

CAPSTONE PROJECT - MAJOR PANDEMIC OUTBREAK:

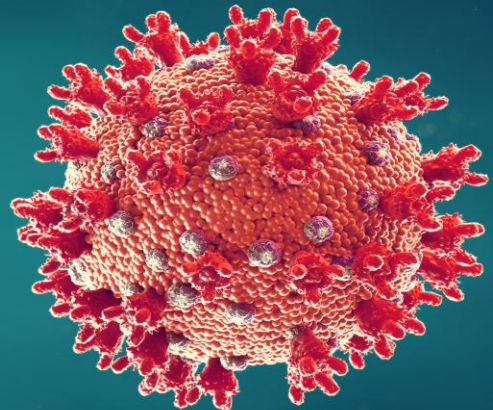
INDIA'S BATTLE AGAINST COVID-19

SRINATH KARLI

20th

August 2020

1.INTRODUCTION



1.1 GENERAL

The COVID-19 pandemic in India is part of the worldwide pandemic of corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. India currently has the largest number of confirmed cases in Asia. India's case fatality rate is among the lowest in the world at 2.41% as of 23 July and is steadily declining. As of 24 May 2020, Lakshadweep is the only region which has not reported a case. India's recovery rate

stands at 63.18% as on 23 July 2020. On 10 June, India's recoveries exceeded active cases for the first time.

In March, after the lockdown was imposed, the United Nations (UN) and the World Health Organization (WHO) praised India's response to the pandemic as 'comprehensive and robust,' terming the lockdown restrictions as 'aggressive but vital' for containing the spread and building necessary healthcare infrastructure. India surpassed Russia as the third worst-hit country by COVID-19 after its case tally crossed 6.9 lakh on Sunday, according to statistics aggregator Worldometer, with several states recording their highest single-day spike.



Image 1.1 - COVID-19 Role in the World.

Russia has 6,81,251 infections while Brazil has 15,78,376 and the US has 29,54,999 cases, according to Worldometer which compiles the COVID-19 data from around the globe. Karnataka has announced a full shutdown barring essential services on Sundays till August 2. Roads wore a deserted look, people stayed indoors and all commercial activities came to a grinding halt on the first such weekly shutdown.

In the past years, India has emerged as a significant vaccine manufacturing hub and Indian manufacturers account for 60 per cent of vaccine supplies made to UNICEF.

1.2 GOVERNMENT FACILITIES

In the national capital, the 10,000-bed Sardar Patel COVID care centre, touted as “one of the largest” facilities in the world, was inaugurated. The facility has been constructed in just 12 days near the Indira Gandhi International (IGI) airport on a piece of land belonging to the Ministry of Defense. The home minister said Prime Minister Narendra Modi is fully committed to helping the people of Delhi in these challenging times and this COVID hospital, yet again, highlights that resolve. “The vaccine for the novel corona virus may be developed anywhere in the world, but

without Indian manufacturers involved the production of required quantities is not going to be feasible,”.



Image 1.2 - Children Playing with Safety Precautions

The ongoing COVID-19 pandemic has created havoc across the world, putting extraordinary pressure on not just public health systems, but also on crisis communications. With social media being the primary medium for information consumption, clear, end-to-end crisis communication with diverse target groups becomes key in dealing with such a pandemic. On 11 March 2020, the World Health Organization's (WHO) declared COVID-19 a pandemic as the number of cases worldwide had surged 13-fold. At that time, only 62 cases were reported in India, a mere 0.05 percent of the global count. While many European countries and the WHO had understood the severity of the crisis and the need to combat the situation, India was still sitting on the fence trying to play defensively, biding time before facing the avalanche.



Image 1.3 - Mask in Public

With about 736 districts in 28 states and eight union territories, and varied shades of dialects and cultures within the states, crisis communication in India becomes a complex exercise. It not only has to address 1.3 billion citizens, but it also has to chalk out customized, tailor-made crisis communication plans for every state and sections of the society, especially the poor and marginalized.

In the initial days of the outbreak in India, the early affected states prepared their own state-specific response, while New Delhi was still unsure of a nationwide strategy. Clearly, coordination between the states and the centre could have been better. While the state government had started imposing statewide curfews by invoking section 144 of the Criminal Procedure Code (CrPC), a clear direction from the centre only came on 19 March when Prime Minister Narendra Modi called for a 'Janta Curfew' to be observed on 22 March.



Image 1.4 - Coronavirus Safety Precautions Paintings for Awareness in India

The efficacy of any crisis communication strategy, especially during public health disasters, depend equally on the accuracy of information disseminated and also its inclusivity. The emergence of COVID 19 in India has raised the alarm and exposed the loopholes not only in the public healthcare sphere, but also in the allied legal frame work pertaining to risk communication and crisis management. The government has enforced the lockdown under the provision of the colonial Epidemic Disease Act, 1897 and the more recent National Disaster Management Act, 2005. However, both these acts do not elaborate explicitly on crisis communications, one of the most important tools of crisis management in such times. But these legislations need to be urgently amended and expanded to chart out a national crisis management framework, keeping in mind the exponential growth of digital communication channels.

Though being highly populated the relative confirmed cases of India is low compared to other countries. This could be because of two reasons:

1. 21 day lockdown imposed by prime minister Narendra Modi (Source : [Health Ministry](#))
2. Low testing rate (Source: [news18](#))

It states, “Develop early warning systems that are people centered, in particular systems whose warnings are timely and understandable to those at risk, which take into account the demographic, gender, cultural and livelihood characteristics of the target audiences, including guidance on how to act upon warnings.” Similar broad and all-encompassing guidelines needs to be embedded in the legal framework in order to make it more contemporary.

