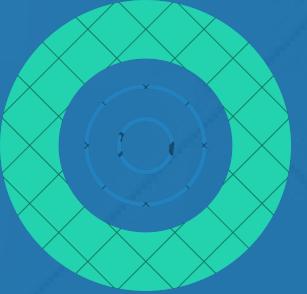
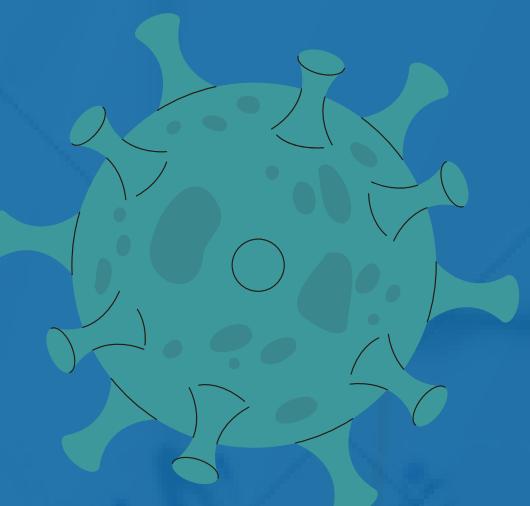
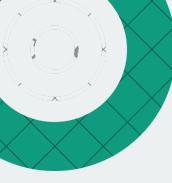




# COVID-19

## Contributing Factors to Covid-19 Cases





WHAT CAN WE ANALYZE  
TO DETERMINE  
INCREASED NUMBERS  
OF CASES? THE  
CAUSES?

# COVID-19: CONTRIBUTING FACTORS

- Was there a direct correlation between certain pre-existing illnesses and increased risk of Covid-19 cases or deaths? Which conditions impacted the virus most?
- What regions were most impacted by the virus? Was there a correlation between access to healthcare and number of cases?
- What is the relationship between vaccination status and number of deaths and cases of Covid-19? Which vaccines were most commonly used and did the number of vaccinations affect the number of Covid-19 cases?
- Is there a relationship between racial and ethnic groups and the number of Covid-19 cases and deaths observed?

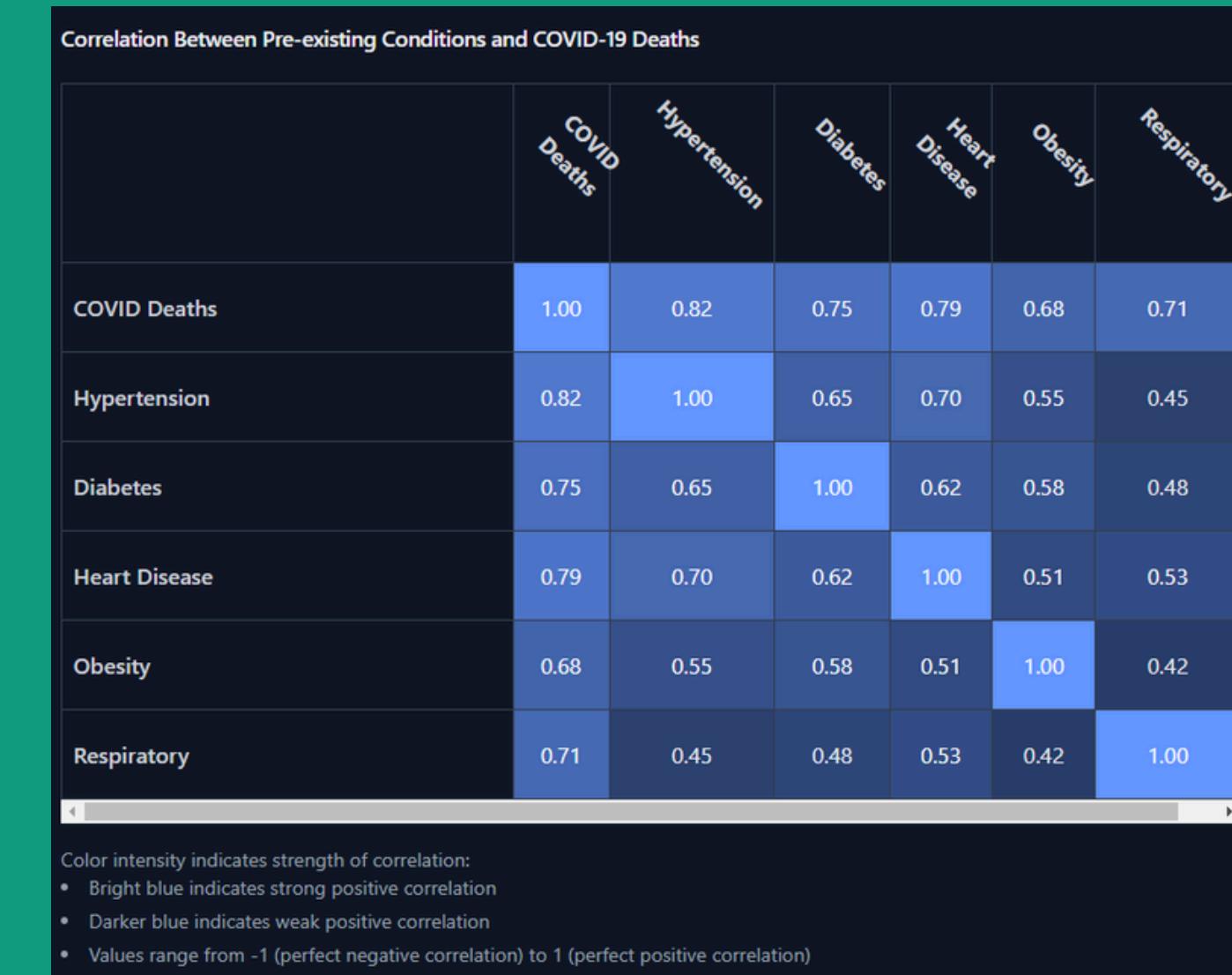


## RESEARCH QUESTIONS

# KEY FINDINGS & VISUALIZATIONS



## Comorbidities and Pre-existing Illnesses



### Visualization: Correlation Heat Map

This heat map visually represents the correlation between pre-existing conditions (e.g., obesity, diabetes, cardiovascular diseases) and death rates due to COVID-19. Using this heat map, the correlation between different illnesses and death rates are displayed in regards to their strength. The checkboxes allows users to select and compare conditions along the way.



