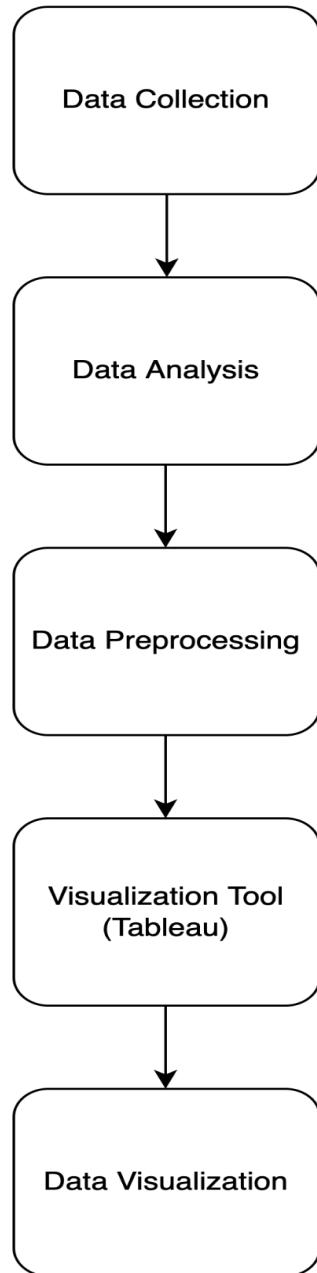


Team Members: Kishan Patel (922243969), Manali Seth (922053012)

Visualization Project - Project Implementation

1) System Architecture



Tools and Technologies

Programming Language: Python

Libraries: Pandas, Numpy

Tool: Visual Studio Code, Tableau

Exploratory visualization dashboards include analyzing data via line chart, pie chart, map, bar chart and area chart. We can view confirmed and death cases country-wise globally and state-wise for the USA.

2) Data set Description

COVID19 dataset is collected by Johns Hopkins Center for Systems Science and Engineering (CSSE) and John Hopkins Center for Civic Impact (CCI). It includes datasets based on time-series, US and non-US locations for vaccinations, cases and deaths. The data is collected since January 2020 and is updated on a regular basis, making this a dynamic and scalable dataset.

Field Description:

- Province_State - The name of the State within the USA.
- Country_Region - The name of the Country (USA).
- Last_Update - The most recent date the file was pushed. MM/DD/YYYY HH:mm:ss (24 hour format, in UTC).
- Lat - Latitude.
- Long_ - Longitude.
- Confirmed - Aggregated case count. Counts include confirmed and probable (where reported).
- Deaths - Aggregated death toll. Counts include confirmed and probable (where reported).
- Recovered - Aggregated Recovered case count.
- Active - Aggregated confirmed cases that have not been resolved (Active cases = total cases - total recovered - total deaths).
- FIPS - USA only. Federal Information Processing Standards code that uniquely identifies counties within the USA.
- Admin2: County name. USA only.
- Incident_Rate - cases per 100,000 persons.
- Total_Test_Results - Total number of people who have been tested.
- People_Hospitalized - Total number of people hospitalized.
- Case_Fatality_Ratio - Number recorded deaths * 100/ Number confirmed cases.
- UID - Unique Identifier for each row entry.
- ISO3 - Officially assigned country code identifiers.
- Testing_Rate - Total test results per 100,000 persons. The "total test results" are equal to "Total test results (Positive + Negative)"
- Hospitalization_Rate - USA Hospitalization Rate (%): = Total number hospitalized / Number cases.

- **Confirmed and Death Cases:**

Source:

https://github.com/CSSEGISandData/COVID-19/tree/master/csse_covid_19_data/csse_covid_19_time_series

Description:

time_series_covid19_confirmed_global

```
RangeIndex: 289 entries, 0 to 288
Columns: 1056 entries, Province/State to 12/8/22
dtypes: float64(2), int64(1052), object(2)
```

time_series_covid19_deaths_global

```
RangeIndex: 289 entries, 0 to 288
Columns: 1056 entries, Province/State to 12/8/22
dtypes: float64(2), int64(1052), object(2)
```

time_series_covid19_confirmed_US

```
RangeIndex: 3342 entries, 0 to 3341
Columns: 1063 entries, UID to 12/8/22
dtypes: float64(3), int64(1054), object(6)
```

time_series_covid19_deaths_US

```
RangeIndex: 3342 entries, 0 to 3341
Columns: 1064 entries, UID to 12/8/22
dtypes: float64(3), int64(1055), object(6)
```

