

## DAC\_Phase5

Date	03 November 2023
Team ID	Proj_216194_Team_3
Project Name	COVID vaccine analysis

### Project Overview:

In this project, we conducted an in-depth analysis of Covid-19 vaccines, focusing on their effectiveness, distribution, and impact on the spread of the virus. This documentation outlines the problem statement, design thinking process, development phases, data sources, data preprocessing steps, analysis techniques, and key findings with recommendations.

### Problem Statement:

The Covid-19 pandemic posed a global health crisis, and the rapid development and distribution of vaccines became a critical strategy for mitigating the spread of the virus. The problem was to assess the effectiveness of these vaccines, understand their distribution, and provide data-driven insights for policymakers.

### Design Thinking Process:

- **Understanding the Problem:** We started by comprehensively understanding the challenges posed by the pandemic, including vaccination efforts, data availability, and global disparities.
- **Research and Ideation:** We collected and reviewed data from trusted sources, brainstormed potential analysis approaches, and considered various dimensions of the problem.
- **Data Analysis and Insights:** We employed data analysis techniques to derive insights and patterns, enabling us to draw meaningful conclusions.

# DEVELOPMENT PHASES:

## Phase 1 - Data Collection:

- **Data Sources:** Collected data from multiple sources, including the **World Health Organization (WHO)**, the Centers for Disease Control and Prevention (CDC), national and regional government health agencies, and global vaccination databases.

country	iso_code	date	total_vaccinat	people_vaccin	people_fully_v	daily_vaccin	daily_vacc	total_vacc	people_v	people_f	daily_vacc	vaccines	source	source_website
Afghanistan	AFG	22-02-2021	0	0					0	0			Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	23-02-2021						1367					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	24-02-2021						1367					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	25-02-2021						1367					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	26-02-2021						1367					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	27-02-2021						1367					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	28-02-2021	8200	8200				1367	0.02	0.02			Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	01-03-2021						1580					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	02-03-2021						1794					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	03-03-2021						2008					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	04-03-2021						2221					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	05-03-2021						2435					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	06-03-2021						2649					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	07-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	08-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	09-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	10-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	11-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	12-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	13-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	14-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	15-03-2021						2862					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	16-03-2021	54000	54000				2862	0.14	0.14			Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	17-03-2021						2882					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	18-03-2021						2902					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	19-03-2021						2921					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	20-03-2021						2941					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	21-03-2021						2961					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	22-03-2021						2980					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	23-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	24-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	25-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	26-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	27-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	28-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	29-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	30-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	31-03-2021						3000					Johnson & World Hei	https://covid19.who.int/
Afghanistan	AFG	01-04-2021						3000					Johnson & World Hei	https://covid19.who.int/

## Phase 2 - Data Preprocessing:

- **Data Cleaning:** Removed duplicates, handled missing values, and corrected inconsistencies.
- **Data Reduction:** Obtain reduced representation in volume but produces the same or similar analytical results.
- **Data Transformation:** Standardized data formats and units of measurement.
- **Feature Engineering:** Created new variables, including vaccination coverage rates, infection trends, and demographic variables.