# KEY FINDINGS & VISUALIZATIONS

## Comorbidities & Pre-existing Illnesses

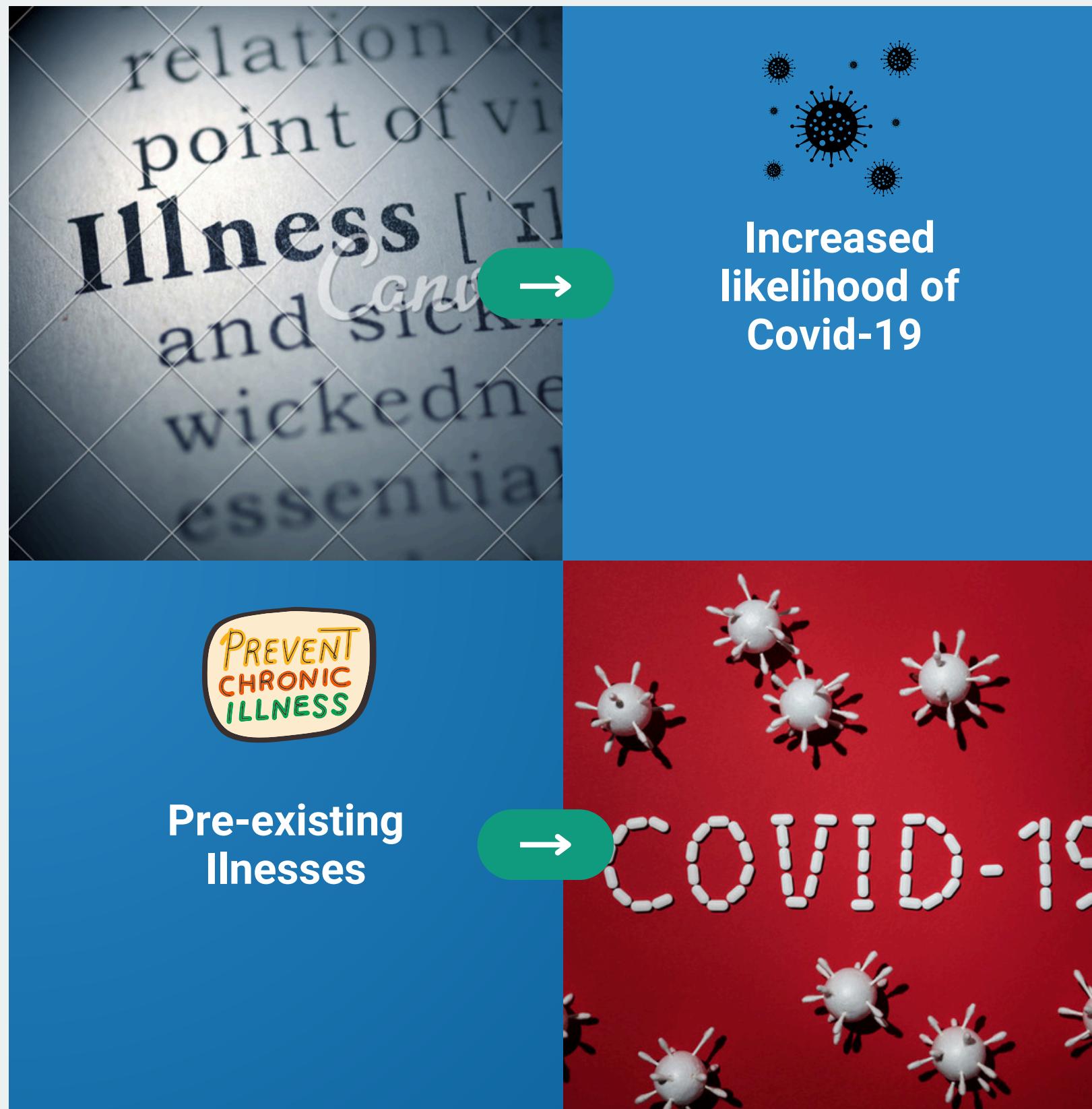
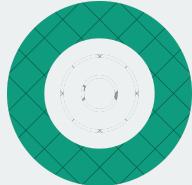
Visualization: Interactive Bar Plot of Pre-existing Illnesses

This bar plot displays the top conditions contributing to COVID-19 deaths.

Method:

Plotly provides an interactive bar plot where users can filter by date range, hover over bars for detailed data, and zoom in on specific areas.





# CORRELATION ANALYSIS



***What did we determine?***

It was demonstrated that there is a clear correlation between various pre-existing conditions and COVID-19 deaths and cases.

Using heatmaps, interactive bar charts, and pie charts (not shown in this presentation) users can explore data and draw insights about which health conditions contributed most to the severity of COVID-19 outcomes.