1.4 CORONA VIRUS MYTH BUSTERS

- a) Studies show hydroxychloroquine does not have clinical benefits in treating COVID-19.
- b) The likelihood of shoes spreading COVID-19 is very low.
- c) People should NOT wear masks when exercising, as masks may reduce the ability to breathe comfortably.
- d) The coronavirus disease (COVID-19) is caused by a virus, NOT by bacteria.

- e) The prolonged use of medical masks when properly worn, DOES NOT cause CO2 intoxication nor oxygen deficiency.
- f) Most people who get COVID-19 have mild or moderate symptoms and can recover thanks to supportive care.
- g) Drinking alcohol does not protect you against COVID-19 and can be dangerous.
- h) Thermal scanners are effective in detecting people who have a fever (i.e. Have a higher than normal body temperature).
- i) There are currently no drugs licensed for the treatment or prevention of COVID-19.
- j) Adding pepper to your soup or other meals DOES NOT prevent or cure COVID-19.
- k) COVID-19 is NOT transmitted through houseflies.
- l) Spraying and introducing bleach or another disinfectant into your body WILL NOT protect you against COVID-19 and can be dangerous.
- m) Drinking methanol, ethanol or bleach DOES NOT prevent or cure COVID-19 and can be extremely dangerous.
- n) 5G mobile networks DO NOT spread COVID-19.
- o) Exposing yourself to the sun or temperatures higher than 25°C DOES NOT protect you from COVID-19.
- p) Catching COVID-19 DOES NOT mean you will have it for life.
- q) Being able to hold your breath for 10 seconds or more without coughing or feeling discomfort DOES NOT mean you are free from COVID-19.
- r) Cold weather and snow CANNOT kill the COVID-19 virus.
- s) Taking a hot bath does not prevent COVID-19.
- t) The COVID-19 virus CANNOT be spread through mosquito bites.
- u) Hand dryers are NOT effective in killing the COVID-19 virus.
- v) Ultra-violet (UV) lamps should NOT be used to disinfect hands or other areas of your skin.
- w) Rinsing your nose with saline does NOT prevent COVID-19.
- x) Eating garlic does NOT prevent COVID-19.
- y) People of all ages can be infected by the COVID-19 virus.

1.3 OBJECTIVES

1. To spread awareness among the citizens of India.
2. To evaluate the daily crisis due to COVID-19.
3. To examine the presently available COVID-19 data for India.
4. To examine the deadly corona virus spread among the citizens and community.
5. To provide better methods for estimates that can assist medical and governmental institutions to prepare and adjust as pandemics unfold.
6. To analyze total number of cases in India with the help of Python Data Visualization.

2. DATASETS

2.1 DATA ASSEST

I. CONTEXT & LINKS

The first COVID-19 case was reported on 30 January in a student who arrived in Kerala state from Wuhan. Then 2 more cases were reported in the next 2 days in Kerala again. For almost a month, no new cases were reported in India, however, on 8th March, five new cases of corona virus in Kerala were again reported and since then the cases have been rising affecting 14 states. Coronavirus is a family of viruses that can cause illness, which can vary from common cold and cough to sometimes more severe disease. SARS-CoV-2 (n-corona virus) is the new virus of the corona virus family, which first discovered in 2019. It is a contiguous virus which started from Wuhan in December 2019 which later declared as Pandemic by WHO due to high rate spreads throughout the world. Pandemic is spreading all over the world; it becomes more important to understand about this spread.

From [World Health Organization](#) - On 31 December 2019, WHO was alerted to several cases of pneumonia in Wuhan City, Hubei Province of China.

So daily level information on the affected people can give some interesting insights when it is made available to the broader data science community.

[Johns Hopkins University has made an excellent dashboard](#) using the affected cases data. Data is extracted from the google sheets associated and made available here.

- COVID-19 cases at daily level is present in covid_19_india.csv file
- Individual level details are present in IndividualDetails.csv file and is obtained from [this link](#)
- Population at state level is present in population_india_census2011.csv file
- Number of COVID-19 tests at daily level in ICMRTestingDetails.csv file
- Number of hospital beds in each state in present in HospitalBedsIndia.csv file and is extracted from this [link](#)

- Travel history dataset by <https://www.kaggle.com/dheerajmpai/covidindiatravelhistory>

The number of new cases are increasing day by day around the world. This dataset has information from the states and union territories of India at daily level.

State Wise data fetched from [Ministry of Health & Family Welfare](#)

ICMR Testing Data comes from [Indian Council of Medical Research](#)

- <https://www.covid19india.org/> provides a crowd sourced data.
- Their API provides district level number of cases.
- The API also provides data on tests, facilities, no. of hospitals.
- More information about them can be found here : <https://www.covid19india.org/about>
- <https://api.covid19india.org/> has the list of all the API's that they have made available.
- Here is the github repo of the project : <https://github.com/covid19india/covid19india-react>.
- <https://github.com/imdevskp/covid-19-india-data>
- Population at state level is present in `population_india_census2011.csv` file.
- Number of COVID-19 tests at daily level in `ICMRTestingDetails.csv` file.
- Number of hospital beds in each state is present in `HospitalBedsIndia.csv` file and is extracted from this [link](#).

