

Project Report on
“COVID – 19 ANALYSIS”

Submitted as Major Project as the award of the degree
Of

Master's of Computer Application

SILIGURI INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER APPLICATION



SILIGURI INSTITUTE OF TECHNOLOGY

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I would like to show our greatest appreciation to Prof. Tumpa Banerjee. I always feel motivated and encouraged every time by her valuable advice and constant inspiration , without her encouragement and guidance this project would not have materialized.

CERTIFICATE OF ORIGINALITY

This is to certify that the project report entitled **COVID-19 ANALYSIS** submitted to Department of Computer Application, Siliguri Institute of Technology , affiliated to Maulana Abul Azad University of Technology (MAKAUT) for the Award of **Master's of Computer Application (MCA)**, is an original work carried out by Mr./Ms. **Shikha Kumari** RollNo: **33671020017** and Mr./Ms. **Subhajit Sarkar** RollNo.: **33671020019** under the guidance of **Prof. Tumpa Banerjee**.

SELF CERTIFICATE

This is to certify that this project untitled “ **Covid 19 Analysis** ”submitted as Major Project for the award of the degree of MASTER OF COMPUTER APPLICATION is an authentic work which is done by me under the guidance of Mrs. Tumpa Banerjee . The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Shikha Kumari
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SELF CERTIFICATE

This is to certify that this project untitled “ **Covid 19 Analysis** ”submitted as Major Project for the award of the degree of MASTER OF COMPUTER APPLICATION is an authentic work which is done by me under the guidance of Mrs. Tumpa Banerjee . The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Subhajit Sarkar
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INTRODUCTION

The full name of COVID-2019 is the Coronavirus disease of 2019, which has created panic in the whole world. Novel COVID-2019 has been reported to be the most harmful and dangerous in the world since the 1918 H1N1 influenza epidemic. Based on the report of the World Health Organization, by April 10, 2020, a total of 15,225,252 case reports were filed and a total of 100,075 deaths occurred. Thus, it can be said that COVID-2019 has been spreading very fast since the first December 2020 to till date. Till now COVID-2019 has spread in 172 countries. At present, the highest number of cases has been found in the United States of America (USA). COVID2019 is a terrible contagious disease that results in very rapid movement from one person to another people. The COVID-2019 epidemic is a member of the family of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). Thus here it can be said that coronavirus is a contagious disease. The invention of the coronavirus was first discovered in 2002 and 2012 from China and Saudi Arabia respectively. Corona is a family of viruses that is responsible for diseases ranging from cold, cough, respiratory diseases and life-threatening diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). COVID-2019 was first invented by China in mid-December 2020. It was first found in the city of Wuhan, China [2]. According to some media reports, this COVID-2019 was found in China in mid-19 November. Therefore, we can say here that China did not reveal the correct information about this virus to the countries of the world. This was a serious matter. In a study with Jiang and his colleagues, it was found that the fatality rate for COVID-2019 is around 7.5% . These people have also found in their study that the fatality rate for persons in the age group of 70–79 is 8.0% whereas, for those above the age of 80 years, the fatality rate is around 14.8% . This study considers individuals above the age of 50 years with the highest risk of underlying illnesses such as diabetes, Parkinson’s disease, and cardiovascular. A person suffering from COVID-2019 starts showing symptoms in 2–14 days. Due to this virus, the patient suffers from diseases like fever, cough, breathlessness, pneumonia, kidney failure, etc.. The coronavirus spreads very rapidly from one human to another by respiratory drops. This virus does not live long in the air. The virus does not spread through the air because it is not alive for long in the air .

WAVE DESCRIPTIONS

Covid-19 First wave

The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, among three Indian medical students who had returned from Wuhan, the epicenter of the pandemic. Lockdowns were announced in Kerala on 23 March, and in the rest of the country on 25 March. Infection rates started to drop in September. Daily cases peaked mid-September with over 90,000 cases reported per-day, dropping to below 15,000 in January 2021. A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country. By late April, India led the world in new and active cases. On 30 April 2021, it became the first country to report over 400,000 new cases in a 24-hour period. Experts stated that the virus *may* reach an endemic stage in India rather than completely disappear; in late August 2021, Soumya Swaminathan said India may be in some stage of endemicity where the country learns to live with the virus.

Covid-19 Second wave

Like several parts of the world, especially Europe, India has been experiencing a massive surge of COVID-19 cases and deaths. As of April 10, 2021, India is the 3rd leading country based on the USA and Brazil's identified cases . Since the middle of March 2021, the second wave has started, and on April 09, the highest number of cases (144,829) has been identified in India . The major affected states are Maharashtra, Kerala, Karnataka, Andhra Pradesh, Tamil Nadu, Andhra Pradesh, Delhi, Uttar Pradesh, and West Bengal. Despite this high caseload, several national movements such as the farmers' movement, election in several states have been going on. Those can increase the risk of transmission of COVID-1.

PROJECT CATEGORY

The project category is Data Science based developed in Jupyter notebook and Google colab. Language used is Python.

This project is based on the Data Analytics Method. Here we first take some data in the form of csv file (Coma Separated values). Then by using data analytics method with the help of python language we analysis the data which contain various information about the country wise covid-19. From that csv file we provide a visualization of data in a bar graph and histogram. That any non-technical person can easily understand about the data.

This project provides visualization of the data in graphical manner .Here we use various types of python modules which contain some predefined built-in method. Like Numpy, Matplotlib , pandas, seaborn etc.

SYSTEM REQUIREMENTS:

The minimum requirements for such project are as follow:

HARDWARE:

- Computer or Laptop :: Intel
- Processor :: Quad Core or higher (Dual core is not best for this kind of work , but manageable)
- RAM :: 16GB RAM or higher (8GB RAM is okay but not for the performance we may want or expect)
- CACHE :: 512 MB
- Input Device :: Mouse and Keyboard

SOFTWARE :

The project requires the support of the following software for the database and other requirements:

- Windows 10 or higher operating system
- A high level programming language i.e. Python
- Python modules like NumPy , Matplotlib , Pandas , Seaborn etc.
- Online environment like Jupyter , Google colab

PROJECT MODULES:

Python is one of the most popular programming languages for task and it has replaced many languages in the industry. One of the reason is its vast collection of libraries. Python libraries that are used

- Pandas
- Matplotlib
- NumPy
- Seaborn
- Express
- Folium map
- Choropleth map

PANDAS :

Pandas are a vast Python library used for the purpose of data analysis and manipulation and also for working with numerical tables or data frames and time series , thus being heavily used in for algorithmic trading using python . Pandas can be used for various functions importing .csv files , performing arithmetic operations in series , Boolean indexing , collecting information about a data frame etc.

Logic Process :

In order to be able to work with the data in Python , we'll need to read the csv file into a Pandas DataFrame . A DataFrame is a way to represent and work with tabular data . Tabular data has rows and columns , just like our csv file . To read in the data , we need to use the pandas.read_csv function .

```
Import pandas as pd Data = pd.read_csv ( " master.csv " )
```

NUMPY :

NumPy or Numerical Python provides powerful implementations of large multi - dimensional arrays and matrices . The library consists of functions for complex array processing and high - level computations on these arrays . Some of the mathematical functions of this library include trigonometric functions (sin , cos , tan , radians) , hyperbolic functions (sinh , cosh , tanh) , logarithmic functions (log , log10 , log2) etc. Logic Process : It is common to need to reshape a one - dimensional array into a two - dimensional array with one column and multiple arrays . NumPy provides the reshape () function on the NumPy array object that can be used to reshape the data . The reshape () function takes a single argument that specifies the new shape of the array . Then we use `Data = data . reshape (data . shape [0] , 1)` Structures like lists and NumPy arrays can be sliced . This means that a subsequence of the structure can be indexed and retrieved . Then we use `Data [from : to]`

MATPLOTLIB :

It is a Python library used for plotting 2D structures like graphs , charts , histogram , scatter plots etc. Along with the other libraries which are used for computations , it becomes necessary to use matplotlib to represent that data in a graphical format using charts and graphs . Few of the functions of matplotlib include scatter (for scatter plots) , pie (for pie charts) , stackplot (for stacked area plot) , colorbar (to add a colorbar to the plot) etc. It has a module named pyplot which makes things easy for plotting by providing feature to control line styles , font properties , formatting axes etc.

Logic Process :

Matplotlib.pyplot is a collection of command style functions that make matplotlib work like MATLAB . Each pyplot function makes some changes to a figure : e.g. , creates a figure , creates a plotting area in a figure , plots some lines in a plotting area , decorates the plot with labels etc. In matplotlib.pyplot , various states are preserved across function calls , so that it keeps track of things like the current figure and plotting area and the plotting functions are directed to the current axes . If we provided a single list or array to the plot () command , matplotlib assumes it is a sequence of y values and automatically generates the x values for us.

SEABORN :

Seaborn is one of an amazing library for visualization of the graphical statistical plotting in Python. Seaborn provides many color palettes and defaults beautiful styles to make the creation of many statistical plots in Python more attractive.

Seaborn library aims to make a more attractive visualization of the central part of understanding and exploring data. It is built on the core of the matplotlib library and also provides dataset-oriented APIs.

Seaborn is also closely integrated with the Panda's data structures, and with this, we can easily jump between the different visual representations for a given variable to better understand the provided dataset.

Folium Maps:

Folium is a powerful Python library that helps you create several types of Leaflet maps. By default, Folium creates a map in a separate HTML file. Since Folium results are interactive, this library is very useful for dashboard building. You can also create inline Jupyter maps in Folium.

Folium builds on the data wrangling strengths of the Python ecosystem and the mapping strengths of the Leaflet.js library. Using Folium, you can manipulate your data in Python, then visualize it in a Leaflet map.