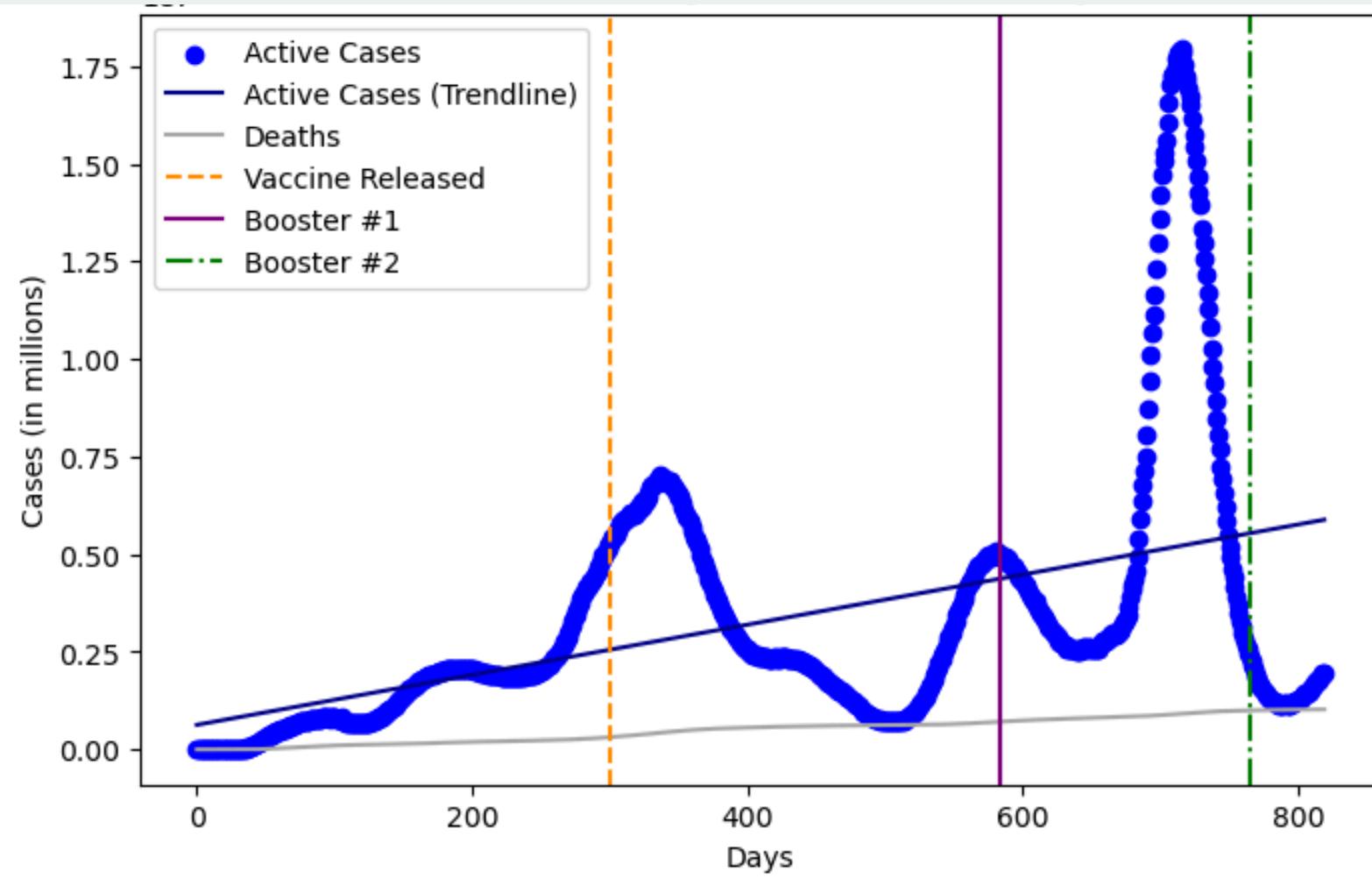
As per the analysis done, the top 3 illnesses that most impacted number of deaths and cases include:

- Hypertension
- Diabetes
- Heart Disease

# VISUALIZATIONS

Strong positive correlation between total cases and Healthcare Infrastructure.

Countries with early lockdowns reduced spread effectively.



Global Heatmap [Scaled by  $1e^6$ , sorted by population]

country	total_confirmed	total_deaths	total_recovered	active_cases	serious_or_critical	total_cases_per_1m_population	total_deaths_per_1m_population	total_tests_per_1m_population
China	0.22	0.0052	0.21	0.0061	0.00038	0.00015	4e-06	0.11
India	43	0.52	43	0.018	0.0007	0.031	0.00031	0.6
USA	84	1	81	1.9	0.0019	0.25	0.0031	3
Indonesia	6.1	0.16	5.9	0.0048	0.0028	0.022	0.00056	0.35
Pakistan	1.5	0.03	1.5	0.0047	0.00011	0.0067	0.00013	0.12
Nigeria	0.26	0.0031	0.25	0.0028	1.1e-05	0.0012	1.5e-05	0.024
Brazil	31	0.66	30	0.3	0.0083	0.14	0.0031	0.3
Bangladesh	2	0.029	1.9	0.024	0.0013	0.012	0.00017	0.084
Russia	18	0.38	18	0.24	0.0023	0.13	0.0026	1.9

# Health and health systems ranking of countries worldwide

Search:

Records: 13

## CORRELATION SUMMARY: COVID-19 CASES AND HEALTHCARE SYSTEMS

### Characteristic

### Ranking

Singapore

1

Japan

2

South Korea

3

Taiwan

4

China

5

Israel

6

Norway

7

Iceland

8

Sweden

9

Switzerland

10

Netherlands

11

Luxembourg

12

Germany

13

1. **Healthcare Infrastructure:** Strong systems (e.g., China) managed cases better, while weaker systems (e.g., India, Brazil) faced higher rates.