II. ACKNOWLEDGMENT

- Original source of data was https://developers.google.com/public-data/docs/canonical/countries_csv and https://developers.google.com/public-data/docs/canonical/states_csv. Data was originally released under a Creative Commons 4.0 license.
- Thanks to [covid19india.org](https://www.covid19india.org) for making the individual level details and testing details available to general public.
- Thanks to Indian [Ministry of Health & Family Welfare](#) for making the data available to general public.
- Thanks to [Wikipedia](#) for population information.

III. DATA VISUALIZATION WITH PYTHON PROGRAMMING LANGUAGE:

1. Data Analysis with Python Language **(Python Notebook)**.
2. Comparison of COVID-19 Cases with other countries **(Table Wise)**.
3. Spike in India for COVID Cases **(Line Chart)**.
4. Age Group Analysis **(Pie Chart)**.
5. Indian COVID-19 Patients Outcome Age Wise **(Box-Plot)**.

TOOLS & OTHER GRAPHS FEASIBLY USED IN CAPSTONE DATA SCIENCE FINAL PROJECT

- MATPLOTLIB
- PANDAS
- NUMPY
- SCIPY
- SEABORN
- FOLIUM (WORLD LEVEL & INDIA LEVEL INTENSITY OF THE COVID-19 SPREAD)
- GEOSPATIAL DATA & CO-ORDINATES DATA
- AREA PLOT
- BAR CHART
- SCATTER PLOTS WORD CLOUD

3. METHODOLOGY

1. Determining the Flourish Bar Chart determines the state wise breakdown
2. Feasibility of COVID cases in the Plot shows the testing pattern and persons tested positive
3. Determining the Various data in the Plot shows the increasing trend of confirmed cases as well as recovered patients in India
4. Plot shows the number of persons infected due to the COVID-19 in India
5. By the available Kaggle data the Plot shows the number of person's deaths due to the COVID-19 in India.
6. Plot shows the rate of cumulative recoveries overtime in India
7. Determining the various data collected over the India country Plot shows the rate of daily cases overtime in India
8. Plot shows the 7-Day rolling average vs. daily death over time
9. Plot shows the 7-Day rolling average vs. daily recoveries over time.
10. Comparison of number of confirmed, Deaths and cured cases in Indian States.
11. The bar chart shows the sample tested for COVID-19 in India
12. State wise data for COVID-19
13. Tree map for various affected states in India in which Maharashtra state is the most affected followed by the state Tamilnadu.
14. ICMR lab tests for various states in India shows the Tree Map in which Maharashtra has highest testing conducted in the country followed by Hyderabad, Pune, New Delhi and Tamilnadu state for the COVID-19.
15. Medical facility functioning below TREE MAP shows that Uttar Pradesh state has the highest number of PHC's functioning with only 1 doctor available at the particular area also Chhattisgarh state has the highest number of state functioning without doctor followed by other states.
16. Below table values for the state and union territory death with comparison to the state in India.

4. ANALYSIS AND RESULTS

4.1 Flourish Bar Chart determines the state wise breakdown for the confirmed cases in India Country till the data available. We have also introduced the state wise vs date wise chart which is showing the growing trend of the cases in the particular state wise in the whole country with maximum of 211987 cases registered in the state Maharashtra followed by Tamilnadu and Delhi.