- **Vaccination Data:**

Source:

https://github.com/govex/COVID-19/tree/master/data_tables/vaccine_data

Description:

time_series_covid19_vaccine_global

```
RangeIndex: 126517 entries, 0 to 126516
Data columns (total 6 columns):
 #   Column           Non-Null Count   Dtype  
 ---  --  
 0   Date             126517 non-null    object 
 1   UID              125807 non-null    float64
 2   Province_State   0 non-null       float64
 3   Country_Region   126517 non-null    object 
 4   Doses_admin      126509 non-null    float64
 5   People_at_least_one_dose 126517 non-null    int64  
dtypes: float64(3), int64(1), object(2)
```

time_series_covid19_vaccine_US

```
RangeIndex: 41459 entries, 0 to 41458
Data columns (total 8 columns):
 #   Column           Non-Null Count   Dtype  
 ---  --  
 0   Date             41459 non-null    object 
 1   UID              41459 non-null    int64  
 2   Province_State   40735 non-null    object 
 3   Country_Region   41459 non-null    object 
 4   Doses_admin      41459 non-null    int64  
 5   People_at_least_one_dose 41459 non-null    int64  
 6   People_fully_vaccinated 41459 non-null    int64  
 7   Total_additional_doses 41459 non-null    int64  
dtypes: int64(5), object(3)
```

- COVID 19 data

- 1) Source:

https://raw.githubusercontent.com/CSSEGISandData/COVID-19/web-data/data/cases_country.csv

Description:

```
RangeIndex: 201 entries, 0 to 200
Data columns (total 16 columns):
 #   Column           Non-Null Count  Dtype  
--- 
 0   Country_Region    201 non-null    object  
 1   Last_Update       201 non-null    object  
 2   Lat                199 non-null    float64 
 3   Long_              199 non-null    float64 
 4   Confirmed         201 non-null    int64  
 5   Deaths             201 non-null    int64  
 6   Recovered          0 non-null     float64 
 7   Active              0 non-null     float64 
 8   Incident_Rate     196 non-null    float64 
 9   People_Tested      0 non-null     float64 
 10  People_Hospitalized 0 non-null    float64 
 11  Mortality_Rate    201 non-null    float64 
 12  UID                201 non-null    int64  
 13  ISO3               197 non-null    object  
 14  Cases_28_Days     201 non-null    int64  
 15  Deaths_28_Days    201 non-null    int64  
dtypes: float64(8), int64(5), object(3)
```

2) Source:

https://raw.githubusercontent.com/CSSEGISandData/COVID-19/web-data/data/cases_time.csv

Description:

```
RangeIndex: 272468 entries, 0 to 272467
Data columns (total 17 columns):
 #   Column           Non-Null Count  Dtype  
--- 
 0   Country_Region    272468 non-null   object  
 1   Last_Update       272468 non-null   datetime64[ns]
 2   Confirmed         272468 non-null   int64   
 3   Deaths            272468 non-null   int64   
 4   Recovered         0 non-null        float64 
 5   Active             0 non-null        float64 
 6   Delta_Confirmed   272185 non-null   float64 
 7   Delta_Recovered   0 non-null        float64 
 8   Incident_Rate     264052 non-null   float64 
 9   People_Tested     0 non-null        float64 
 10  People_Hospitalized 0 non-null      float64 
 11  Province_State    61016 non-null    object  
 12  FIPS              61016 non-null    float64 
 13  UID               272468 non-null   int64   
 14  iso3              268260 non-null   object  
 15  Report_Date_String 272468 non-null   object  
 16  Delta_Deaths      271972 non-null   float64 
dtypes: datetime64[ns](1), float64(9), int64(3), object(4)
```

3) System Description

Countrywise Confirmed Cases and Deaths

A world map shows how different countries worldwide are affected by COVID19. Upon hovering over any region on the world map, the tooltip shows the country name, number of confirmed cases and number of deaths. On the right top, there is a scale showing the range of confirmed cases and deaths. There is a filter option provided to select any country and that will be highlighted on the world map. On the bottom, there are two line charts showing the number of confirmed cases and deaths for the selected country. Selecting a line on line chart shows country name, month and number of cases/deaths.

USA Statewise Confirmed Cases and Deaths

The USA map shows how different states are affected by COVID19. Upon hovering over any region on the USA map, the tooltip shows the state, number of confirmed cases and number of deaths. On the right top, there is a scale showing the range of confirmed cases and deaths. There is a filter option provided to select any country and that will be highlighted on the USA map. On the bottom, there are two line charts showing the number of confirmed cases and deaths for the selected country. Selecting a line on line chart shows state, month and number of cases/deaths.

Countrywise People Vaccinated

A world map shows the number of people with at least one dose of vaccination taken. Upon hovering over any region on the world map, the tooltip shows the country name and number of people with at least one dose. On the right top, there is a dropdown to select any country and get its vaccination information. Below the world map is a progression bar showing variations in the number of vaccination doses during different months of the year starting December 2020. Along with the map, there is a pie chart in the bottom right displaying the percentage of population with at least one dose and the percentage of population with no doses. At the bottom, a table shows values for total population, number of people with at least one dose and the number of people with no doses for the selected country.