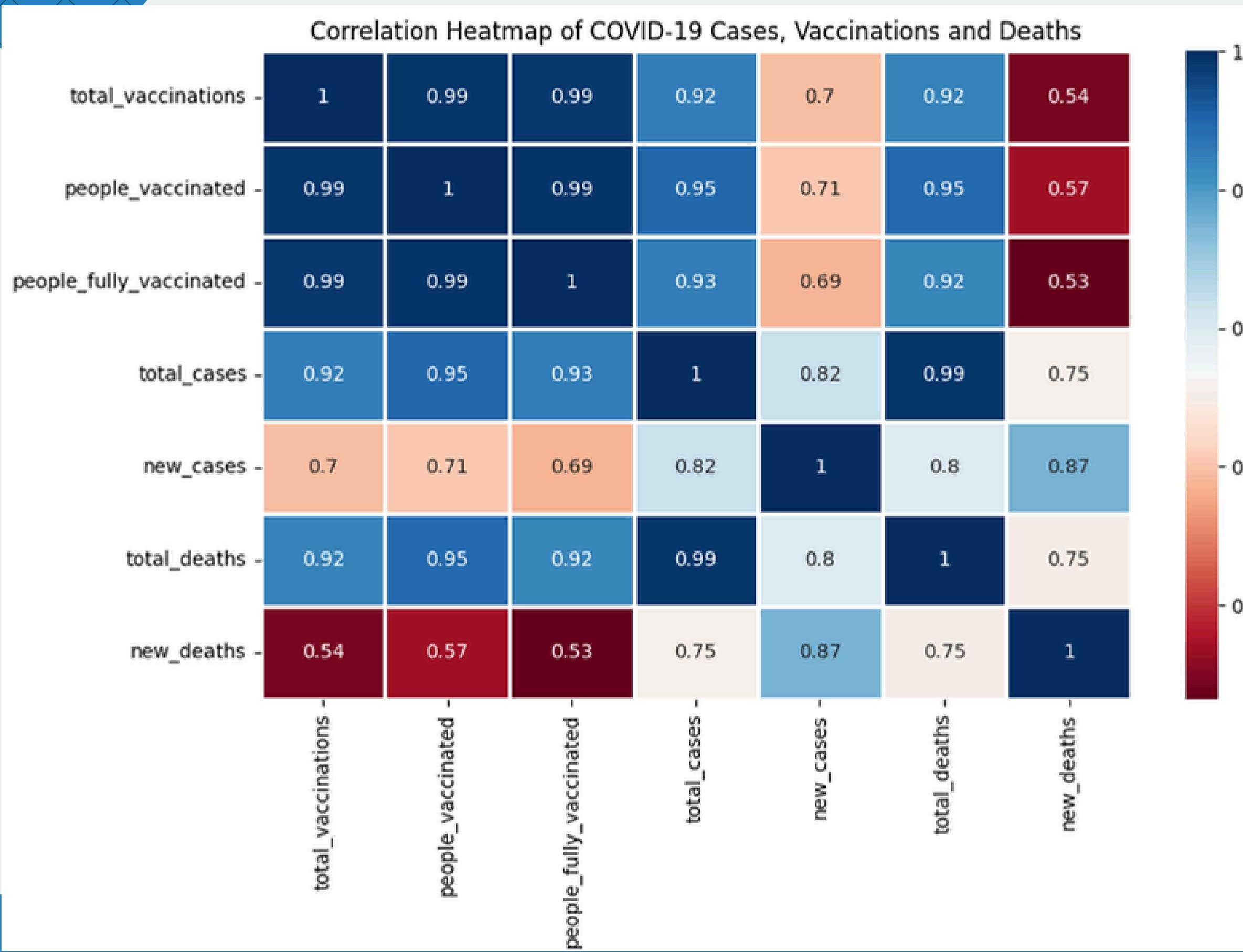
2. **Healthcare Spending:** Higher spending correlated with better pandemic responses (e.g., Norway, Sweden).

3. **Socioeconomic Factors:** Lower socioeconomic status linked to higher case rates due to limited healthcare access.

### Conclusion

Robust healthcare systems, early interventions, and vaccination are key to controlling COVID-19 effectively.

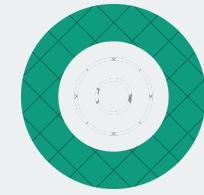
# Covid-19 Vaccination Data



Strong positive correlation between vaccinations and total cases: Vaccinations and total cases exhibit a strong positive correlation (~0.92), indicating that as vaccination efforts increase so did the recorded cases.

Strong positive correlation (~0.87) between new cases and new deaths, highlighting the direct relationship between spikes in cases and subsequent increases in deaths.

