An Analysis of Covid-19 Vaccination Data from Across the Globe

Julia Burek and Ani Ponugoti

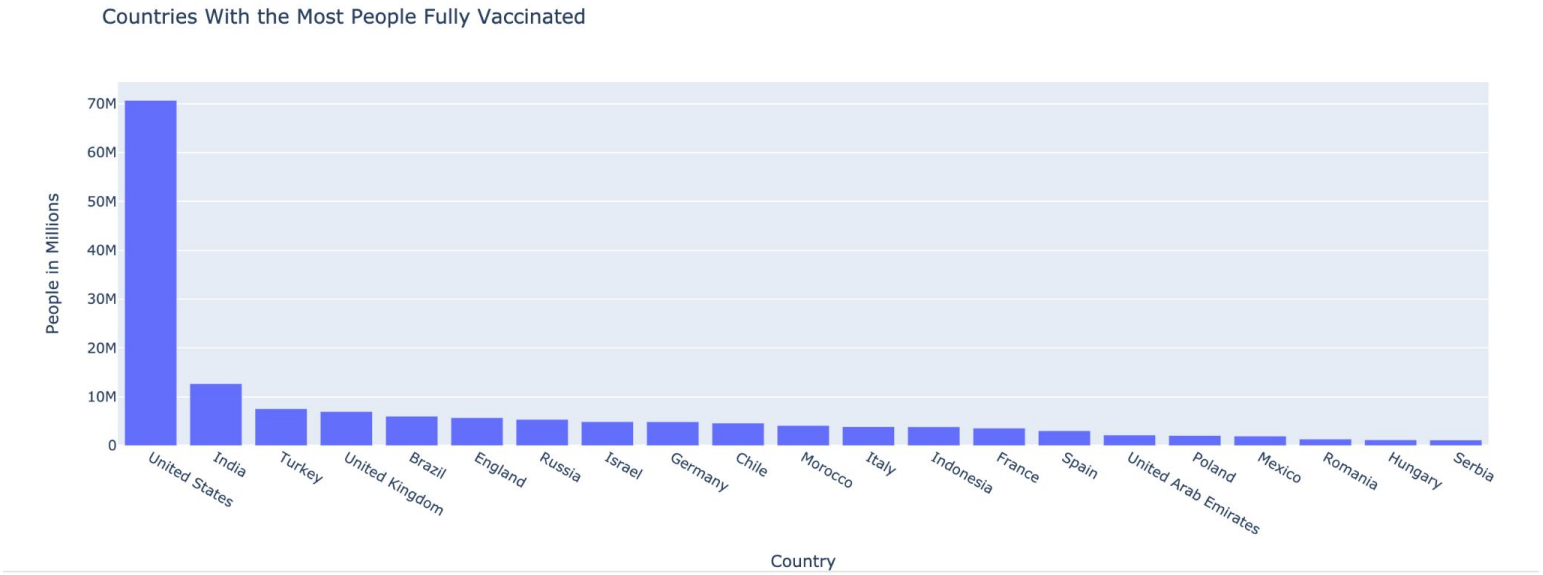
Objectives

- Analyze Covid-19 vaccination data from various countries around the world, with an emphasis on the United States data
- Research Questions:
  - Which countries are leading in vaccination rates?
  - How well is the United States doing in their vaccination efforts?
  - Based on the current vaccination rates, when will the United States population be vaccinated (at least one dose)?