USA Statewise People Vaccinated

The USA map shows the number of people with at least one dose of vaccination taken. Upon hovering over any region on the USA map, the tooltip shows the state, number of people with at least one dose and number of people fully vaccinated. On the right top, there is a dropdown to select any USA state and get its vaccination related information. Below the USA map is a progression bar showing variations in the number of vaccination doses during different months of the year starting December 2020. Along with the map, there is a pie chart in the bottom right displaying the percentage of population not vaccinated, percentage of population fully vaccinated, percent of population partially vaccinated. At the bottom, a table shows values for total population, number of people fully vaccinated, number of people partially vaccinated and number of people not vaccinated for the selected state.

Countrywise New Cases and Deaths

The dual axis line and bar chart shows the number of cases and number of deaths globally over different months. On the right top, there is a dropdown to select a country to show its new cases and deaths information. Upon hovering on the bar chart or line chart, the tooltip shows month and new cases/deaths.

USA Statewise New Cases and Deaths

The dual axis line and bar chart shows the number of cases and number of deaths statewise for the USA over different months. On the right top, there is a dropdown to select a state to show its new cases and deaths information. Upon hovering on the bar chart or line chart, the tooltip shows month and new cases/deaths.

Countrywise Total Doses Administered

An area graph showing total doses administered over different months countrywise. Upon hovering on any region on the chart, the tooltip shows country name, month and total doses administered.

USA Statewise Total Doses Administered

An area graph showing total doses administered over different months statewise for the USA. Upon hovering on any region on the chart, the tooltip shows state, month and total doses administered.