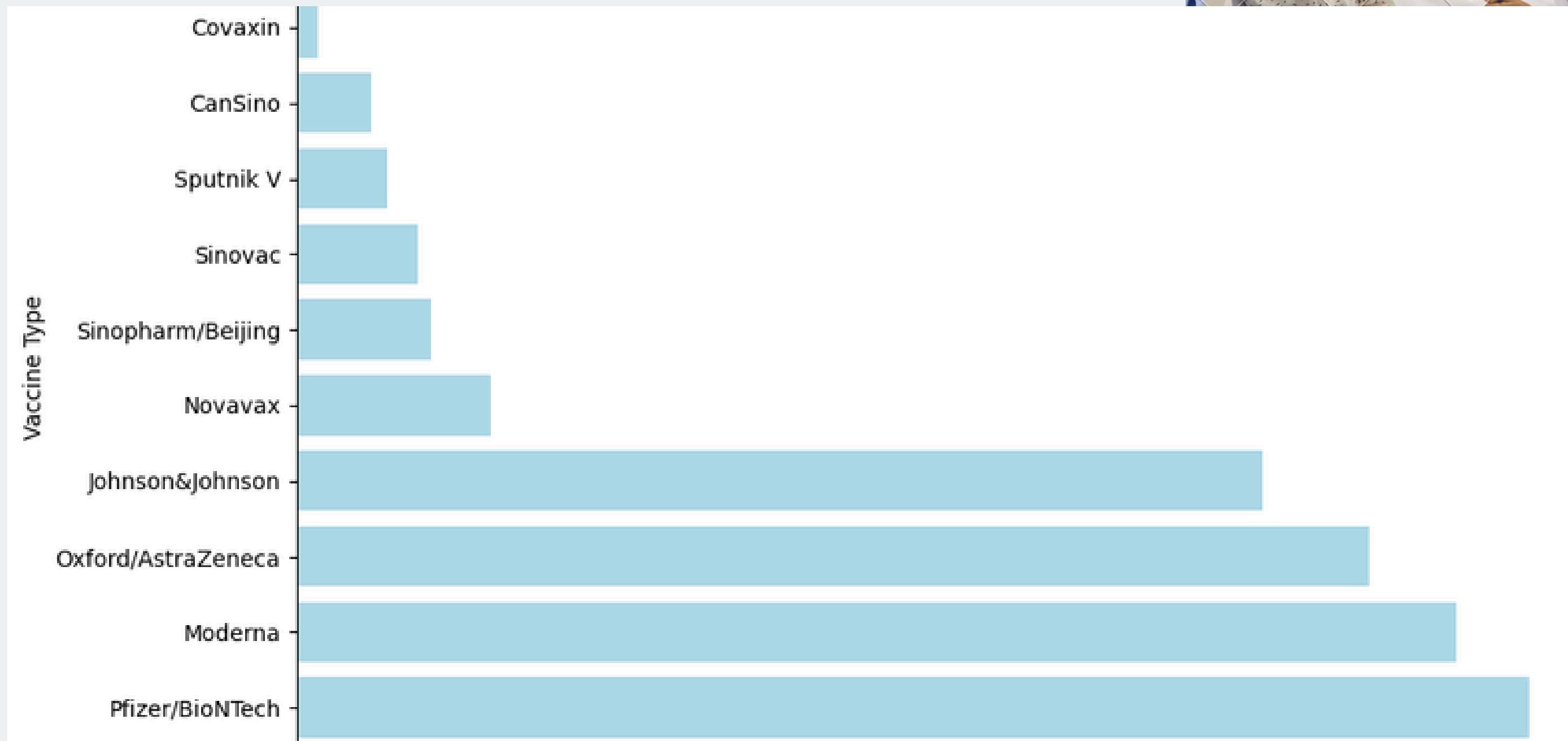
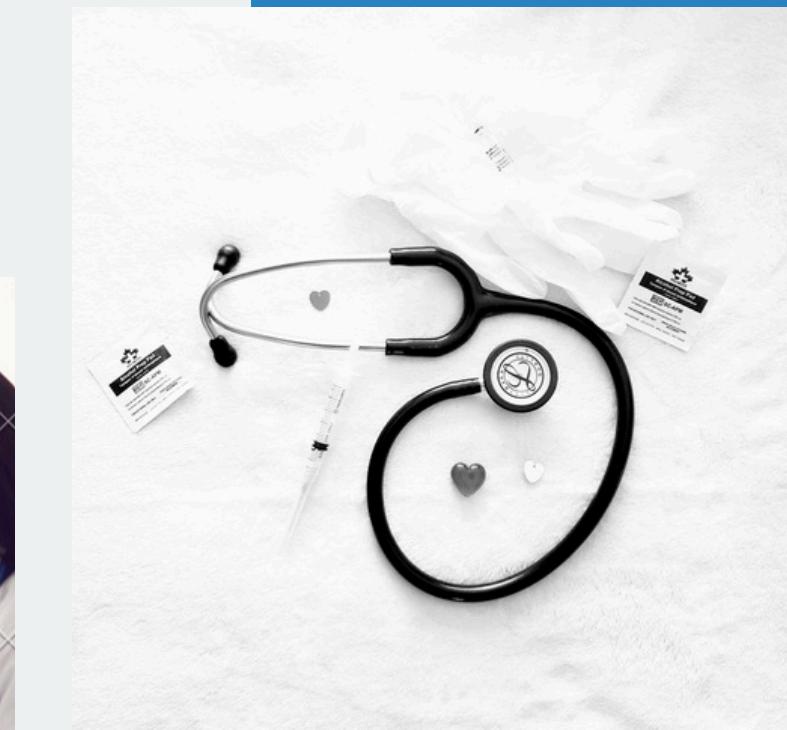
Moderate correlation (~0.53 to ~0.57) between vaccination numbers and new deaths, which may suggest a complex relationship where higher vaccinations don't immediately reduce death rates.



# VACCINATION TYPES

This bar chart displays the most commonly administered COVID-19 vaccines across various countries in 2021.