Choropleth map:

Plotly is a Python library that is very popular among data scientists to create interactive data visualizations. One of the visualizations available in Plotly is Choropleth Maps. Choropleth maps are used to plot maps with shaded or patterned areas which are proportional to a statistical variable. They are composed of colored polygons. They are used for representing spatial variations of a quantity.

ALGORITHM

- Data Collection
- Data Formatting
- Model Selection

Data Collection:

We have collected data sets related to population from online website. We have downloaded the csv files in which information

Data Formatting:

The collected data is formatted into suitable data sets. We check the co-linearity with mean suicide rate. The data sets which have co-linearity nearer to 1.0 has been selected.

Model Selection:

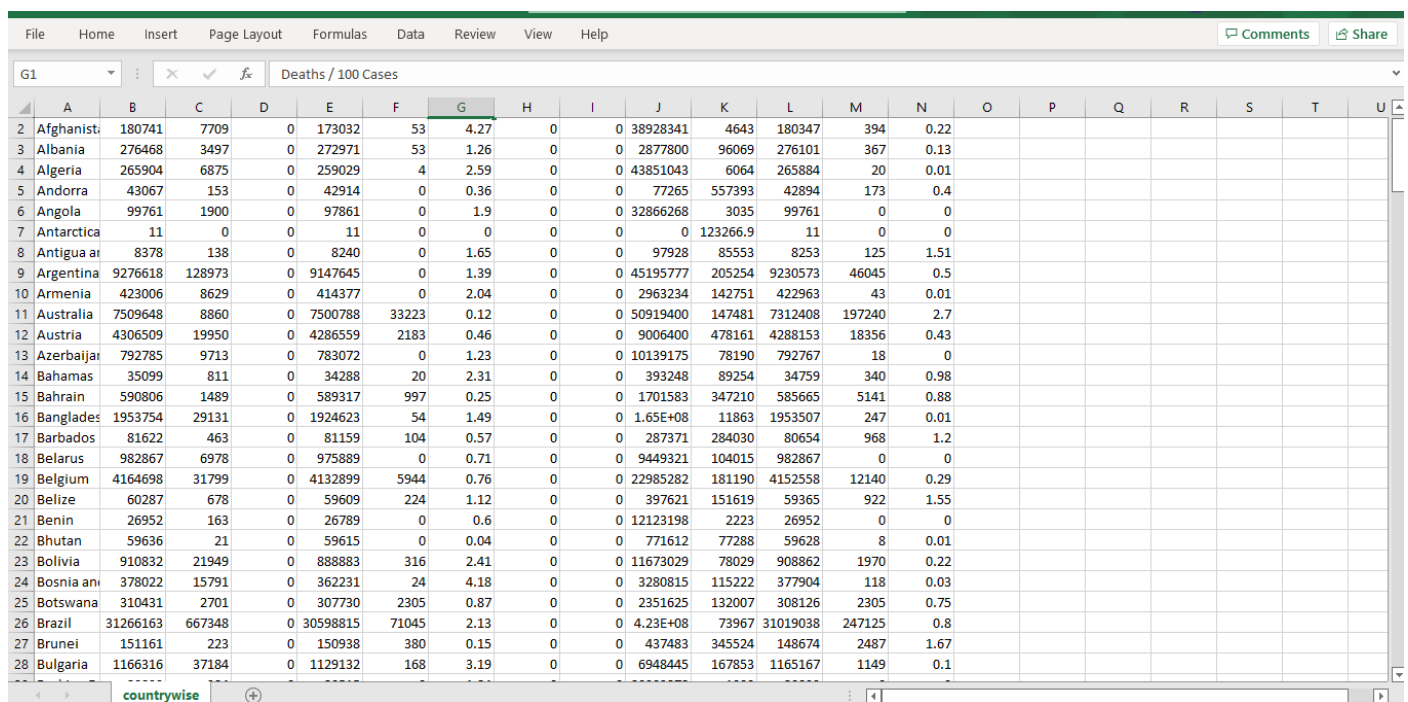
We have selected different models to minimize the error of the predicted value. The different models used are Pandas, NumPy ,Matplotlib , etc.

DATASET

A dataset is a collection of data. Mostly a data set refers to the contents of a single database table, or a single statistical data matrix, where every table column represents a particular variable, and each table row corresponds to a given members of the data set. The objective of project is to find the relations between the dataset to predict the future dataset.

The data set used in this project contains day-wise , country-wise Covid-19 details of all the countries of the world by various parameters from 2020 to 2022. This data is real and original.

Dataset 1:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
2	Afghanistan	180741	7709	0	173032	53	4.27	0	0	38928341	4643	180347	394	0.22							
3	Albania	276468	3497	0	272971	53	1.26	0	0	2877800	96069	276101	367	0.13							
4	Algeria	265904	6875	0	259029	4	2.59	0	0	43851043	6064	265884	20	0.01							
5	Andorra	43067	153	0	42914	0	0.36	0	0	77265	557393	42894	173	0.4							
6	Angola	99761	1900	0	97861	0	1.9	0	0	32866268	3035	99761	0	0							
7	Antarctica	11	0	0	11	0	0	0	0	0	123266.9	11	0	0							
8	Antigua and Barbuda	8378	138	0	8240	0	1.65	0	0	97928	85553	8253	125	1.51							
9	Argentina	9276618	128973	0	9147645	0	1.39	0	0	45195777	205254	9230573	46045	0.5							
10	Armenia	423006	8629	0	414377	0	2.04	0	0	2963234	142751	422963	43	0.01							
11	Australia	7509648	8860	0	7500788	33223	0.12	0	0	50919400	147481	7312408	197240	2.7							
12	Austria	4306509	19950	0	4286559	2183	0.46	0	0	9006400	478161	4288153	18356	0.43							
13	Azerbaijan	792785	9713	0	783072	0	1.23	0	0	10139175	78190	792767	18	0							
14	Bahamas	35099	811	0	34288	20	2.31	0	0	393248	89254	34759	340	0.98							
15	Bahrain	590806	1489	0	589317	997	0.25	0	0	1701583	347210	585665	5141	0.88							
16	Bangladesh	1953754	29131	0	1924623	54	1.49	0	0	1.65E+08	11863	1953507	247	0.01							
17	Barbados	81622	463	0	81159	104	0.57	0	0	287371	284030	80654	968	1.2							
18	Belarus	982867	6978	0	975889	0	0.71	0	0	9449321	104015	982867	0	0							
19	Belgium	4164698	31799	0	4132899	5944	0.76	0	0	22985282	181190	4152558	12140	0.29							
20	Belize	60287	678	0	59609	224	1.12	0	0	397621	151619	59365	922	1.55							
21	Benin	26952	163	0	26789	0	0.6	0	0	12123198	2223	26952	0	0							
22	Bhutan	59636	21	0	59615	0	0.04	0	0	771612	77288	59628	8	0.01							
23	Bolivia	910832	21949	0	888883	316	2.41	0	0	11673029	78029	908862	1970	0.22							
24	Bosnia and Herzegovina	378022	15791	0	362231	24	4.18	0	0	3280815	115222	377904	118	0.03							
25	Botswana	310431	2701	0	307730	2305	0.87	0	0	2351625	132007	308126	2305	0.75							
26	Brazil	31266163	667348	0	30598815	71045	2.13	0	0	4.23E+08	73967	31019038	247125	0.8							
27	Brunei	151161	223	0	150938	380	0.15	0	0	437483	345524	148674	2487	1.67							
28	Bulgaria	1166316	37184	0	1129132	168	3.19	0	0	6948445	167853	1165167	1149	0.1							

This DataSet is taken from Johns Hopkins University Center For Systems Science and Engineering website.

Dataset Features List:

- Country
- Confirmed
- Deaths
- Recovered
- New Cases
- Deaths/100k
- Recovered /100k
- Confirmed/100k

Dataset 2:

FileHomeInsertPage LayoutFormulasDataReviewViewHelp

CommentsShare

F1

X

✓

fx

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	State/UTs	Total Vacc	Dose 1	Dose 2	Population																
2	Andaman	624118	311046	313072	399001																
3	Andhra Pr	84043879	40596914	43446965	91702478																
4	Arunachal	1576467	851479	724988	1711947																
5	Assam	42130902	22470609	19660293	35998752																
6	Bihar	1.17E+08	62060111	54937050	1.29E+08																
7	Chandigar	1989833	1086102	903731	1158040																
8	Chhattisg	35836458	18693176	17143282	32199722																
9	Dadra and	1313783	727305	586478	773997																
10	Delhi	30381117	16492260	13888857	19301096																
11	Goa	2558857	1349270	1209587	1521992																
12	Gujarat	97449266	49173252	48276014	70400153																
13	Haryana	40194002	21896657	18297345	28900667																
14	Himachal	11714543	6014888	5699655	7503010																
15	Jammu an	20123295	9930317	10192978	14999397																
16	Jharkhand	36465011	21158905	15306106	40100376																
17	Karnataka	98646532	49856747	48789785	69599762																
18	Kerala	50506342	26961645	23544697	34698876																
19	Ladakh	402228	218773	183455	290492																
20	Lakshadw	112063	56773	55290	66001																
21	Madhya P	1.07E+08	53932164	53048757	85002417																
22	Maharash	1.54E+08	84358055	69600146	1.25E+08																
23	Manipur	2616582	1447454	1169128	3436948																
24	Meghalay	2330226	1324555	1005671	3772103																
25	Mizoram	1428976	780905	648071	1308967																
26	Nagaland	1502881	833294	669587	2073074																
27	Odisha	59927514	31200338	28727176	47099270																

COVID-19 India Statewise Vaccin

This dataset is taken from <https://www.kaggle.com/datasets/anandhuh/covid19-india-statewise-vaccine-data>.