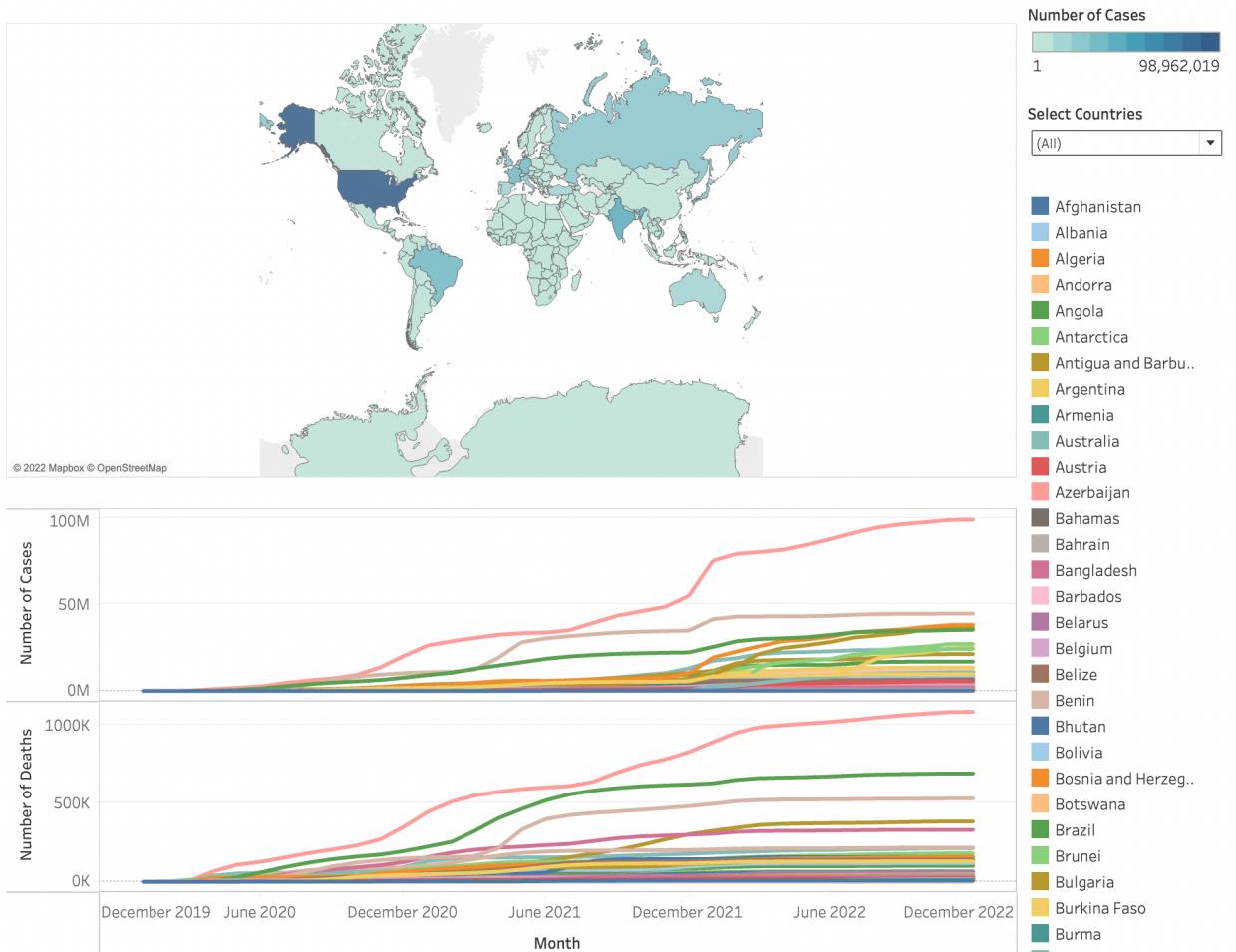
4) Screenshots



Home Page

How are different countries of the world affected by Covid-19 cases and deaths

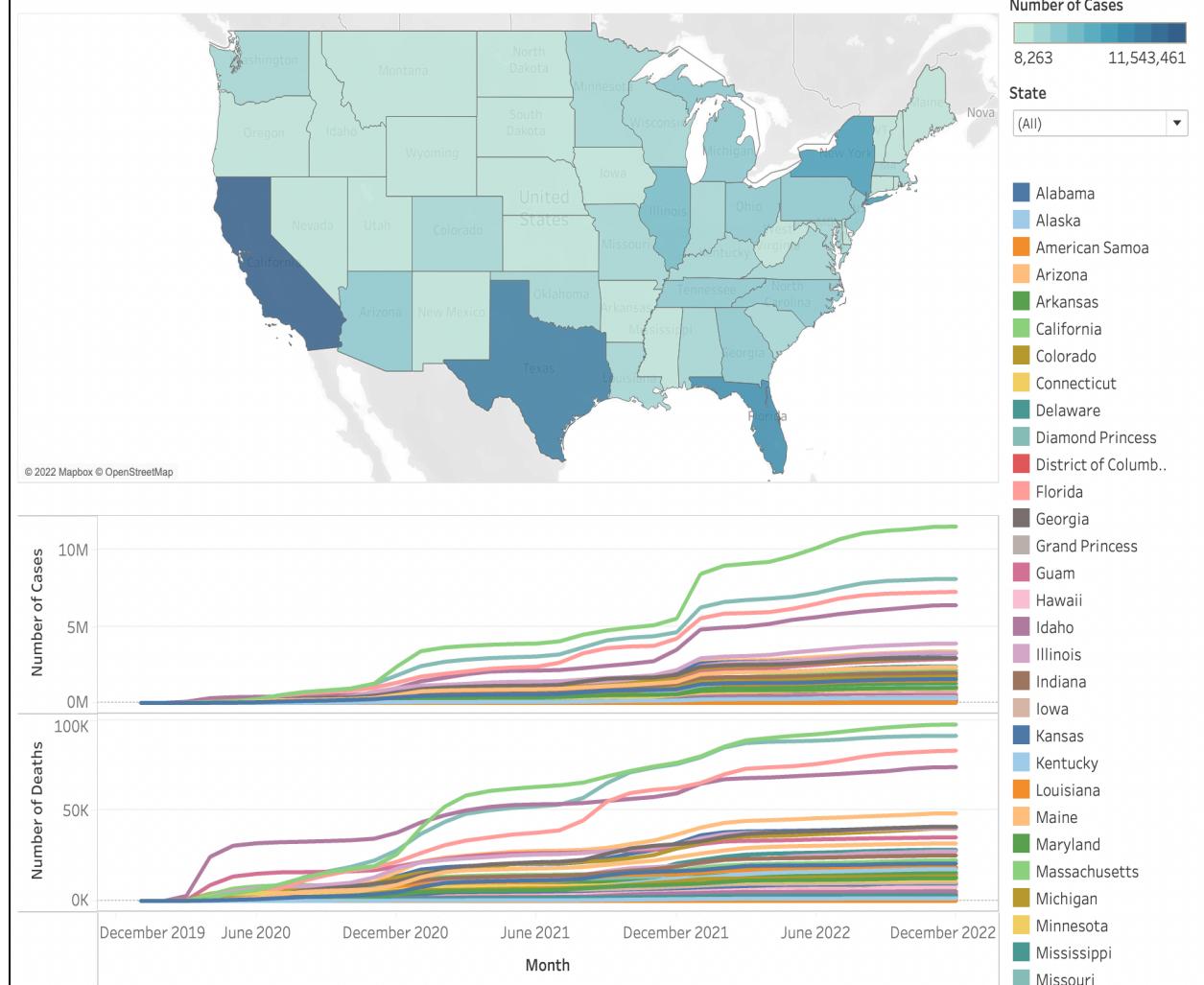
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Countrywise Cases and Deaths

