDI: 0.71



Source: ECDC, Our World in Data

HDI vs. COVID-19 Cases

Region	Avg. Cases per 100k	Average HDI	% of Total Cases*
Africa	262	0.55	≈ 3.32%
Americas	1,328	0.75	≈ 43.03%
Asia	1,089	0.73	≈ 23.47%
Europe	2,907	0.86	≈ 29.79%

* Percentages may not add to 100% as Oceania and outliers omitted from results

Data From: Author

HDI vs. COVID-19 Cases (con.)

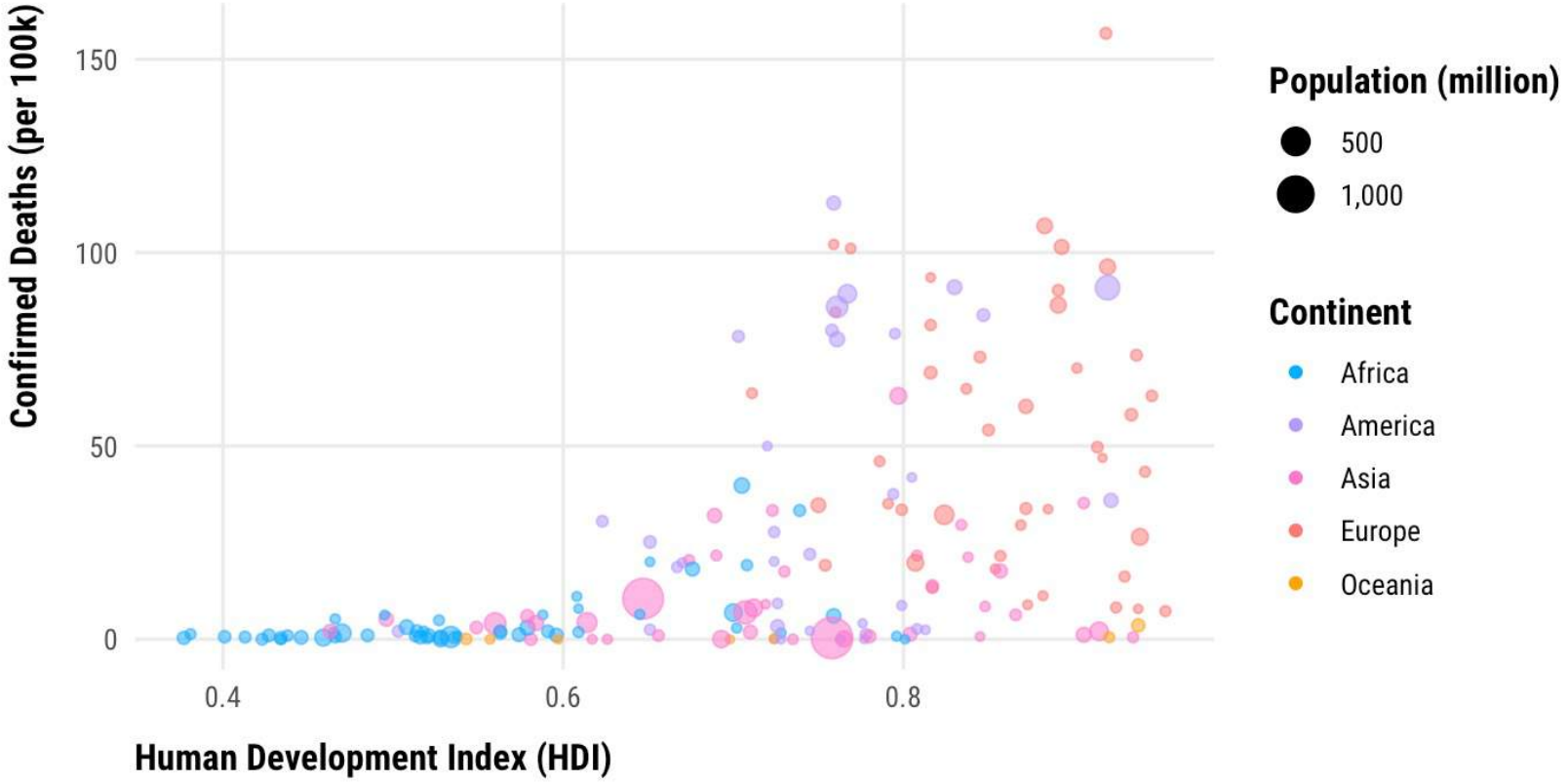
What do these data tell us?

- Africa
  - Most African countries had both a lower HDI and less cases
- Asia and the Americas
  - Most countries in Asia and the Americas had both a higher HDI and more cases, though they were more spread out
- Europe
  - Most European countries had above-average HDI* and cases**

* World Average HDI = 0.71
** World Average Cases per 100k = 2,907

COVID-19 Deaths vs. HDI (World)