DataSet Features List:

- State/UTs
- Total vaccination
- Dose 1
- Dose 2
- Total Population

WORLD PLOTS

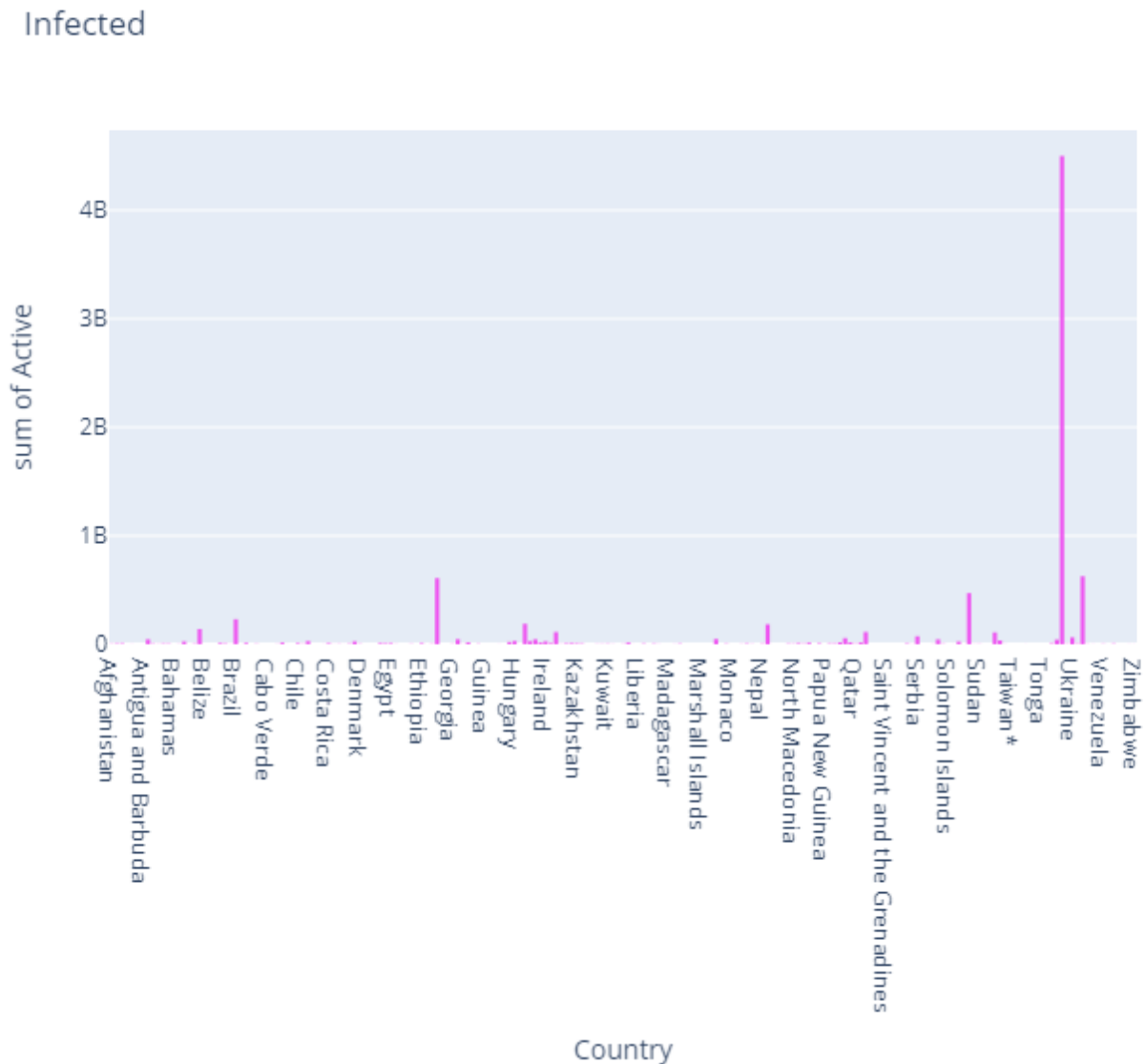


Fig. Histogram of covid-19 First wave Infected Cases (country-wise)

This bar graph shows the world first wave infected cases of covid-19. Here we see that Ukraine has the highest infected rate in first wave. The **COVID-19 pandemic in Ukraine** has resulted in 5,040,518 confirmed cases of COVID-19 and 112,459 deaths.

The virus was confirmed to have spread to Ukraine when the country's first case was confirmed to be hospitalized in Chernivtsi Oblast on 3 March 2020, a man who had travelled from Italy to Romania by plane and then arrived in Ukraine by car.

An emergency was declared on 20 March 2020 in Kyiv Oblast, Chernivtsi Oblast, Zhytomyr Oblast, Dnipropetrovsk Oblast, Ivano-Frankivsk Oblast, and the city of Kyiv.

Infected

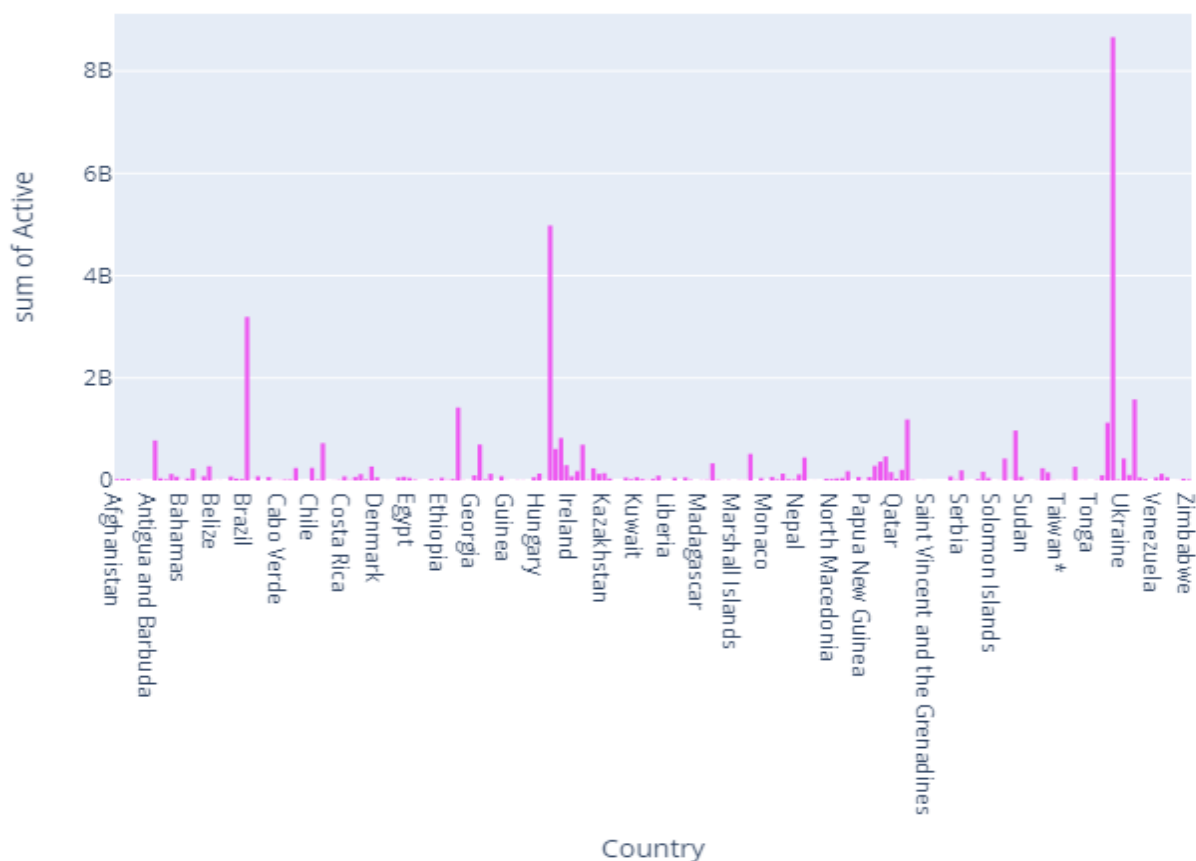


Fig. Histogram for covid-19 Second wave(country-wise)

This bar graph shows the World second wave of covid-19 infected cases. Again we have seen that Ukraine has the highest rate of covid cases followed by Ireland.

New infections and deaths started to break records by late October 2021. By then, a total of 2.8 million coronavirus cases and 64,936 COVID-19 related deaths had occurred in Ukraine.