# Data Preprocessing

## Data Cleaning

### Missing Data

1. Ignore The Tuple
2. Fill The Missing Values (manually, by mean or by most probable value)

### Noisy Data

1. Binning Method
2. Regression
3. Clustering

## Data Transformation

### Normalization

### Attribute Selection

### Discretization

### Concept Hiererchy Generation

## Data Reduction

### Data Cube Aggregation

### Attribute Subset Selection

### Numerosity Reduction

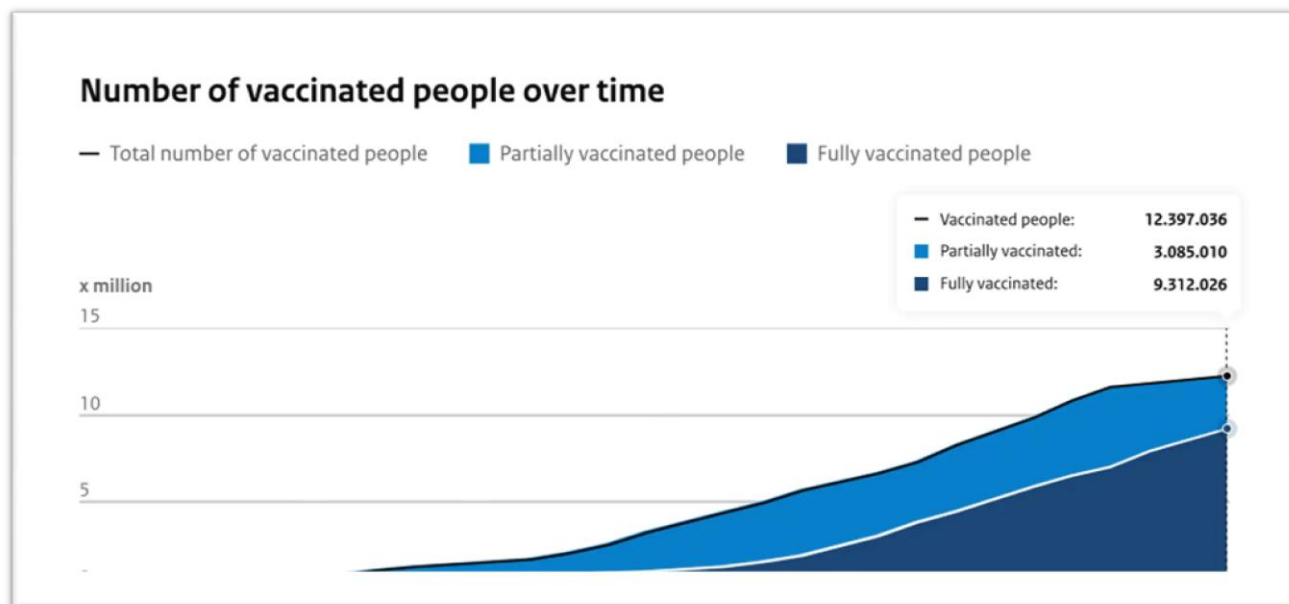
### Dimensionality Reduction

Link: [https://serokell.io/files/df/dfsdv4ab.2\\_\(23\)\\_\(1\).jpg](https://serokell.io/files/df/dfsdv4ab.2_(23)_(1).jpg)

## Phase 3 - Analysis Techniques:

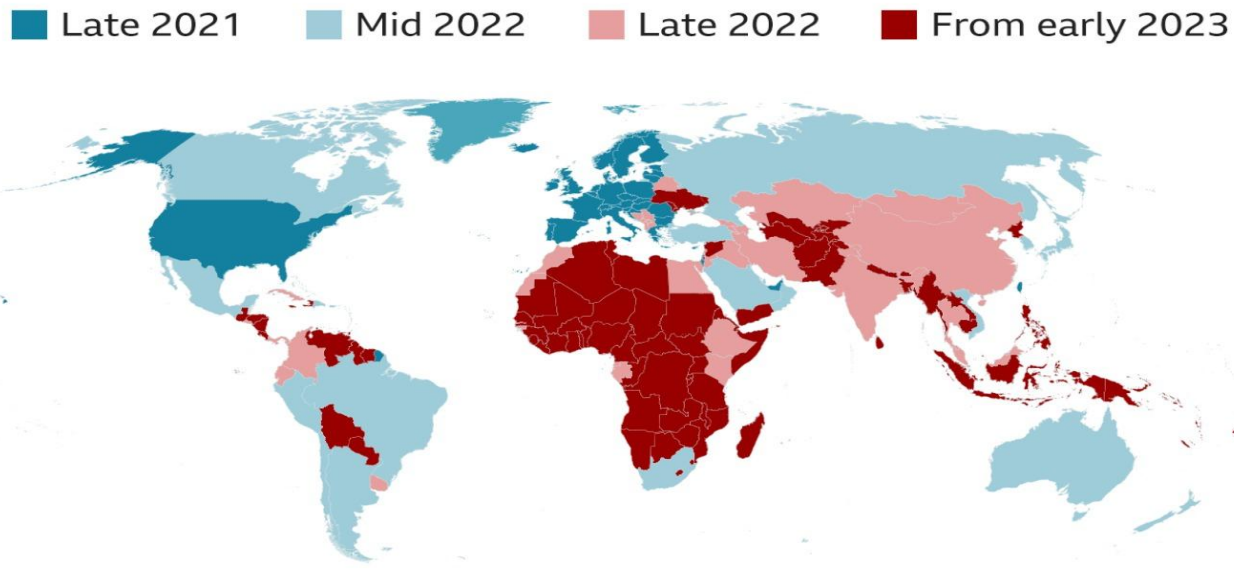
- **Descriptive Analysis:** Presented basic statistics, visualized trends, and explored data distributions.

- **Time Series Analysis:** Investigated temporal patterns of vaccination and infection rates.