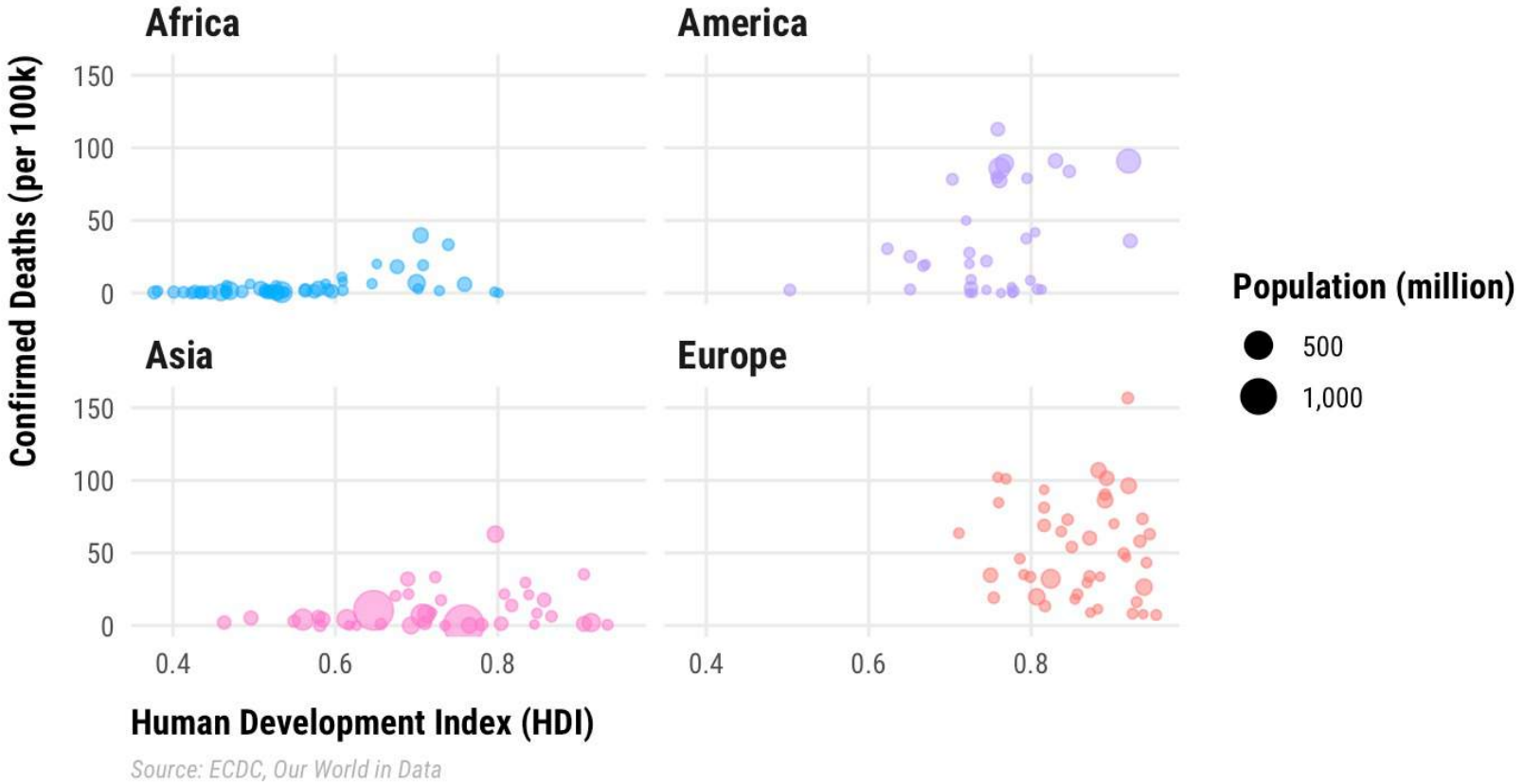
12/31/2019 through 12/14/2020



Source: ECDC, Our World in Data

COVID-19 Deaths vs. HDI (By Country)

Average HDI: 0.71



Source: ECDC, Our World in Data

HDI vs. COVID-19 Deaths

Region	Avg. Cases per 100k	Average HDI	% of Total Deaths*
Africa	262	0.55	≈ 3.48%
Americas	1,328	0.75	≈ 48.61%
Asia	1,089	0.73	≈ 17.99%
Europe	2,907	0.86	≈ 29.64%

* Percentages may not add to 100% as Oceania and outliers are omitted from results

Data From: Author

HDI vs. COVID-19 Deaths (con.)

What do these data tell us?

- Africa
  - Most African countries had both a lower HDI and less deaths
- Asia and the Americas
  - Most countries in Asia and the Americas had both a higher HDI and more deaths, though they were more spread out
- Europe
  - Most European countries had above-average HDI* and deaths**

* World Average HDI = 0.71

** World Average Deaths per 100k = 23

5. The Conclusion

What can we say, given the data?

“

My analysis found that there exists a negative correlation between the Human Development Index (HDI) and the number of reported COVID-19 cases/deaths among surveyed countries.

Correlation ≠ Causation

Many factors play a role in the validity of this conclusion.

- Infrastructure
  - Testing, public health system, government intervention
- Type of Government
  - Democratic, Autocratic, etc.
- Type of Economy
  - Agrarian, industrial, dependency on travel, etc.
- Societal Disadvantages
  - Former colonies, special interest zones, etc.

Further Research

In the future, it may be beneficial to look into how the following could challenge the outcome of my conclusion:

- COVID-19 Testing
  - How much did the surveyed countries actually test?
- Gross Domestic Product (GDP)
  - Would using GDP change the outcome of this analysis?
- Human Freedom Index (HFI)
  - How could using HFI instead of HDI affect the results?
- Demographic Information
  - Could the demographics of a country play a role?

6. References

References

- Our World in Data HDI Overview
  - Link
- Gapminder HDI Dataset
  - Link
- ECDC COVID-19 Dataset
  - Link