Ukraine's ongoing vaccination program started on 24 February 2021 and from that day to 12 September 2021, 10,710,944 vaccinations were given in Ukraine (meaning 18% of the adult population of Ukraine had been vaccinated against COVID-19). About 44% of those vaccinated had been fully vaccinated In an August 2021 poll 56% of Ukrainians did not plan to be vaccinated. Demand for vaccinations multiplied sharply by late October 2021

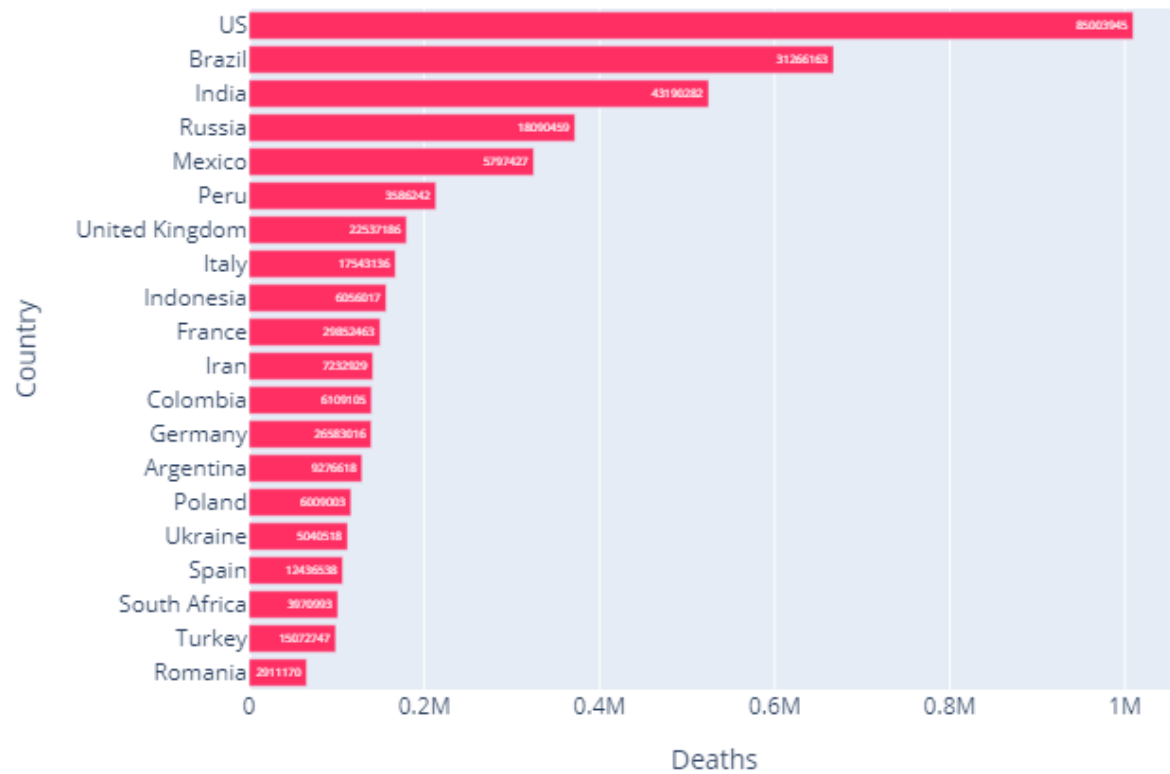


Fig. Bar graph of top 20 countries Death Rate of world total wave during Covid

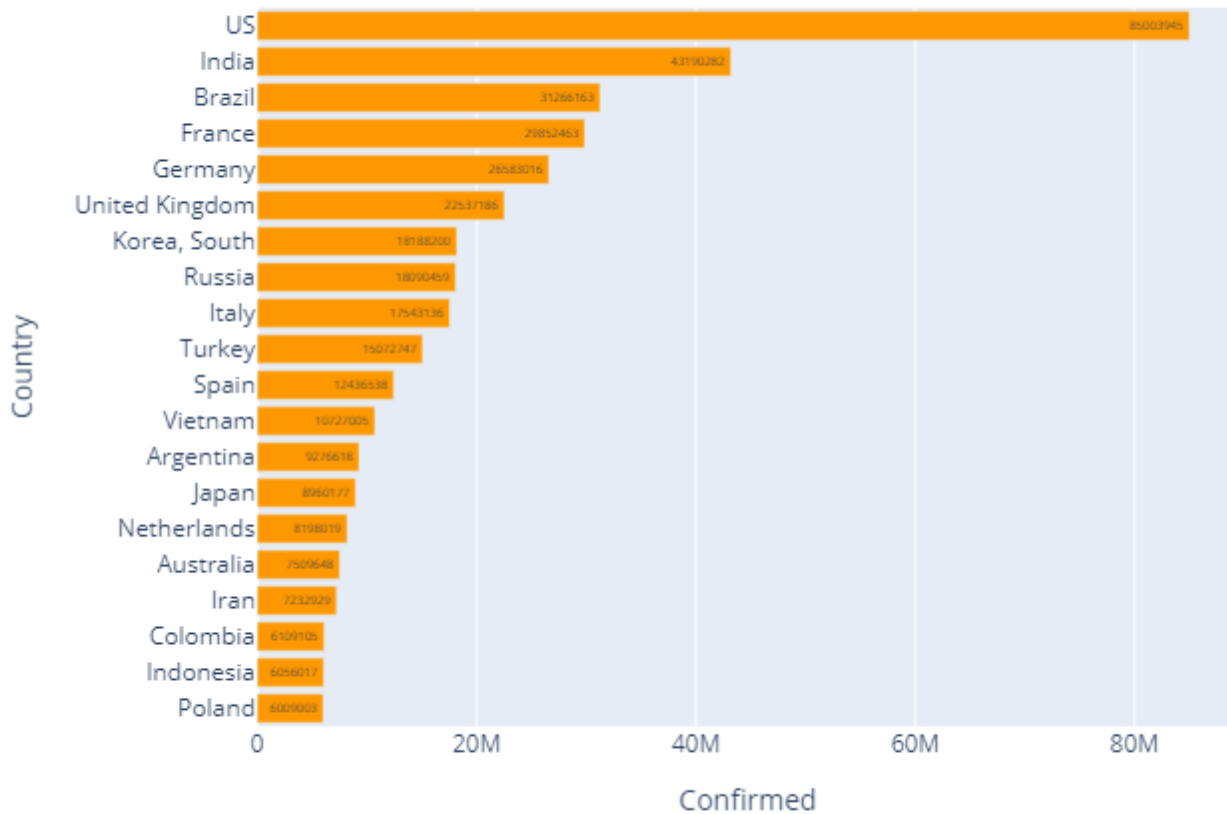


Fig. Bar graph of top 20 countries have confirmed cases of world total wave

According to this bar graph the US has the highest number of death cases and infected cases.

Since the first US case of the new coronavirus was reported in January 2020 in Washington state, more than 85 million people have been diagnosed. In United States of America, from 3 January 2020 to 14 June 2022, there have been 84,593,200 confirmed cases of COVID-19 with 1,001,598 deaths, reported to WHO. As of 2 June 2022, a total of 579,958,258 vaccine doses have been administered.

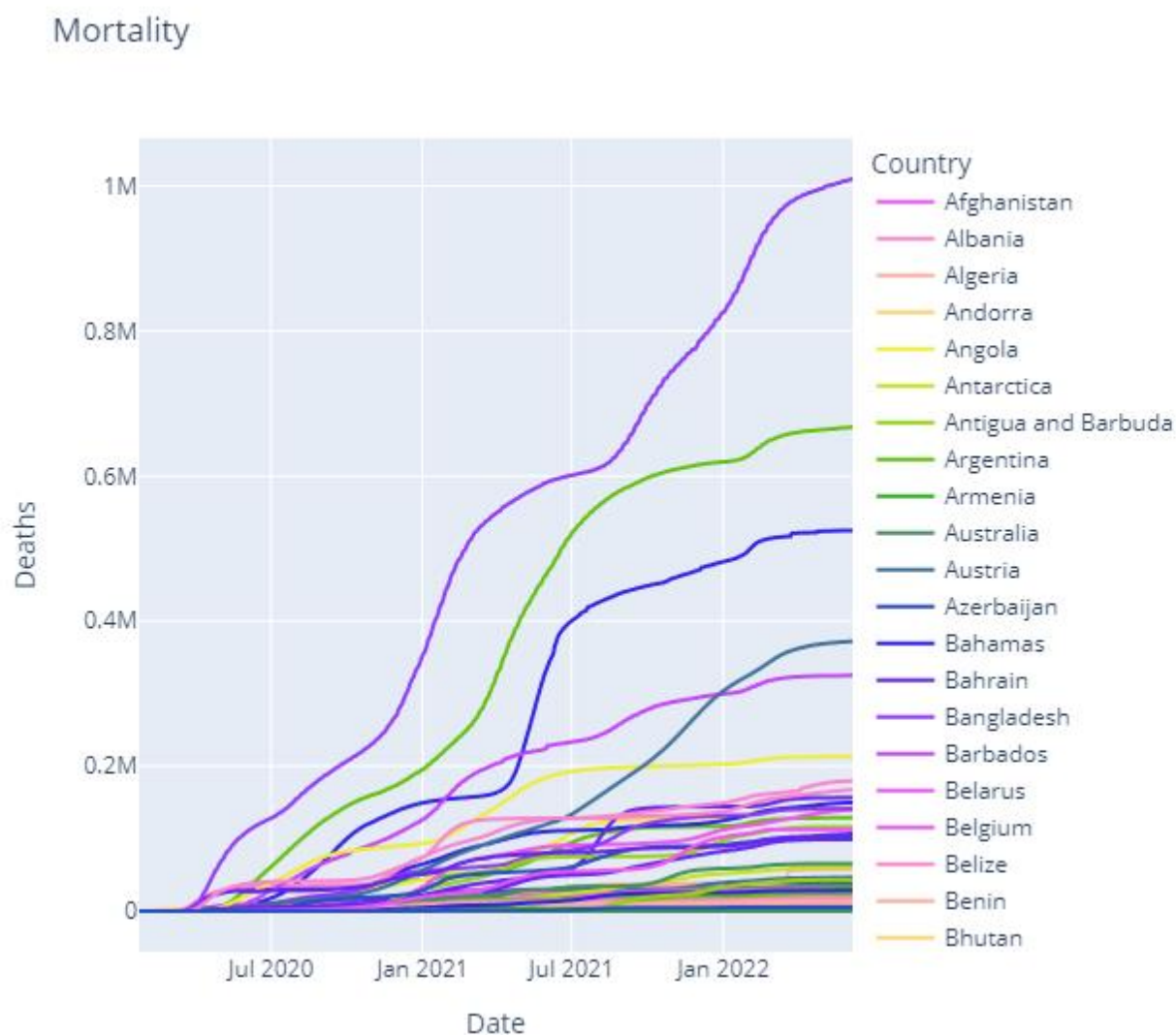


Fig. Line plot of all countries showing the Death rates

The COVID-19 pandemic in Bahrain is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus was confirmed to have reached Bahrain on 21 February 2020.