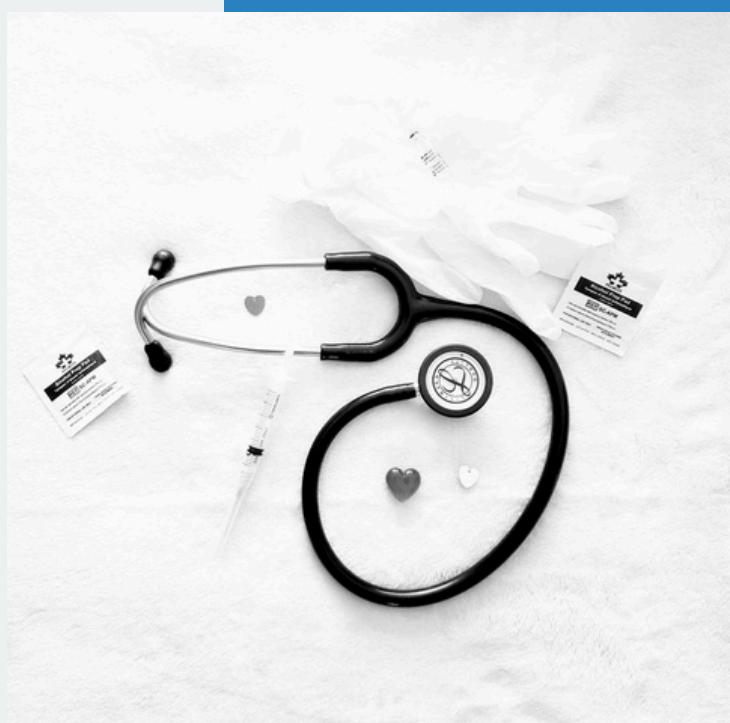
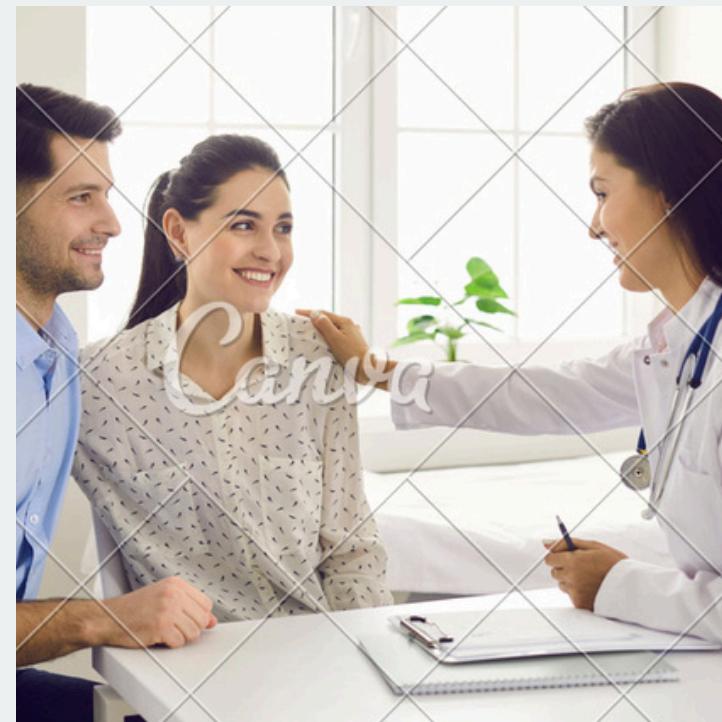
Pfizer/BioNTech leads as the most widely used vaccine, followed by Moderna and Oxford/AstraZeneca.



# Interactive COVID-19 Data Visualization

This Flask-based interactive dashboard allows users to select a country and view its COVID-19 New Cases in 2021 on a dynamic bar chart.

After selecting the desired country and clicking "Get Country Data," the dashboard updates to display the monthly COVID-19 cases specific to that country.