### Geographic Analysis: Mapped vaccine distribution and Covid-19 cases by region.

## When will countries be fully covered?



Link: [116930007\\_vaccine\\_coverage\\_projection\\_robinson\\_map640-nc-2x-nc.png](http://116930007_vaccine_coverage_projection_robinson_map640-nc-2x-nc.png)  
(1280×878) (bbci.co.uk)

- **Statistical Tests:** Conducted hypothesis testing to evaluate vaccine efficacy.
- **Machine Learning:** Developed predictive models to forecast vaccination rates and assess potential future scenarios.

The screenshot displays a Microsoft Excel spreadsheet titled "country\_vaccinations\_by\_manufact". The spreadsheet is organized into columns labeled A through Z and rows numbered 1 through 40. The data is structured as follows:

location	date	vaccine	total_vaccinations
Argentina	29-12-2020	Moderna	2
Argentina	29-12-2020	Oxford/AstraZe	3
Argentina	29-12-2020	Sinopharm/Bej	1
Argentina	29-12-2020	Sputnik V	20481
Argentina	30-12-2020	Moderna	2
Argentina	30-12-2020	Oxford/AstraZe	3
Argentina	30-12-2020	Sinopharm/Bej	1
Argentina	30-12-2020	Sputnik V	40583
Argentina	31-12-2020	Moderna	2
Argentina	31-12-2020	Oxford/AstraZe	3
Argentina	31-12-2020	Sinopharm/Bej	1
Argentina	31-12-2020	Sputnik V	43388
Argentina	01-01-2021	Moderna	2
Argentina	01-01-2021	Oxford/AstraZe	5
Argentina	01-01-2021	Sinopharm/Bej	1
Argentina	01-01-2021	Sputnik V	43513
Argentina	02-01-2021	Moderna	2
Argentina	02-01-2021	Oxford/AstraZe	6
Argentina	02-01-2021	Sinopharm/Bej	1
Argentina	02-01-2021	Sputnik V	46824
Argentina	03-01-2021	Moderna	2
Argentina	03-01-2021	Oxford/AstraZe	6
Argentina	03-01-2021	Sinopharm/Bej	1
Argentina	03-01-2021	Sputnik V	47266
Argentina	04-01-2021	Moderna	2
Argentina	04-01-2021	Oxford/AstraZe	6
Argentina	04-01-2021	Sinopharm/Bej	1
Argentina	04-01-2021	Sputnik V	57726
Argentina	05-01-2021	Moderna	2
Argentina	05-01-2021	Oxford/AstraZe	6
Argentina	05-01-2021	Sinopharm/Bej	5
Argentina	05-01-2021	Sputnik V	68445
Argentina	06-01-2021	Moderna	2
Argentina	06-01-2021	Oxford/AstraZe	6
Argentina	06-01-2021	Sinopharm/Bej	8
Argentina	06-01-2021	Sputnik V	78551
Argentina	07-01-2021	Moderna	2
Argentina	07-01-2021	Oxford/AstraZe	7
Argentina	07-01-2021	Sinopharm/Bej	8

The Excel interface shows the "Home" tab selected, with various formatting options visible. The status bar at the bottom indicates the file is "Ready", the name is "country\_vaccinations\_by\_manufact", and the system clock shows "03-11-2023".

## **Key Findings and Insights:**

- **Vaccination Rates:** Identified regions with varying vaccination coverage, highlighting areas with both high and low coverage.
- **Effectiveness:** Analyzed the relationship between vaccination rates and infection rates, providing insights into vaccine efficacy.
- **Temporal Trends:** Observed how new vaccine rollouts influenced infection rates over time.
- **Geographic Disparities:** Highlighted areas with unequal access to vaccines and the impact on public health.
- **Demographic Insights:** Examined vaccination preferences and hesitancy among different population groups, aiding targeted strategies.

## **Recommendations:**

- **Targeted Vaccination Campaigns:** Encourage focused vaccination efforts in regions with low coverage.
- **Continuous Monitoring:** Continuously assess and adapt vaccination strategies based on effectiveness and emerging trends.
- **Address Vaccine Hesitancy:** Develop targeted campaigns to address hesitancy and improve access to vaccines.
- **Enhance Data Collection:** Collaborate with international organizations to enhance data collection and reporting.
- **Global Equity:** Advocate for global vaccine equity to ensure that vaccines reach underserved populations

## **Conclusion:**

The analysis of COVID vaccines indicates that they have been a crucial tool in the global effort to combat the pandemic. They have shown high efficacy in reducing the risk of severe illness and death, and widespread vaccination campaigns have contributed to a decrease in the spread of the virus. However, challenges such as vaccine distribution, hesitancy, and the emergence of variants require ongoing attention. Continued research and vaccination efforts are essential to manage and ultimately overcome the pandemic.