COVID19: Confirmed Cases in India State wise breakdown

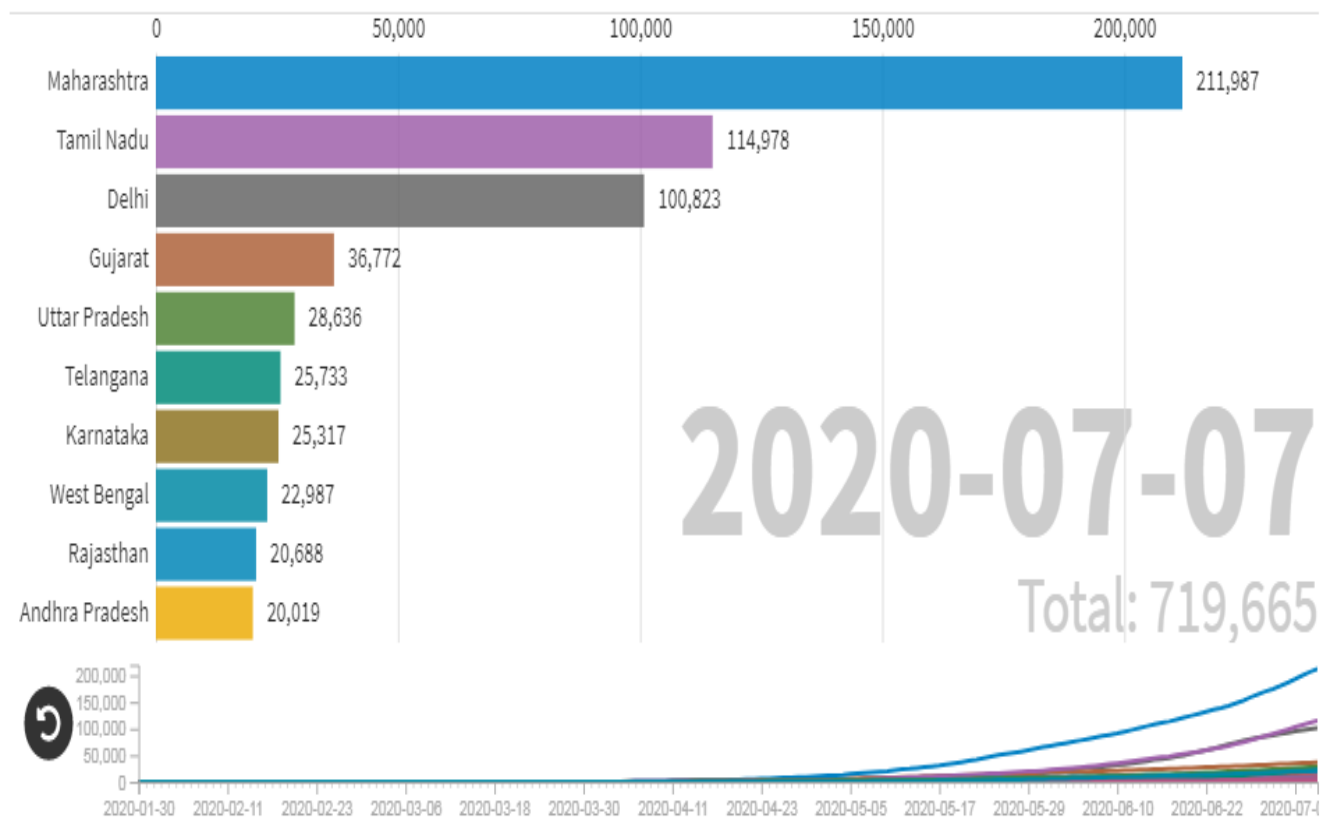


Fig 4.1 Flourish Bar Chart determines the state wise breakdown

4.2 India's Condition for the COVID-19 testing which determines the date wise and particular individual tested is 609917 and till 23rd August 2020 daily deceased was 846 persons in India.

Today's Condition in India: Testing for of 2019-nCoV

Time Stamp :24/08/2020 09:00:00

Individuals Tested :609917

Individuals Found Positive :

Today's Condition in India: 2019-nCoV

Time Stamp :23 August

Positive Reported Today :61749

Deceased Today :846

4.3 Plot shows the testing history for India Covid-19 conditions in which it depicts the testing pattern and the persons tested positive date wise and population wise in the plot.

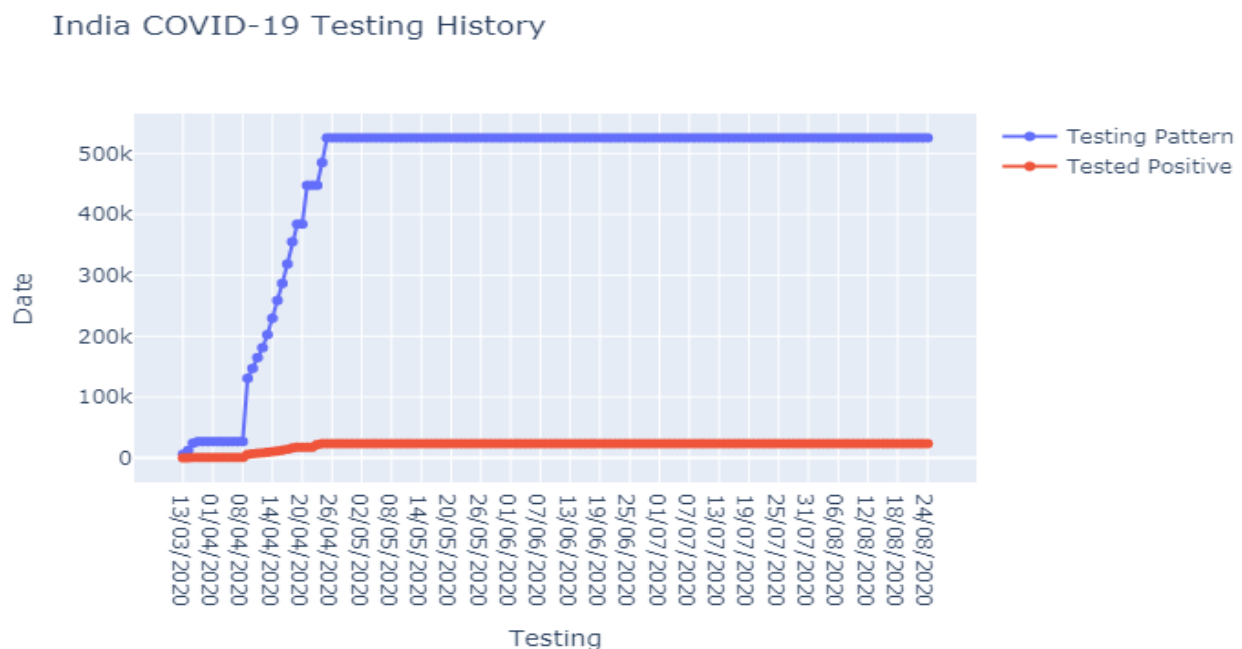


Fig 4.2 Plot shows the testing pattern and persons tested positive

4.4 India COVID-19 testing shows number of confirmed cases, recovered patients and deceased patients which is increasing day by day. But we can also predict that till date the recovered trend is increasing also with the number of increased positive patients as well. Well that is good news for Country India.