Dataset

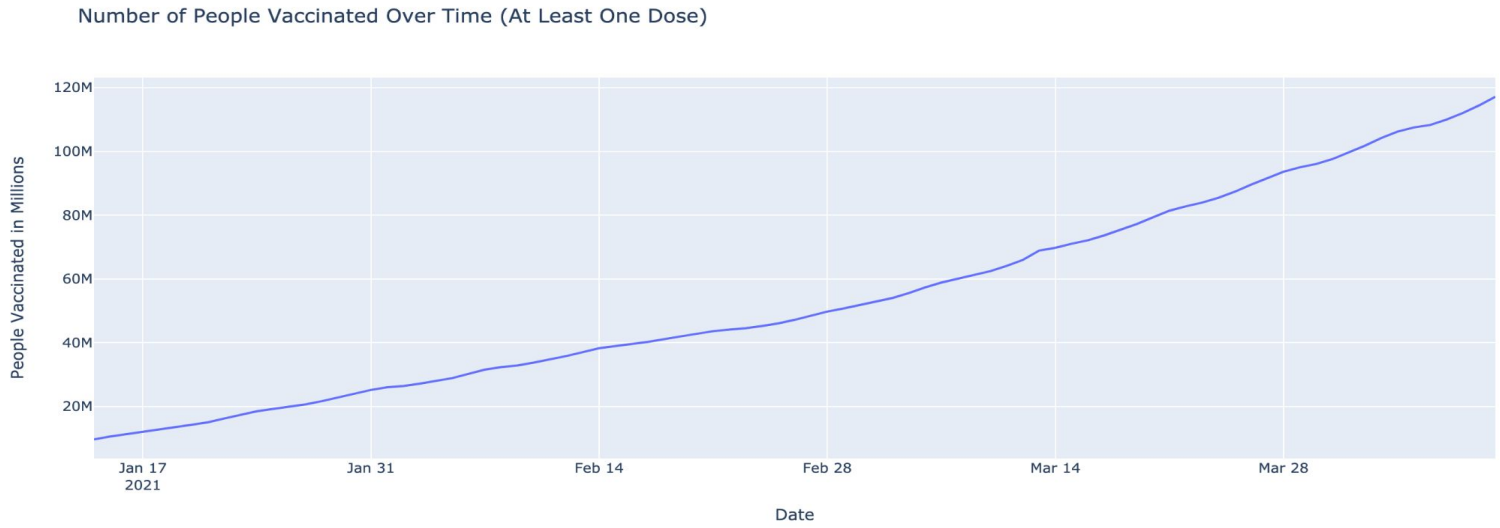
This dataset was obtained from Kaggle and contains Covid-19 vaccination data from various countries. The dataset includes the country, the country's iso code, date of entry, total number of vaccinations, total number of people vaccinated, total number of people fully vaccinated, daily vaccinations, total vaccinations per hundred, total number of vaccinations per hundred, total number of people fully vaccinated per hundred, number of vaccinations per day, daily vaccinations per million, vaccines used in the country, source where this information was found, and the website to the source.

Who is Leading the Race in Vaccinations?



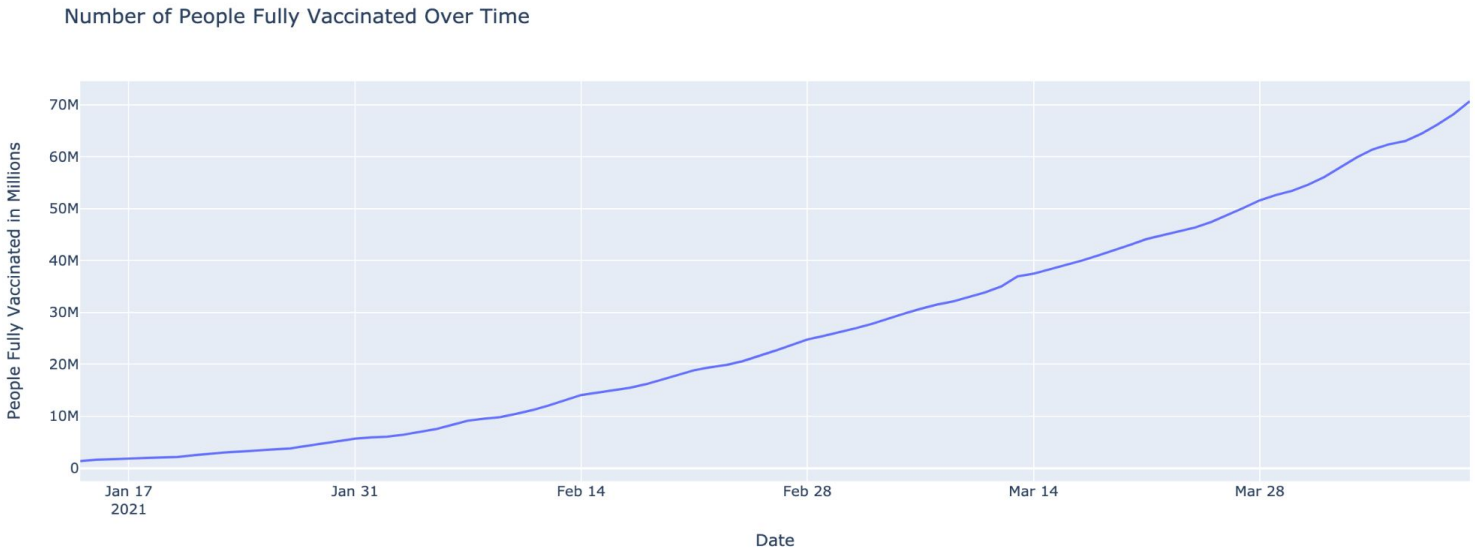
It is clear that the United States is leading the vaccination race with approximately 70M people fully vaccinated, according to this dataset. India follows with approximately 13M people fully vaccinated.