Bahrain is reporting 1,302 new infections on average each day, 17% of the peak. There have been 597,184 infections and 1,489 coronavirus-related deaths reported in the country since the pandemic began.

Daywise Confirmed vs Recovery vs Deaths

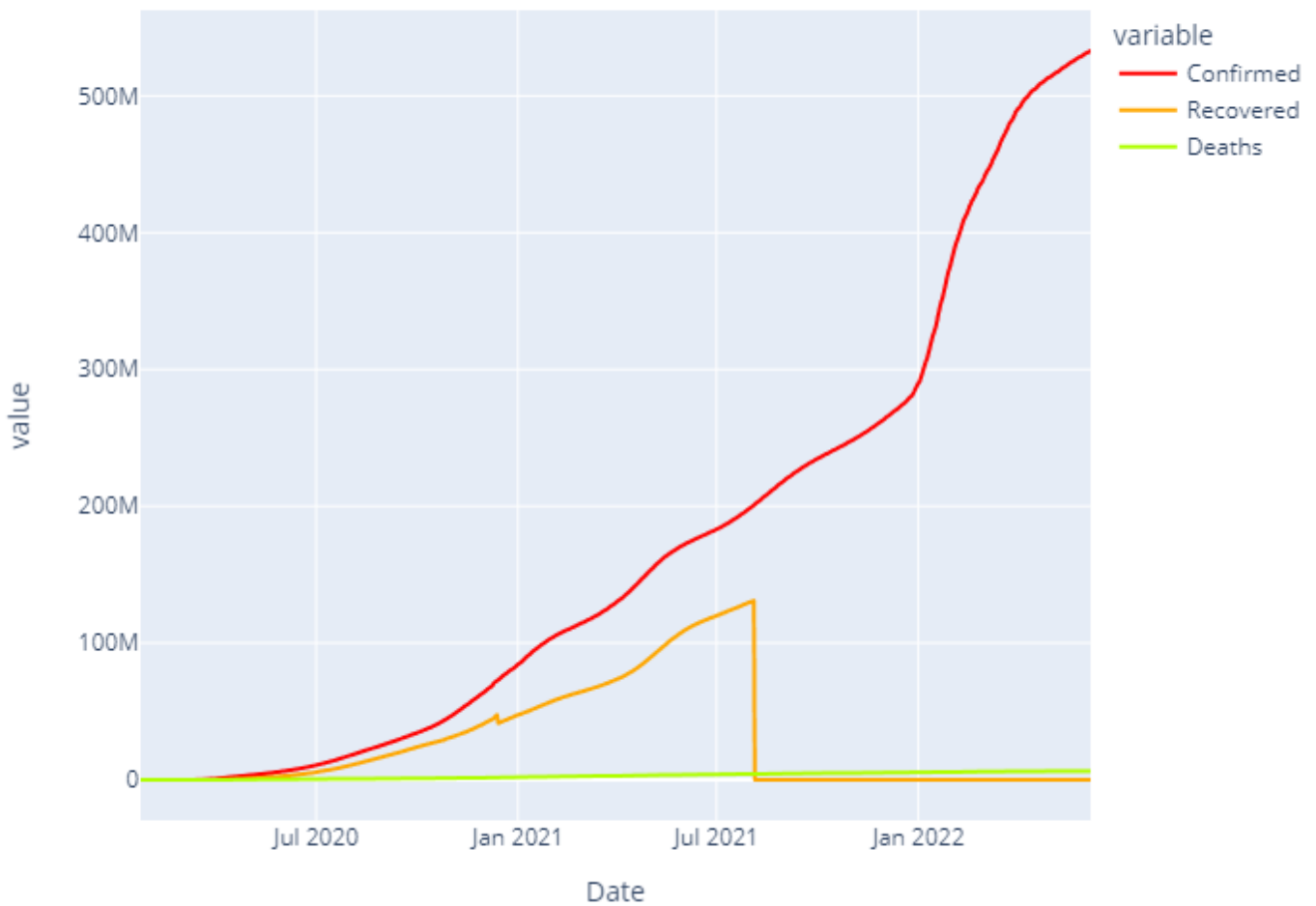


Fig. Histogram plot of World day-wise Confirmed vs Recovered vs Death cases

histogram plots daywise

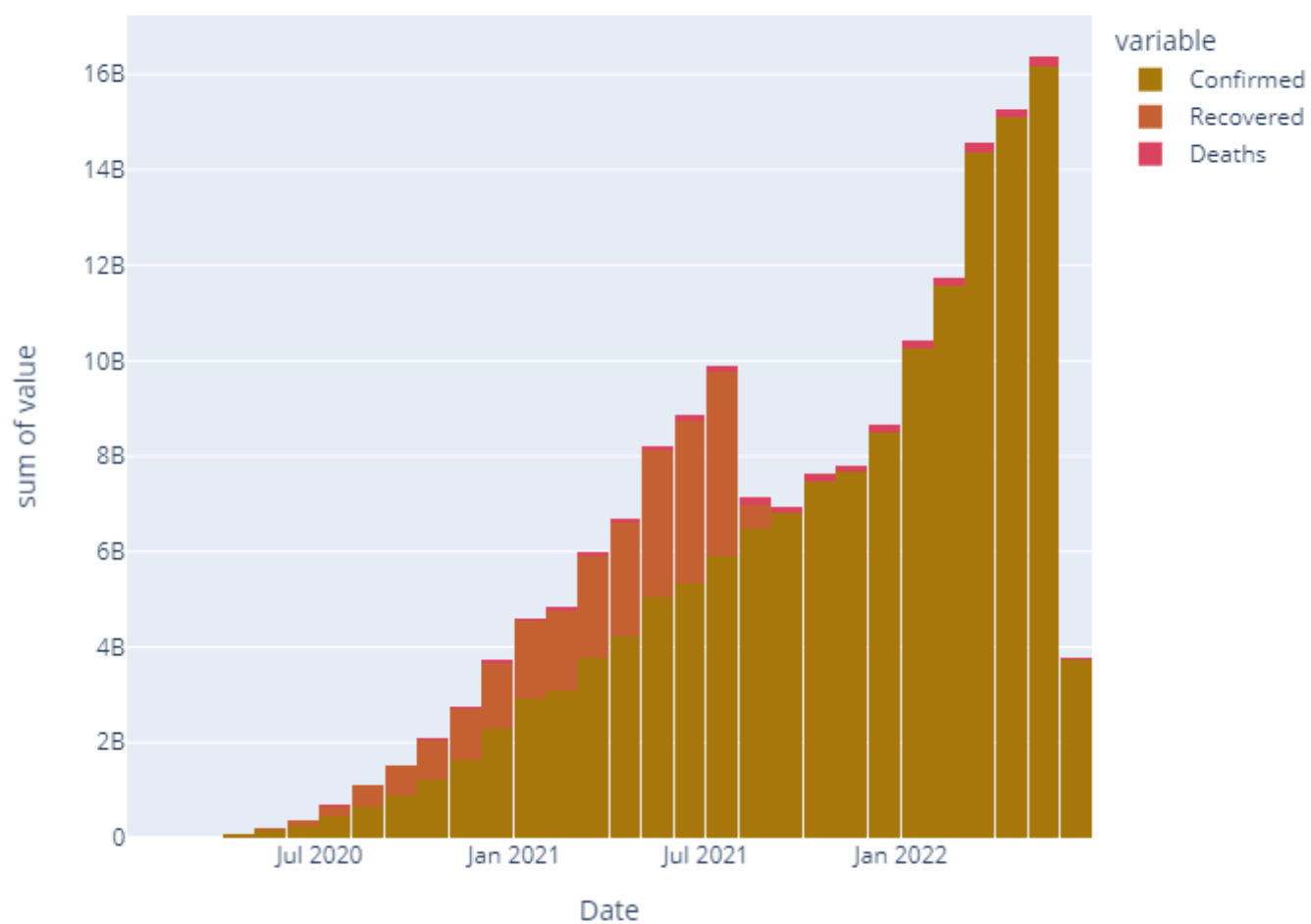


Fig. Histogram plot of World day-wise Confirmed vs Recovered vs Death cases

Cases over time

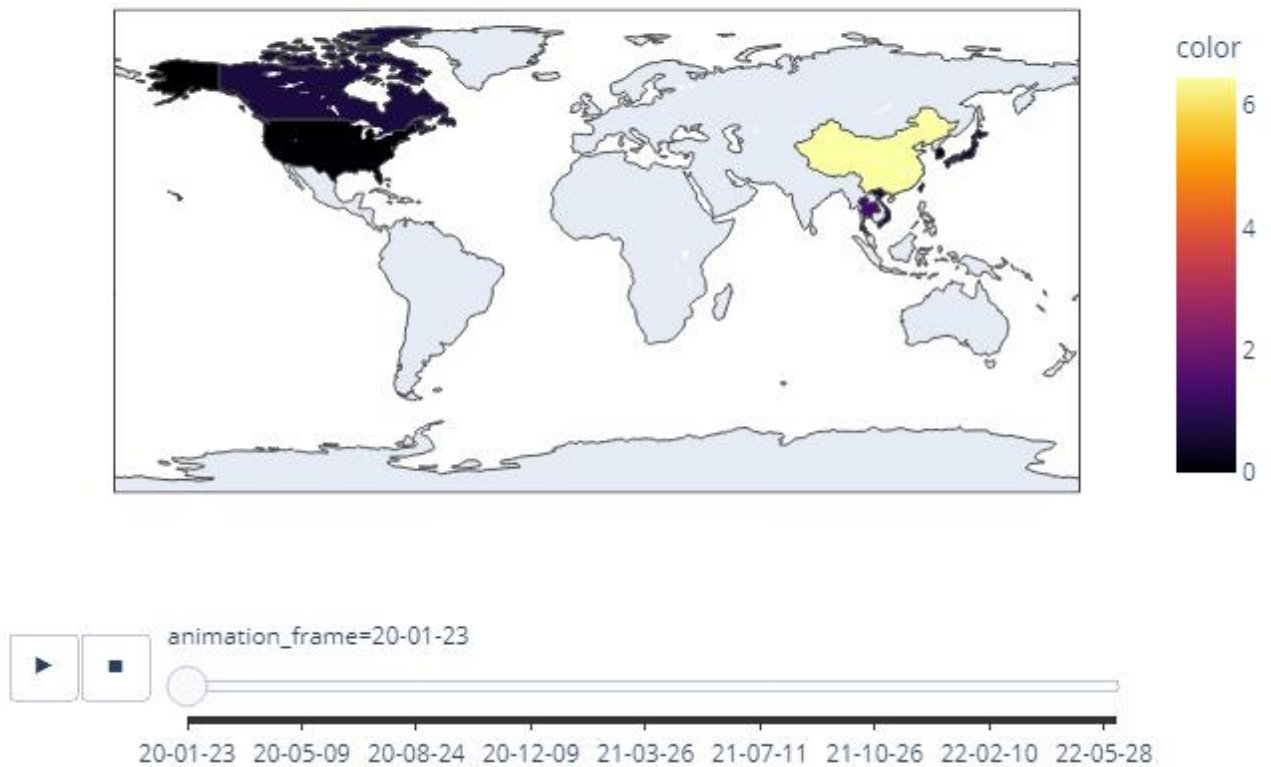


Fig. Choropleth map of Covid cases of World



Fig. Folium map of covid 19 World cases

INDIA PLOT

The first case of COVID-19 in India was reported on January 30, 2020; the index patient was a student who had returned from Wuhan. Thereafter, only 2 more cases were reported in February. Subsequently, more cases came to the forefront in the month of March and there has been a surge in the number of cases since the latter half of April 2020. As of June 9, 2020, according to the Ministry of Health and Family Welfare (MoHFW), a total of 266 598 confirmed COVID-19 cases have been reported from 32 states/union territories.² Most of the cases have been reported from the states of Maharashtra, Tamil Nadu, Delhi, and Gujarat. Hitherto, the MoHFW have reported 7471 deaths due to COVID-19, translating into a case-fatality rate of 2.8%.