India COVID-19

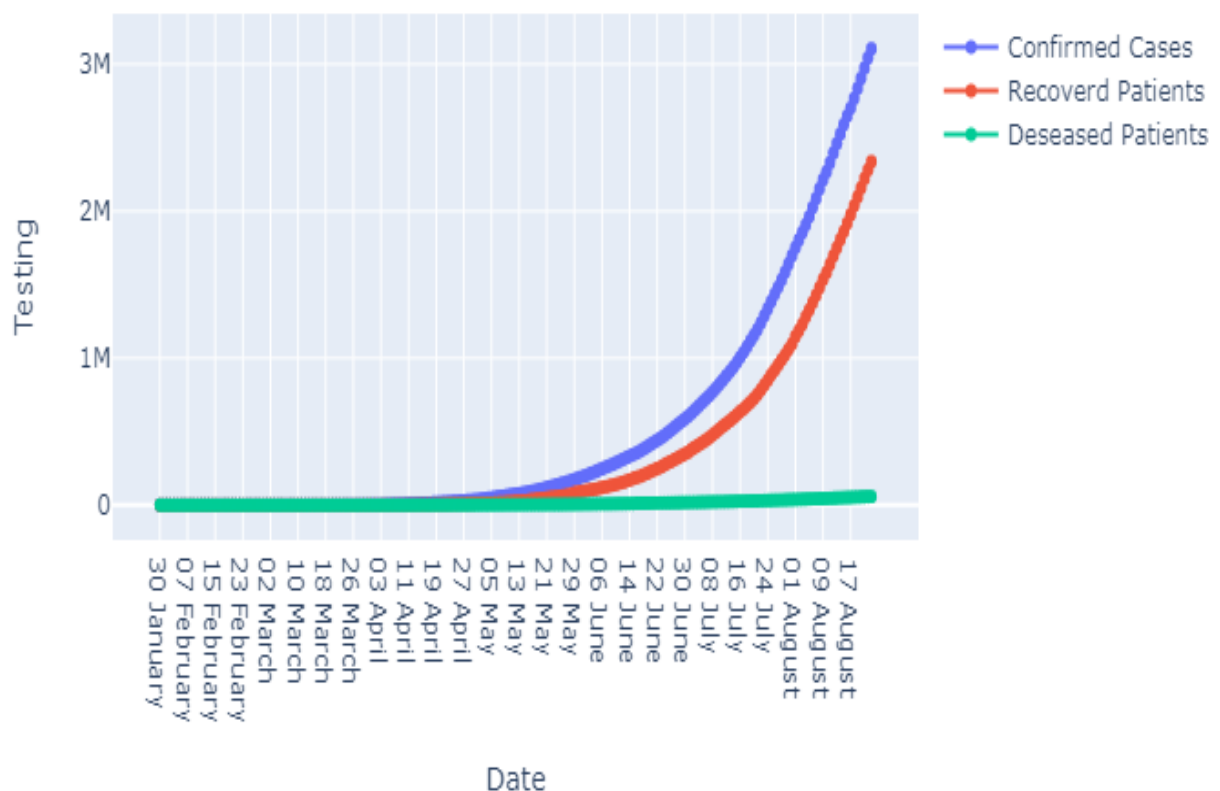


Fig. 4.3 Plot shows the increasing trend of confirmed cases as well as recovered patients in India

4.5 Cumulative positive cases over time which shows the Maharashtra state is the highest leading state in the country followed by state Tamilnadu and Haryana. Number of confirmed deaths are also increased to 20000 persons in the particular state which is higher than ever before in the country India.

Cumulative cases over time

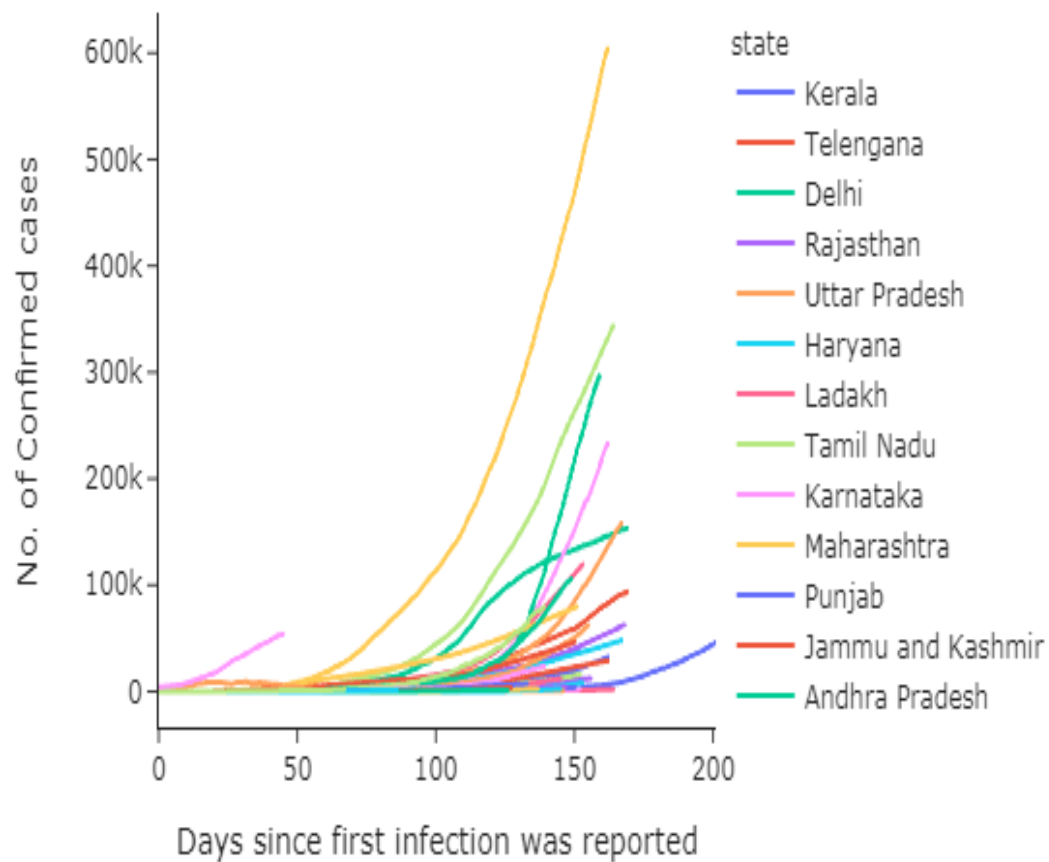


Fig 4.4 Plot shows the number of persons infected due to the COVID-19 in India.