United States: At Least One Dose



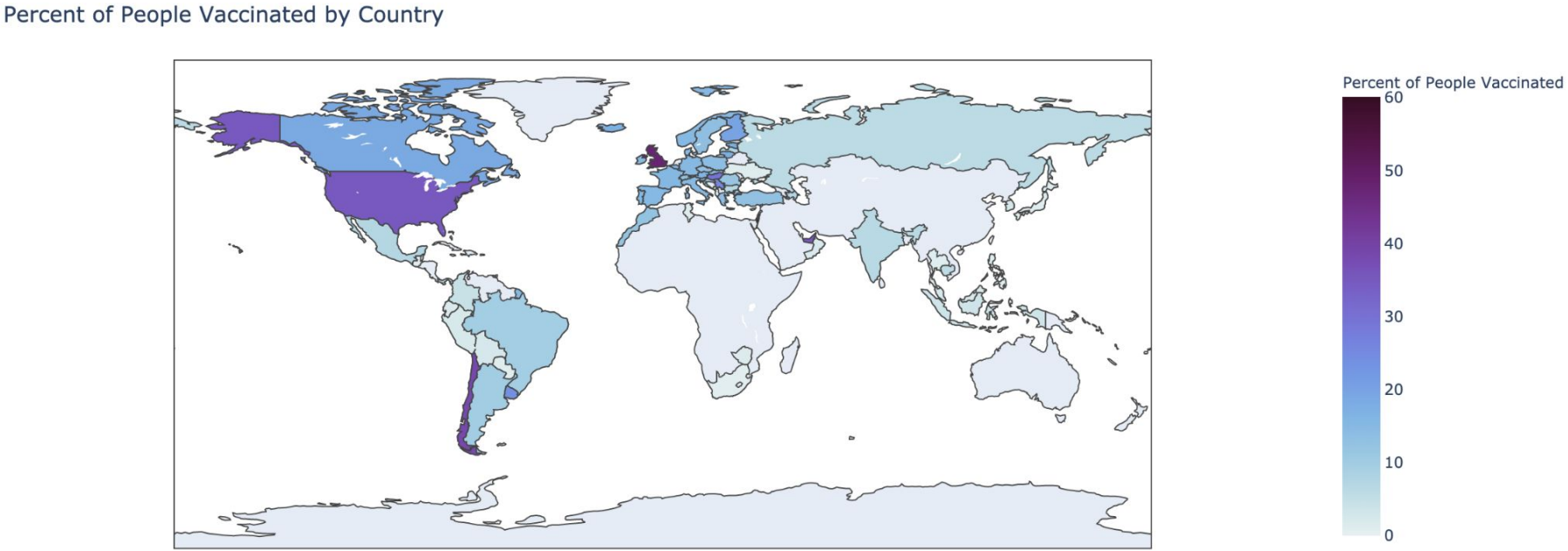
There are approximately 120M people who have been given at least one dose of the vaccine in the United States, according to this dataset.