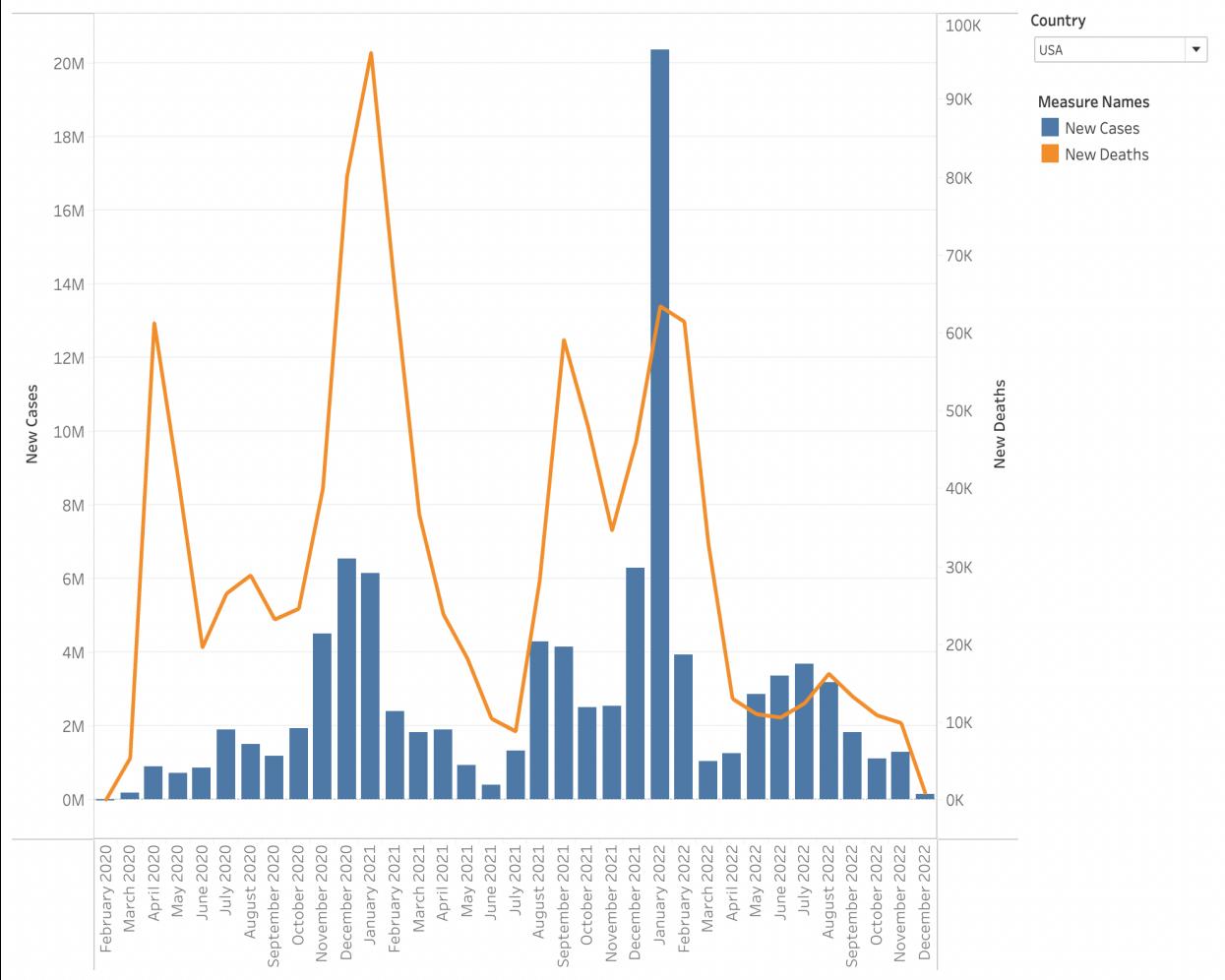
How are different states of the US affected by COVID-19 cases and deaths

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USA Statewise Cases and Deaths