4.6 Cumulative death cases over time which shows the Maharashtra state is the highest leading state in the country followed by state Tamilnadu and Haryana.

Cumulative deaths over time

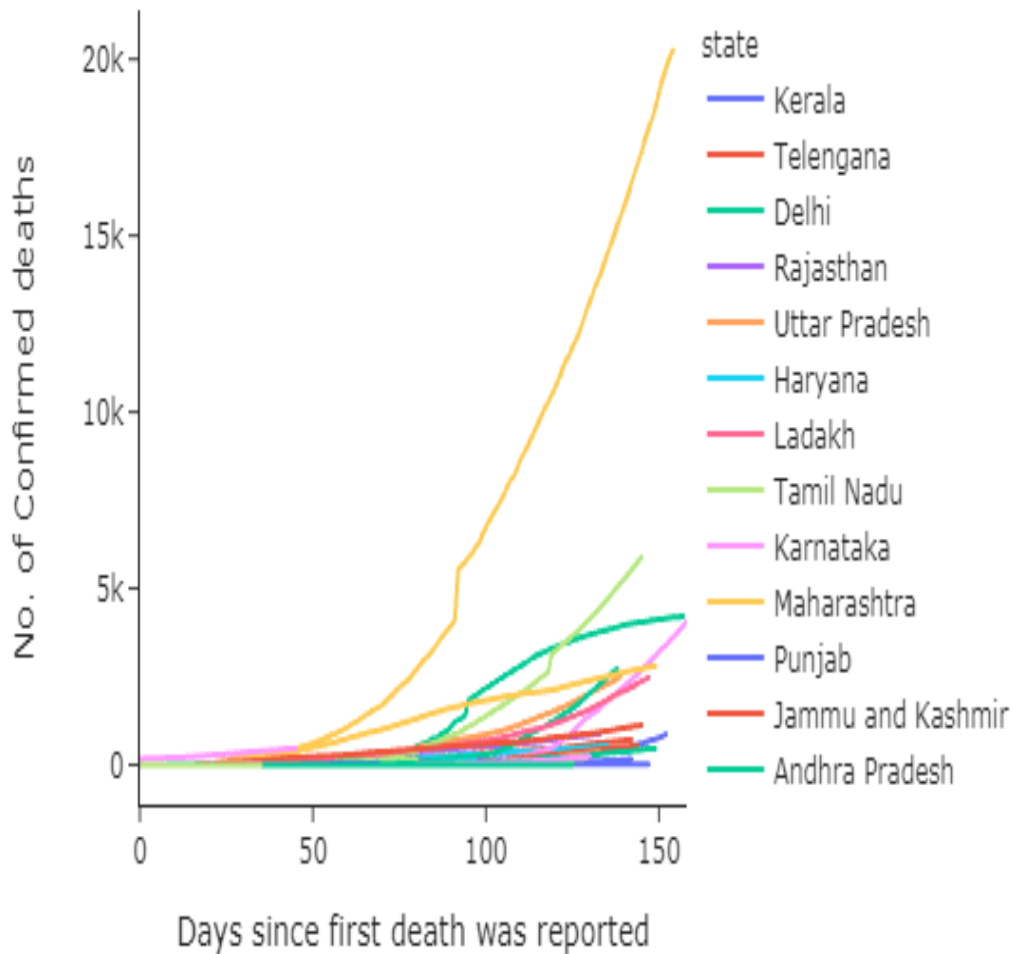


Fig 4.5 Plot shows the number of person's deaths due to the COVID-19 in India.

4.7 Cumulative recoveries over time since the day first was reported in India. The graph shows that the state Maharashtra has the highest recovered followed by the state Tamilnadu and Haryana which directly means the state which is having highest positive cases are also recovering in a very fast way.

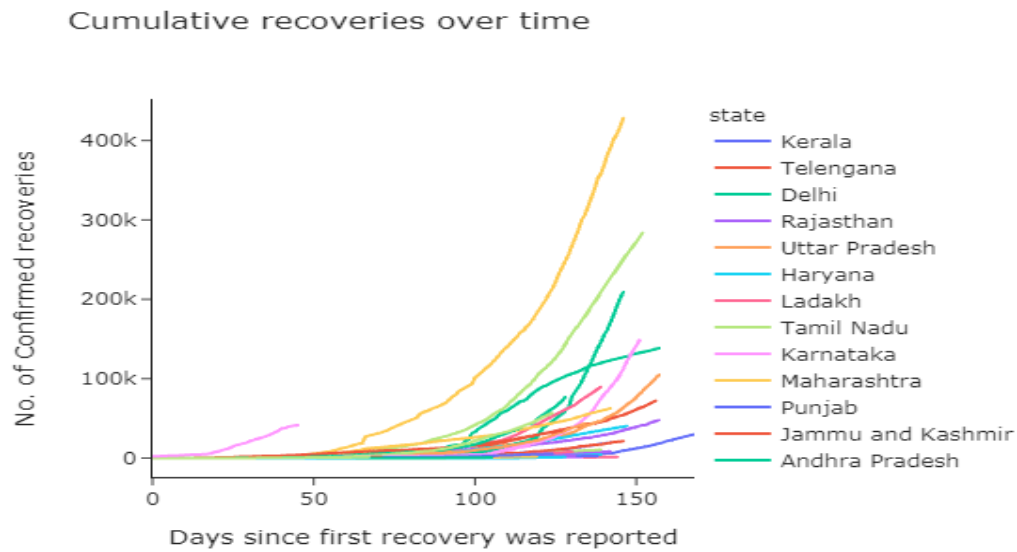


Fig 4.6 Plot shows the rate of cumulative recoveries overtime in India

4.8 Daily cases over time data shows that Goa state has an increasing number of persons around 12000 persons till date followed by the state Andhra Pradesh around 9000 cases.