United States: Fully Vaccinated



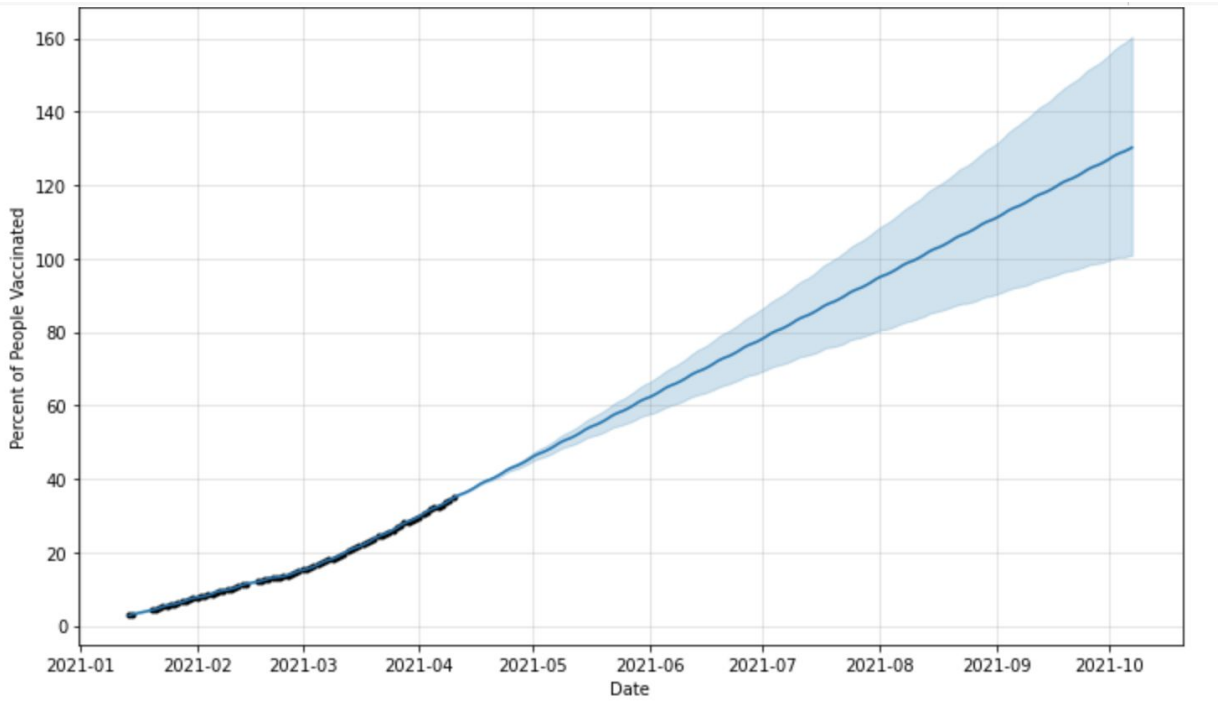
There are approximately 70M people fully vaccinated in the United States, according to this dataset.

Choropleth Map



According to this map, Israel, at 61.35%, has the highest percentage of people vaccinated (have gotten at least one dose). The United Kingdom at 47.15%, Chile at 38.47%, the United Arab Emirates at 35.19%, and the United States at 35.03%, follow.

Predictive Model for the United States' Vaccination Efforts



Based on this model, 100% of people in the United States are predicted to be vaccinated (at least one dose) by the beginning of August.

Predictive Model

- Facebook Prophet (Time-Series)
- The following metrics of accuracy were found for this model:
  - R^2 Score: 0.9999675039902911
    - A high R^2 value of 0.999 indicates that the model has high accuracy.
    - ↑R^2, ↑Accuracy of Prediction
  - Mean Squared Error: 0.0026305282813331 66
    - The mean squared error is low, at 0.0026, meaning the model is fairly accurate.
    - ↓MSE, ↑Accuracy of Prediction
  - Mean Absolute Error: 0.03708958146531375
    - The mean absolute error is fairly low, at 0.037, meaning there is little error between the actual and predicted observations, so the model's predictions are highly accurate.
    - ↓MAE, ↑Accuracy of Prediction

Limitations

- Because this dataset is updated with new data very often, our models and figures may not be giving a fully accurate depiction of Covid-19 vaccination efforts across the globe.
- The numbers of vaccinated individuals is likely lower in this dataset than the actual number of vaccinated individuals by the nature of this dataset.
- 100% of the U.S. population will likely not get vaccinated.
- Some countries’ vaccination efforts were not included in the dataset.

Future Analysis

- Predict when other countries' populations will be vaccinated using the same methods for the United States predictive model.
- Look at how external factors (poverty rates, education about vaccinations, political/personal beliefs, etc.) impact the availability of vaccines in a certain country or how likely one is to get vaccinated in a particular country.
- Explore the different types of vaccines used and the distribution of those particular vaccines in various countries.