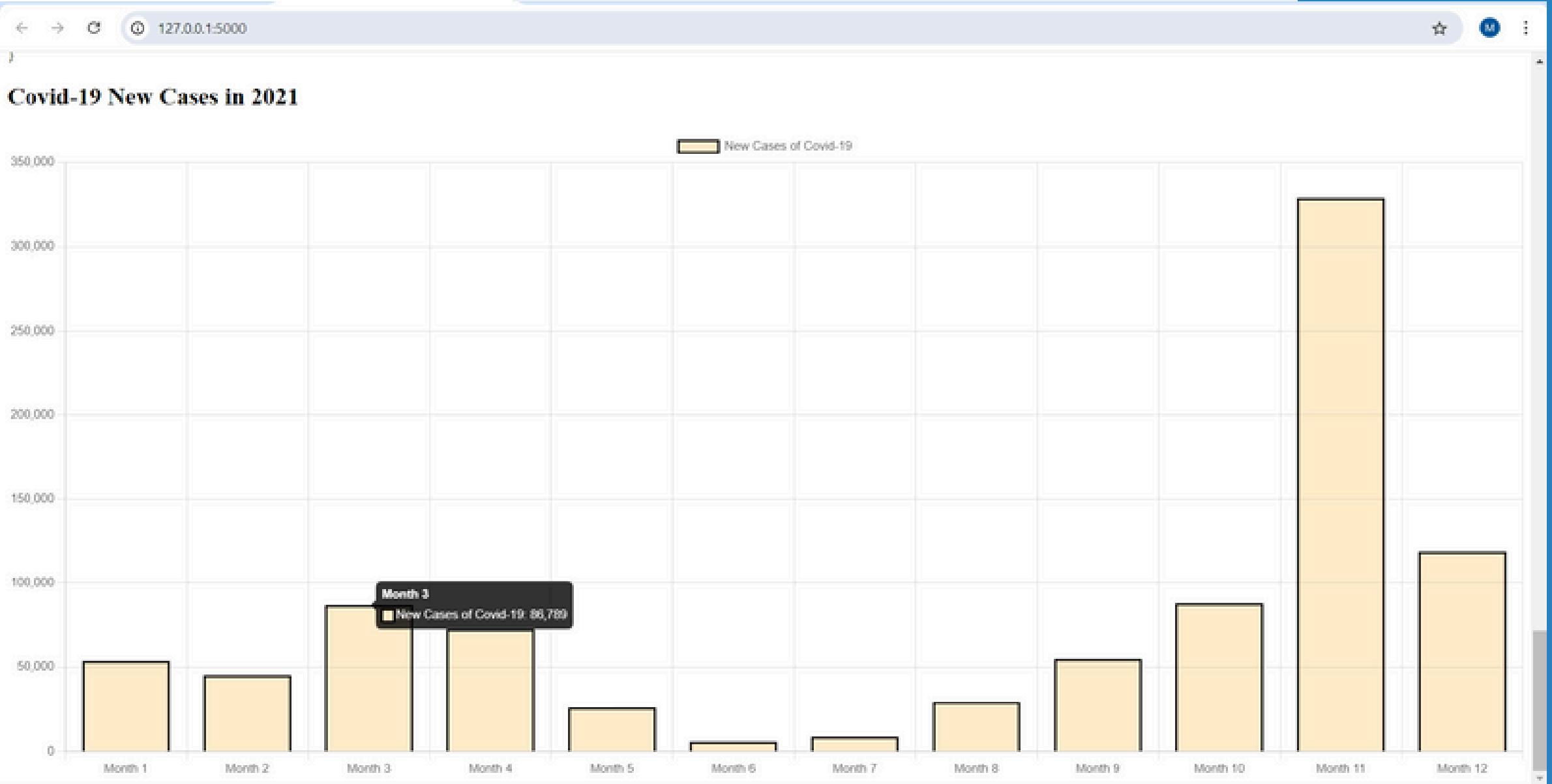
## COVID-19 Vaccination Data

Select a Country:

### Country Data

Country data will be shown here.

### Covid-19 New Cases in 2021



# VACCINATION - ANALYSIS

While vaccinations played a significant role in mitigating deaths, other external factors also impacted the COVID-19 case trajectory, indicating that comprehensive strategies are necessary for pandemic management.

- Despite increasing vaccination rates, there was no immediate drop in new cases. This could be attributed to factors like new variants, population density, and timing of vaccine rollout.
- The most widely used vaccines were Pfizer/BioNTech and Moderna across multiple countries.
- Strong correlations were found between total vaccinations and total cases (0.92) and total deaths (0.92).



Mobile Health Apps



24 Hours Services



*Is there a relationship between racial and ethnic groups and the number of COVID-19 cases?*

## DATASET

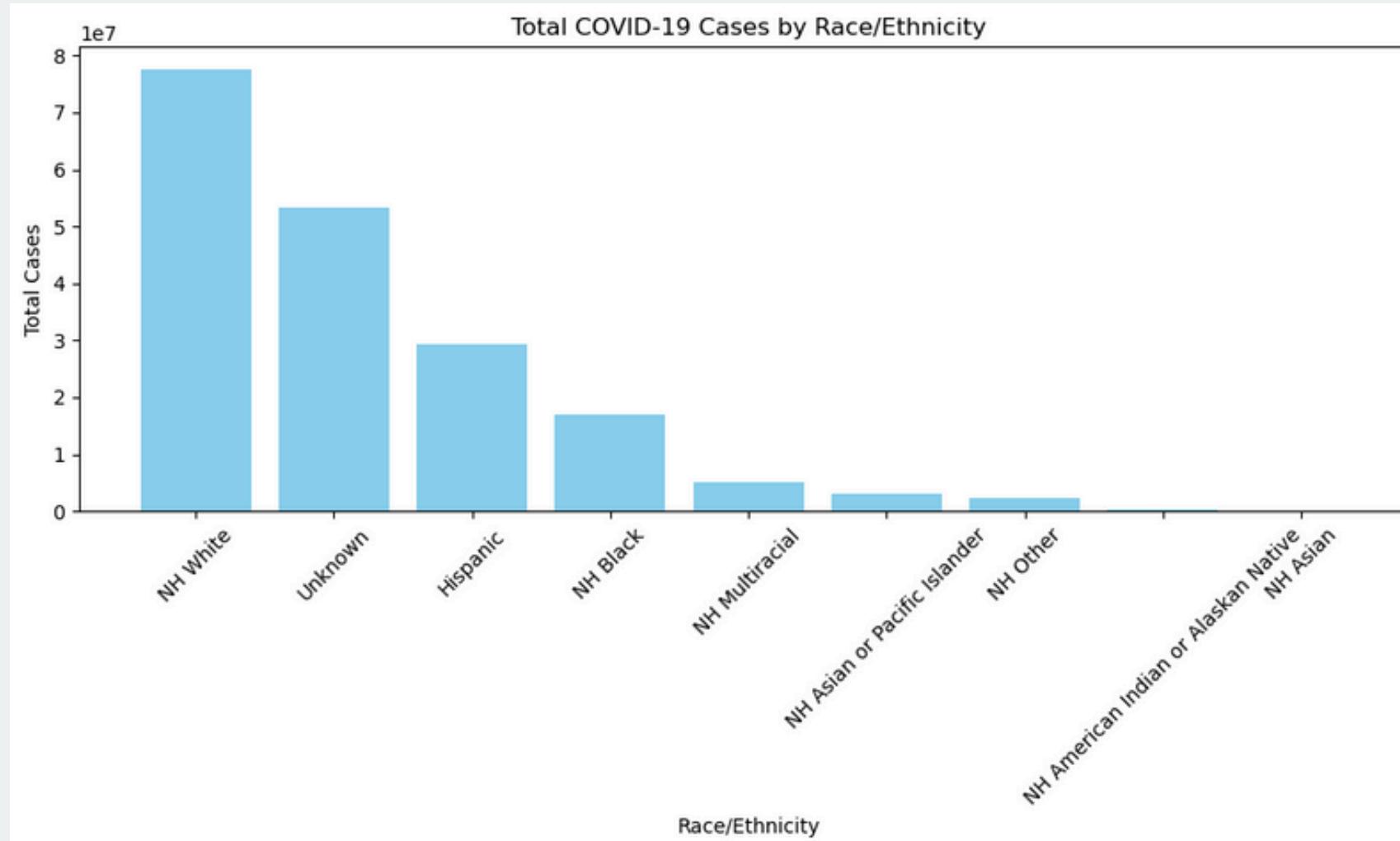
- Source: COVID-19 Cases and Deaths by Race/Ethnicity
- Key Variables: Race/Ethnicity, Total Cases, Total Deaths, Total Population