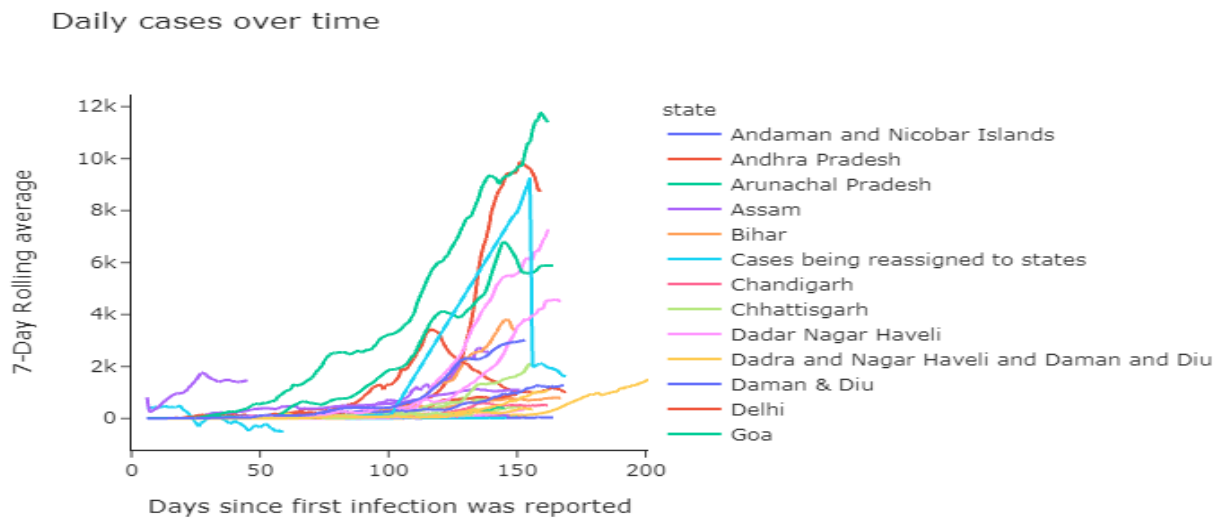


Fig 4.7 Plot shows the rate of daily cases overtime in India

4.9 Daily deaths over time shows that as compared to the 7-Day Rolling Average the most state infected with positive cases in India is Goa which shows around 350 daily deaths over time.