First Wave of Covid-19 in India

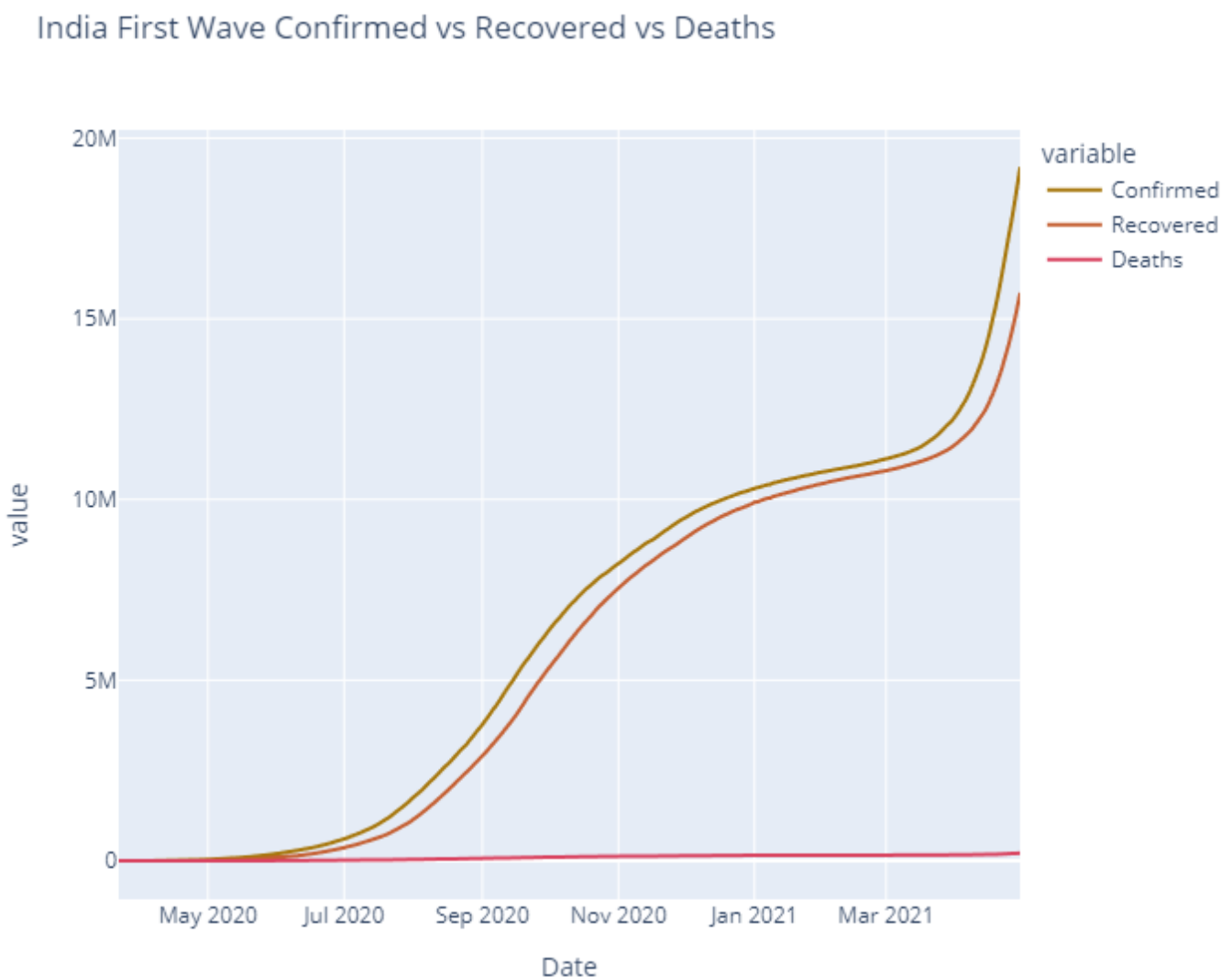


Fig. Line plot of India First Wave of Covid-19

The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, among three Indian medical students who had returned from Wuhan, the epicenter of the pandemic. Lockdowns were announced in Kerala on 23 March, and in the rest of the country on 25 March. Infection rates started to drop in September. Daily cases peaked mid-September with over 90,000 cases reported per-day, dropping to below 15,000 in January 2021. A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country. By late April, India led the world in new and active cases. On 30 April 2021, it became the first country to report over 400,000 new cases in a 24-hour period.

Second Wave of Covid-19 in India

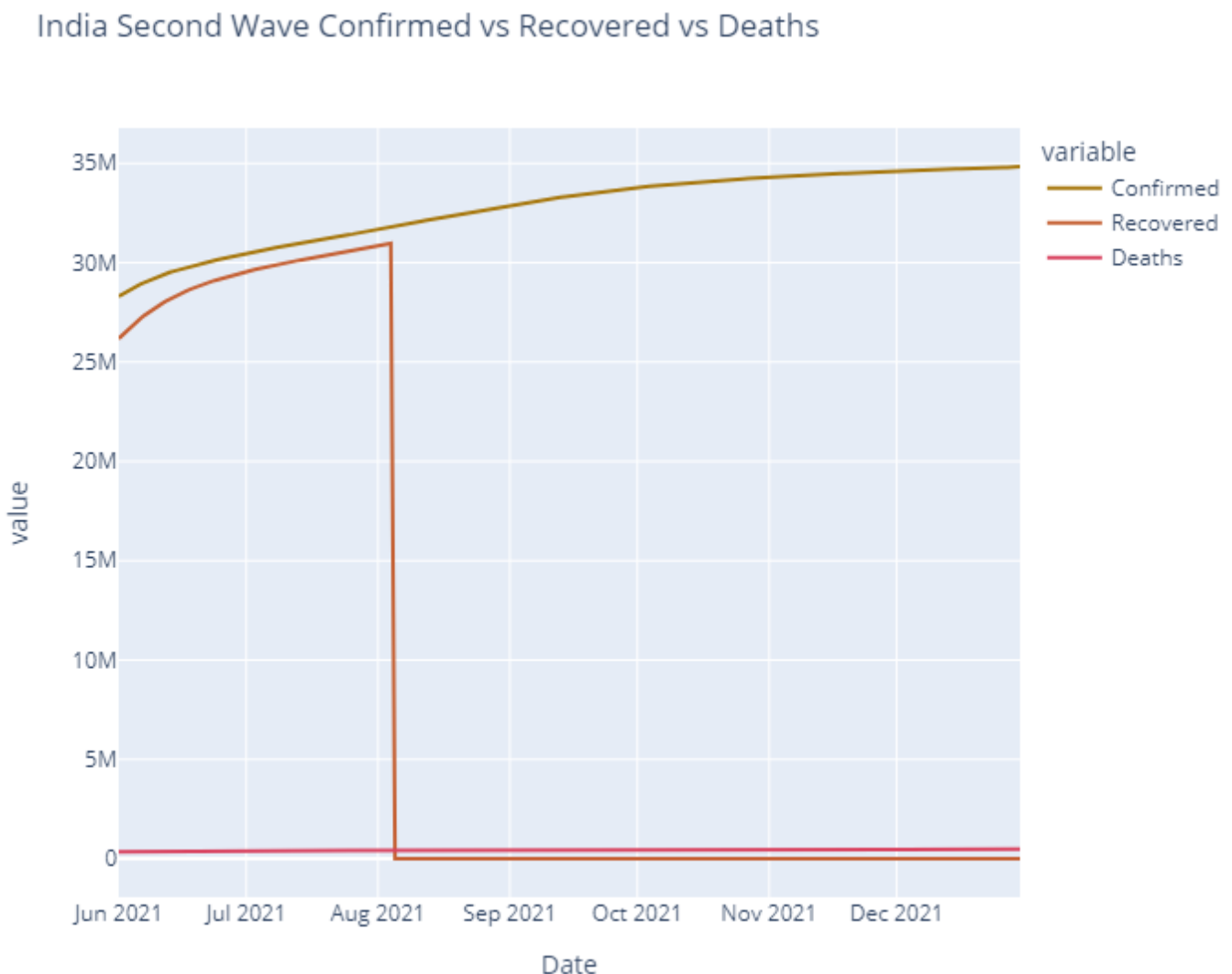


Fig. Line plot of India Second Wave of Covid-19

The wave of corona virus was spreading like a 'tsunami' in India. As on April 23, 2021, the COVID-19 cases have crossed the 15.9 million, with 1,85,000 deaths. The 2nd wave is evolving at a phenomenal speed as compared to the 1st wave. There could be several factors responsible for the increased number of cases in the second wave. It is observed that the mutant virus has more effective transmission capability and its incubation period is also lesser.