## METHODOLOGY

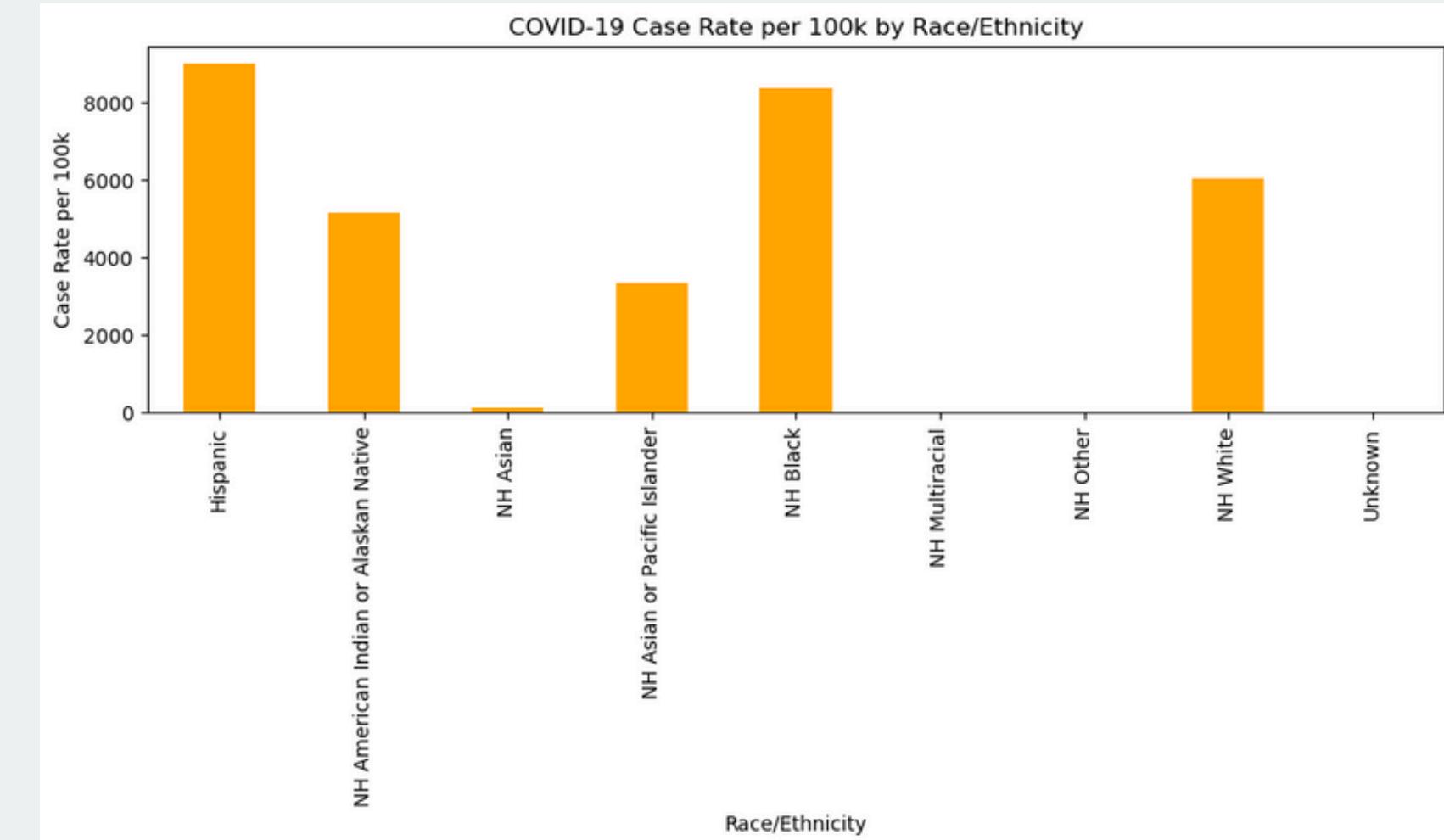
- Data Cleaning for missing values and data types
- Stored Data in a SQLite database
- Calculated case rates per 100,000 people

# KEY FINDINGS AND VISUALIZATIONS

## COVID-19 Case Rates by Race/Ethnicity



Non-Hispanic White have the most cases  
This graph represents the total cases for each group



This chart normalizes data per 100,000 people  
Hispanic group have the highest case rates

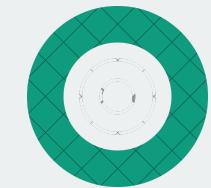
### *Correlation between total cases and total deaths*

	Total Cases	Total Deaths
Total Cases	1.000000	0.714432
Total Deaths	0.714432	1.000000

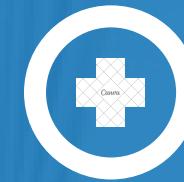
### *Correlation between case rate per 100k and total deaths*

	Cases per 100k	Total Deaths
Cases per 100k	1.000000	0.076028
Total Deaths	0.076028	1.000000

# CORRELATION ANALYSIS



- The correlation coefficient between total cases and total deaths is 0.714 which indicates a **strong positive correlation**.
- The coefficient between case rate per 100k and total number of deaths is 0.076 which indicates a **very weak correlation**.
- This means that other factors such as access to healthcare, demographics, and pre-existing conditions play a larger role.
- Having a higher infection rate does not necessarily lead to more deaths.



# THANK YOU

## GET IN TOUCH

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 *Toronto, ON*