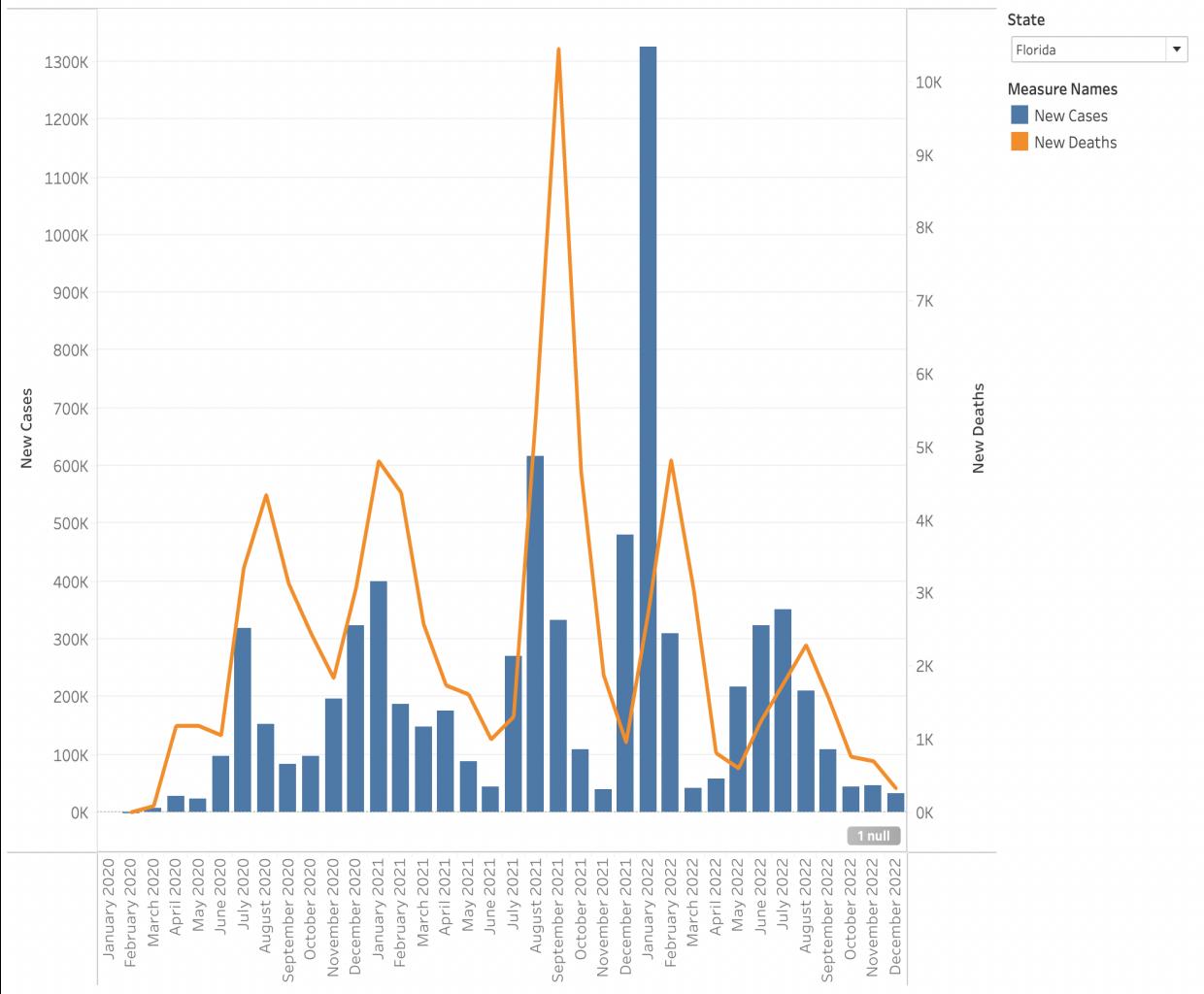
Countrywise New Cases and Deaths

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Countrywise New Cases and Deaths

USA Statewise New Cases and Deaths

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USA Statewise New Cases and Deaths

How does different countries in the world compare in terms of number of people vaccinated

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January 2021



US

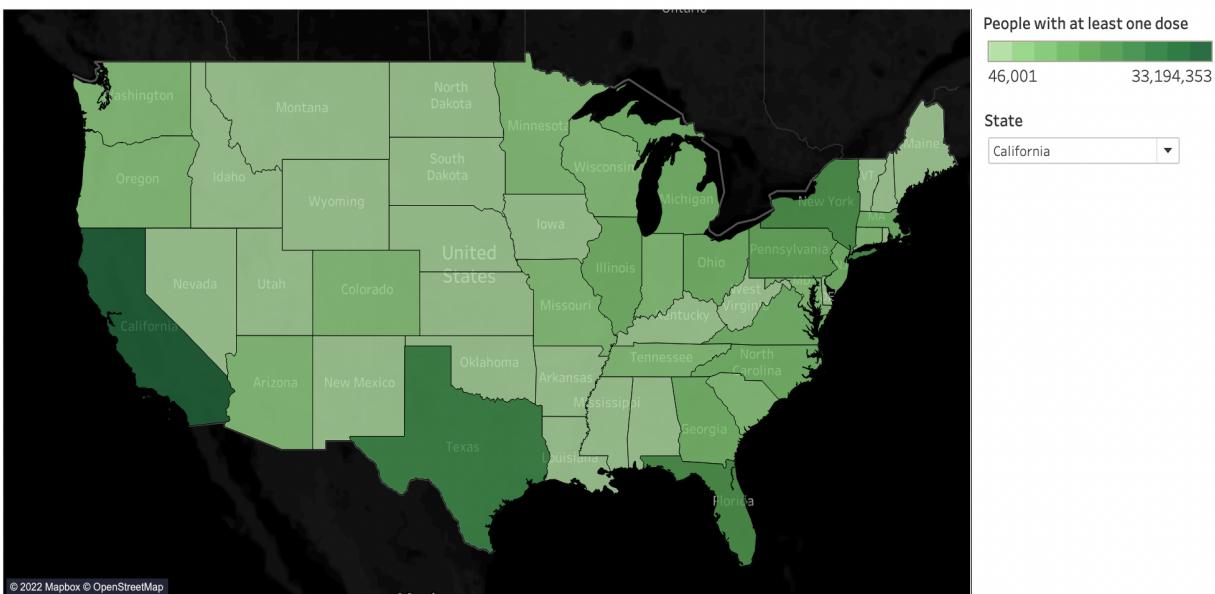
Population	338,289,857
People with at least one dose	29,556,868
People with no doses	308,732,989