Total Cases of Covid-19 in India

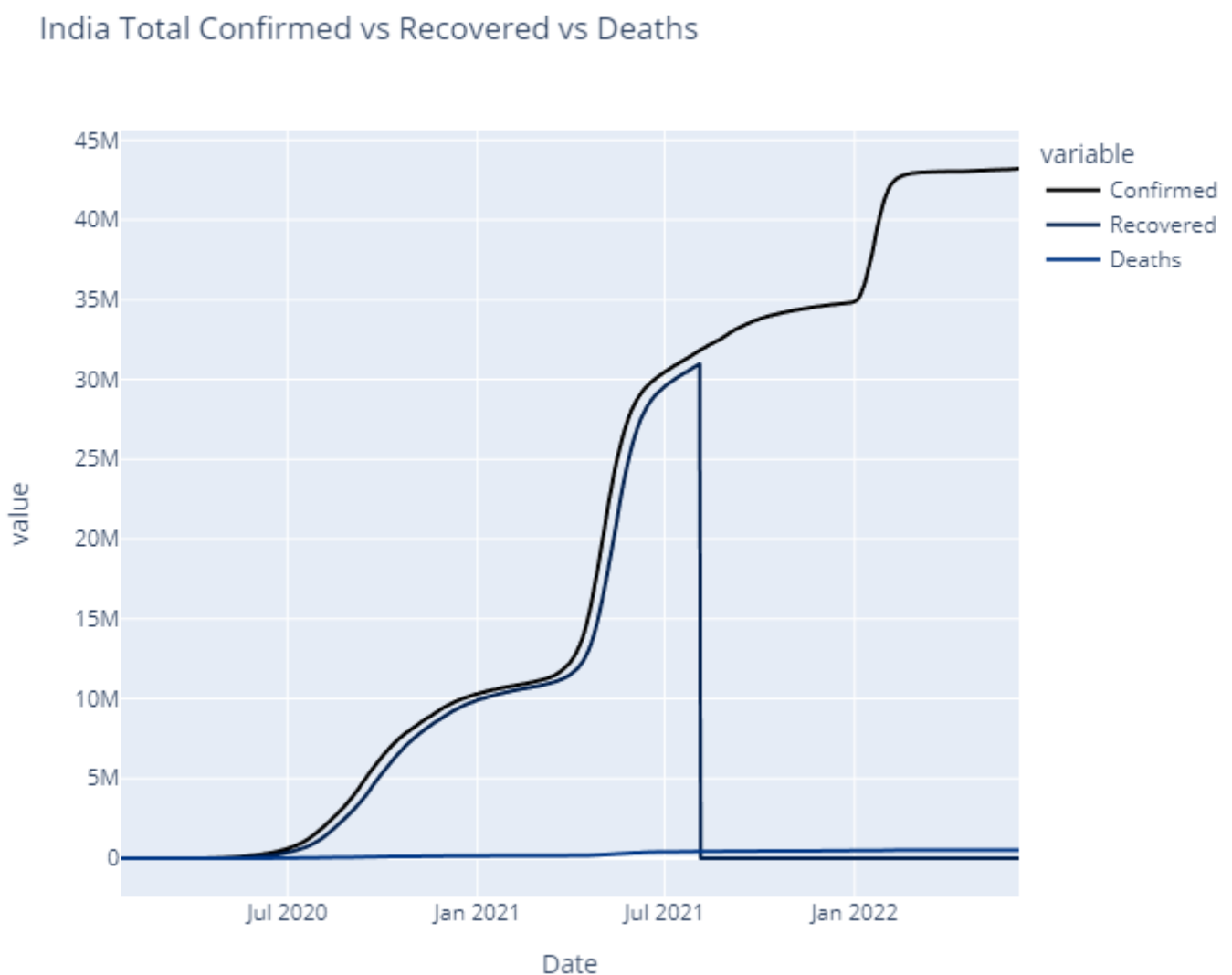


Fig. Line plot of India Total Wave of Covid-19

COVID-19 VACCINATION

Getting vaccinated could save your life. COVID-19 vaccines provide strong protection against serious illness, hospitalization and death. There is also some evidence that being vaccinated will make it less likely that you will pass the virus on to others, which means your decision to get the vaccine also protects those around you.

Even after getting vaccinated, keep taking precautions to protect yourself, family, friends and anyone else you may come into contact with. COVID-19 vaccines are highly effective, but some people will still get ill from COVID-19 after vaccination. There is also still a chance that you could also pass the virus on to others who are not vaccinated. Stay at least 1 metre away from other people, wear a properly fitted mask over your nose and mouth when you can't keep this distance, avoid poorly ventilated places and settings, clean your hands frequently, stay home if unwell and get tested, and stay informed about how much virus is circulating in the areas where you travel, live and work.

Vaccines

India has two approved COVID-19 vaccines: Covishield and Covaxin. Both of them were exported and used in foreign grants by the Government of India.

Covishield

On 1 January 2021, the Drug Controller General of India, approved the emergency or conditional use of Covishield. Covishield is developed by the University of Oxford and its spin-out company, Vaccitech.

Covaxin

On 2 January 2021, Covaxin India's first COVID-19 vaccine, developed by Bharat Biotech in association with the Indian Council of Medical Research and National Institute of Virology received approval from the Drug Controller General of India for its emergency or conditional usage.¹