Countrywise People Vaccinated

How does different states of the US compare in terms of number of people vaccinated

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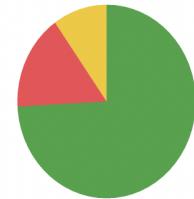


December 2022



California

Population	39,512,223
People fully vaccinated	29,309,317
People partially vaccinated	3,885,036
People not vaccinated	6,317,870

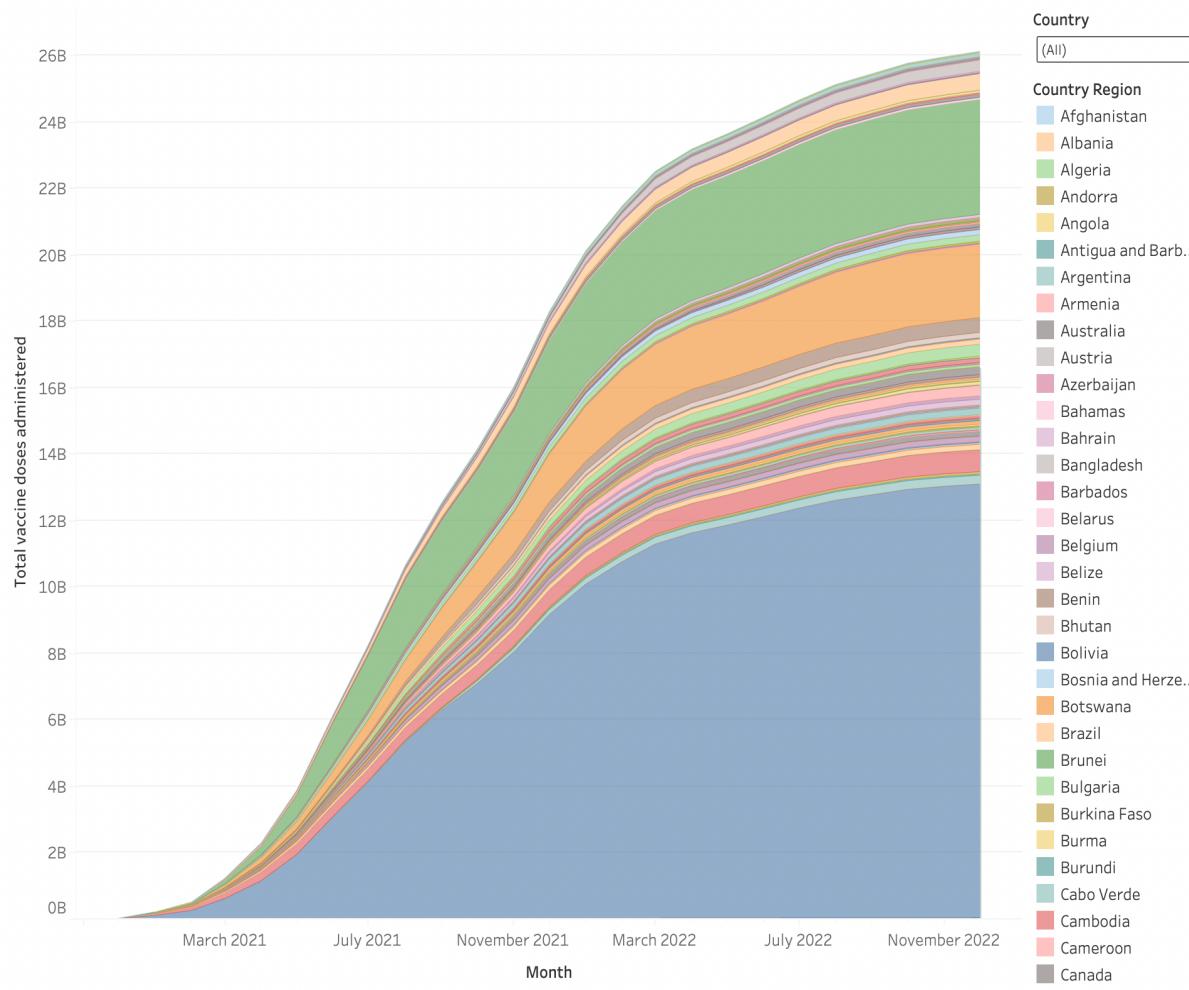


- Percent of population fully vaccinated
- Percent of population not vaccinated
- Percent of population partially vacc..