VACCINATION PLOT OF INDIA

State-wise Population vs Dose 1

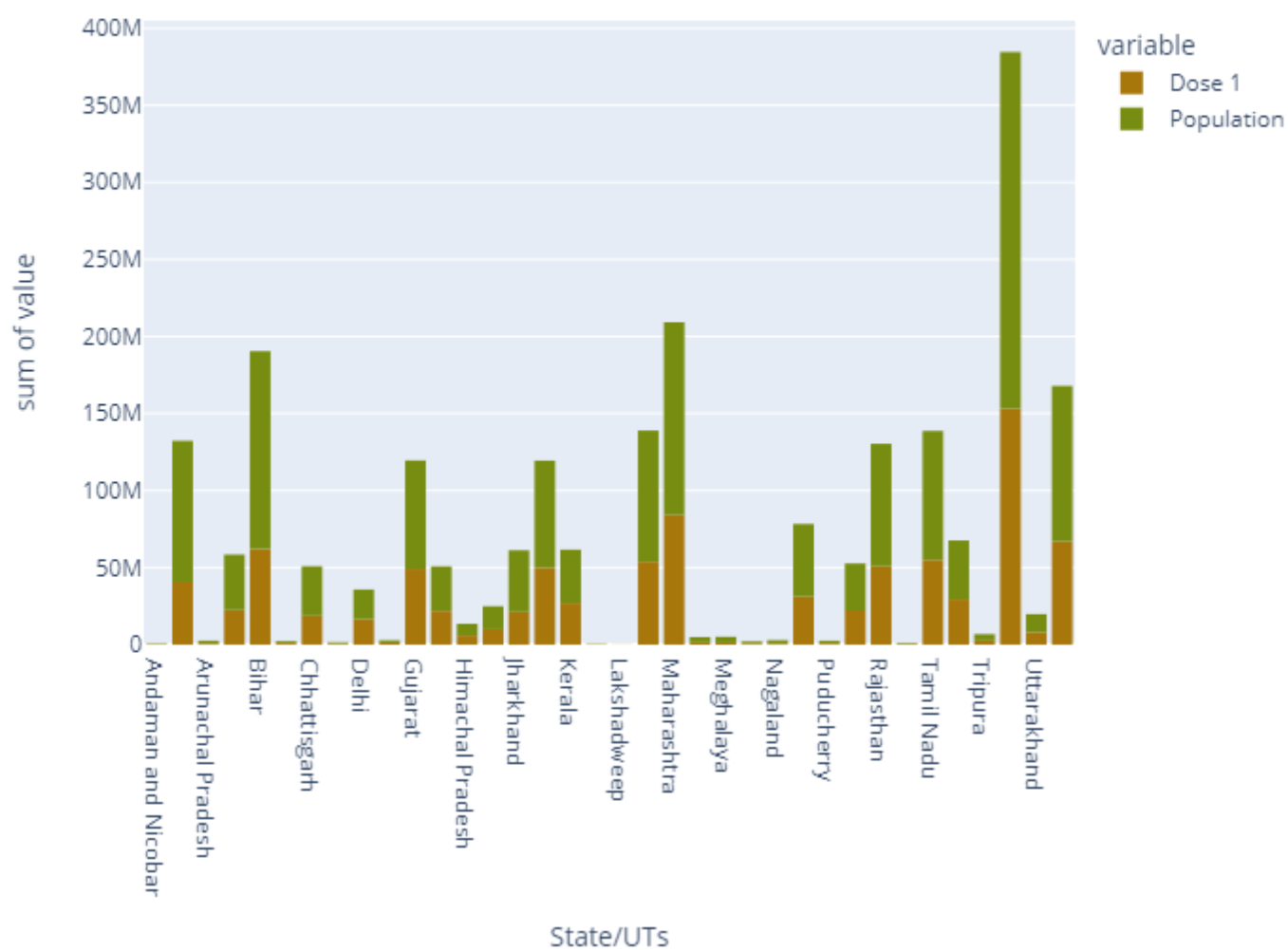


Fig. Histogram for India State-wise Vaccination Dose 1 vs Total Population

State-Wise Population vs Dose 2

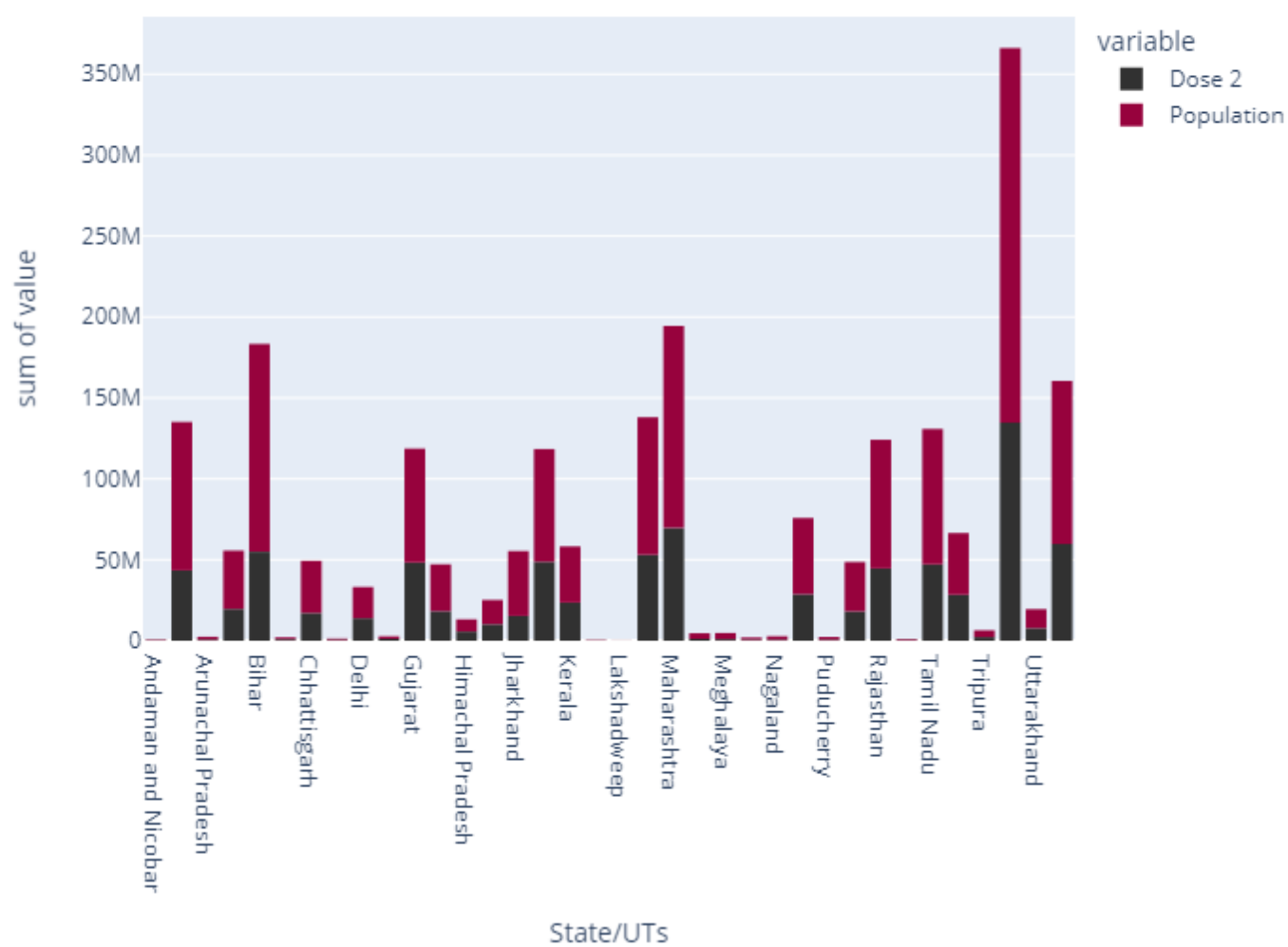


Fig. Histogram of India State-wise Covid Dose 2 vs Total Population

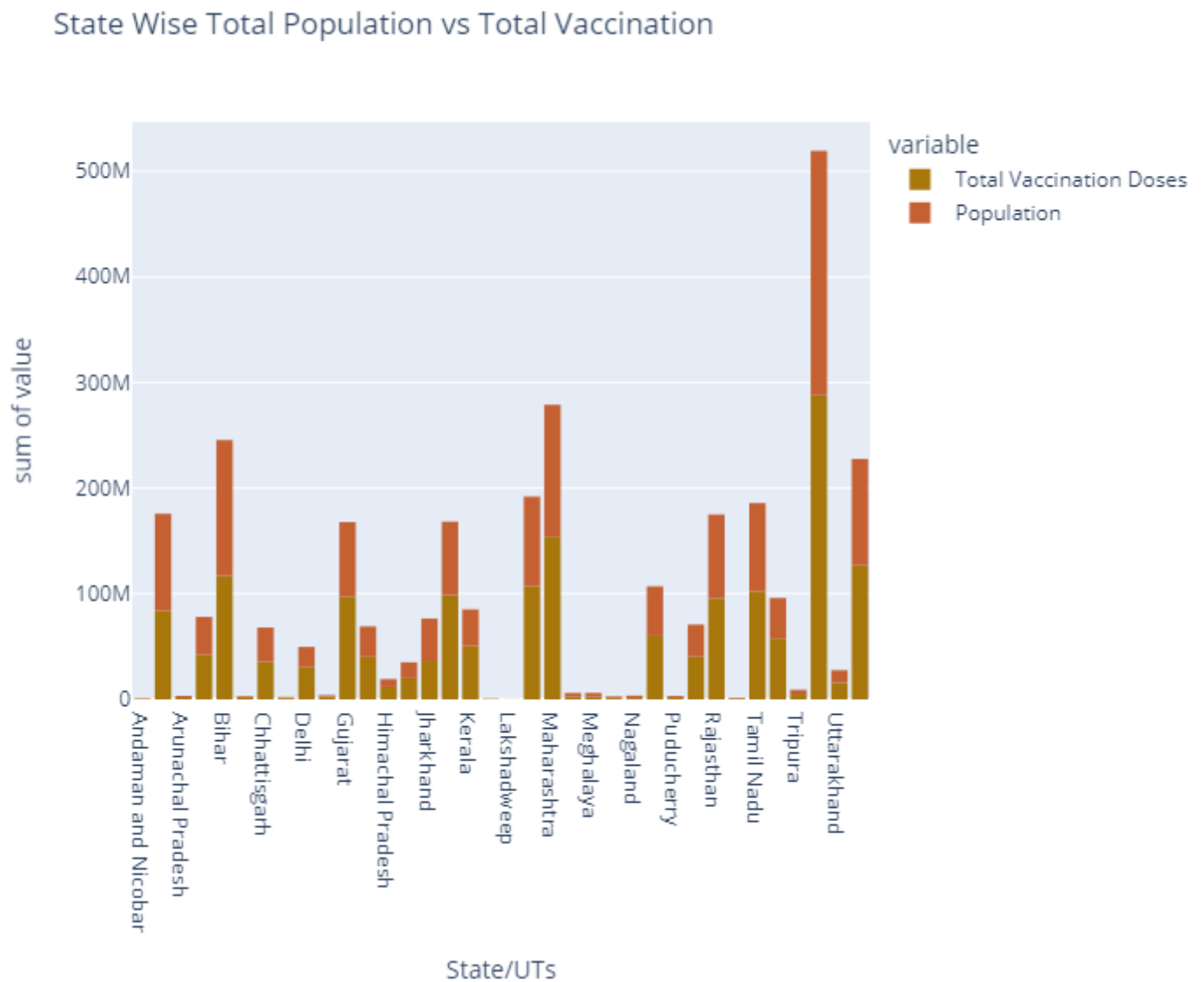


Fig. Histogram Of India State-wise Covid-19 Total Vaccination Dose vs Total Population

CONCLUSION

The results obtained gives us the clear vision about what type of population is highly affected by this problem. This model was designed in such a way that future modifications can be done easily. The following conclusions can be deduced from the development of the project:

- Automation of the entire system improves the efficiency.
- It provides a friendly graphical user interface which proves to be better when compared to the existing model.
- It gives appropriate access to the authorized users depending on their permissions.
- Updating of information becomes so easier.
- System security, data security and reliability are the striking features.

Future Scope:

The data which has been taken was limited. The project could be extended to more number of days. The Covid data was predicted by taking the last 2 years in data. The error can be minimized as well using other algorithms.

In future by this study for any group of population in given countries, the number of infected, deaths , recovery cases can be predicted. This can be used as a reference for evaluating the effectiveness of the preventive measures and policies that government took for reduction of covid cases.

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