USA Statewise People Vaccinated

Countrywise Total Doses Administered

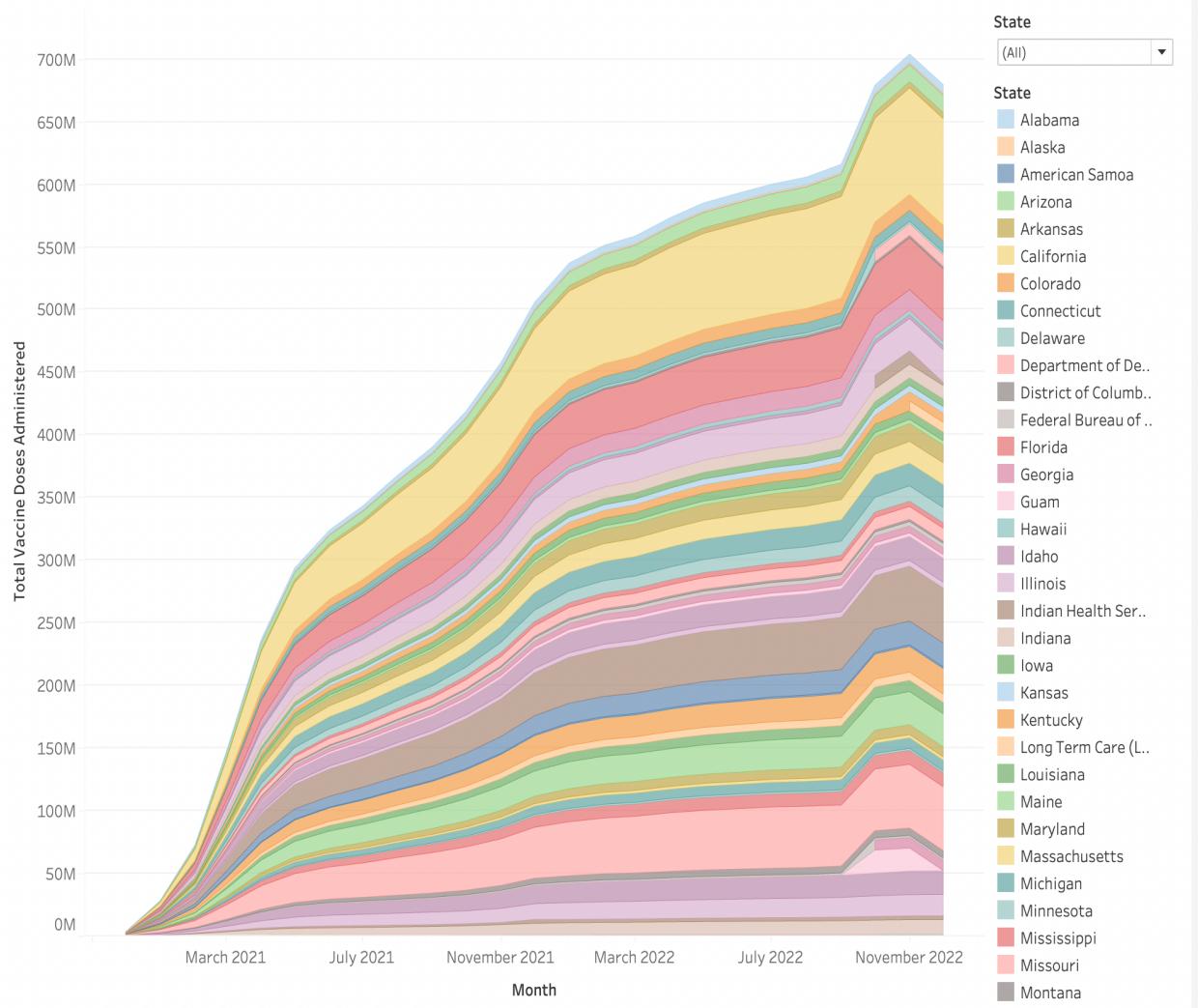
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Countrywise Total Doses Administered

USA Statewise Total Doses Administered

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USA Statewise Total Doses Administered