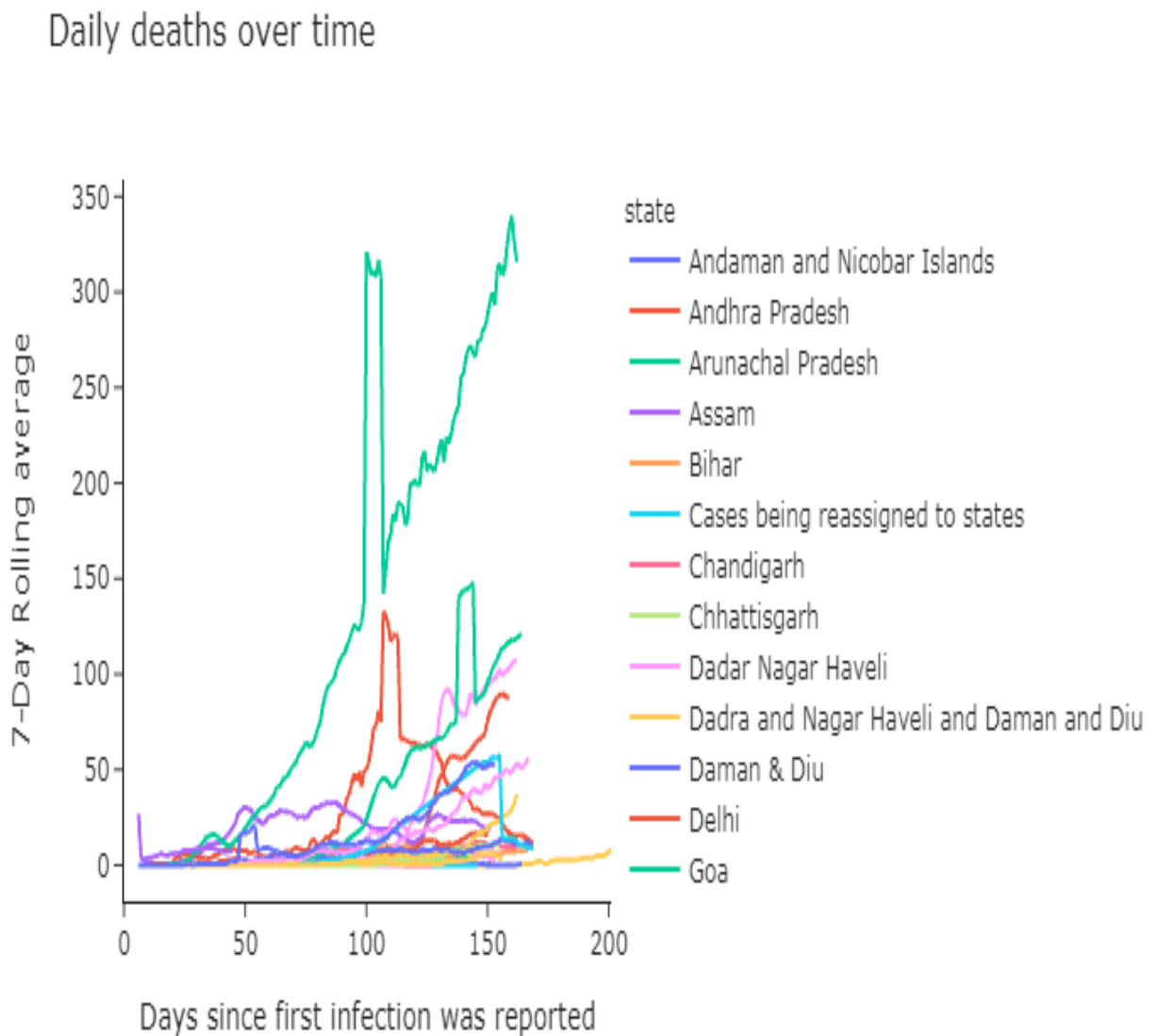


Fig 4.8 Plot shows the 7-Day rolling average vs. daily death over time

4.10 Arunachal Pradesh, Goa and Andhra Pradesh shows that daily recoveries over time for 7-day rolling average which is around 10000 cases for Arunachal Pradesh State in India.

Daily recoveries over time

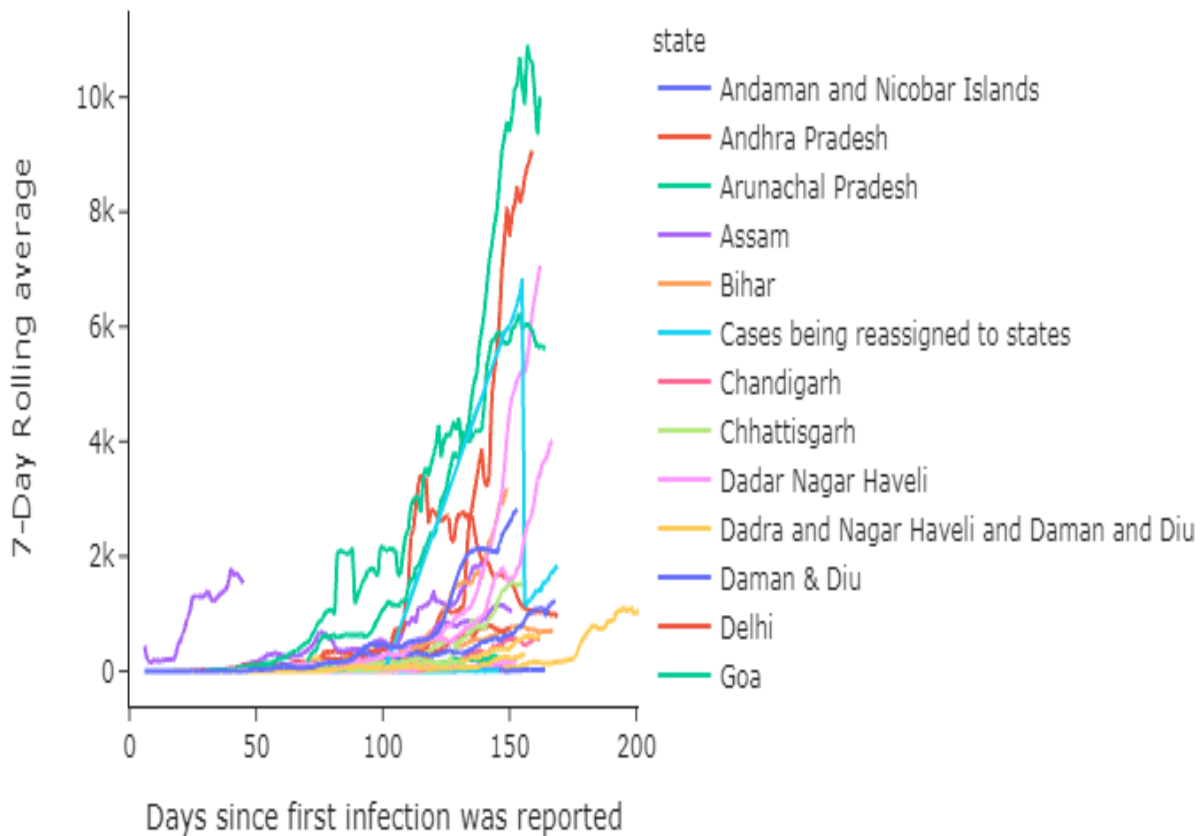


Fig 4.9 Plot shows the 7-Day rolling average vs. daily recoveries over time

4.11 For the country India state wise sorted values per death rate and cure rate are given below in the table in which most confirmed cases are in the state Maharashtra with 604358 total confirmed cases positive for COVID-19 followed by the state Tamilnadu with 343945 number of cases register for the positive cases also 5886 deaths recorded all over the Tamilnadu state.

Table 4.1 Comparison of number of confirmed, Deaths and cured cases in Indian States.

State/Union Territory		Confirmed	Deaths	Cured	Active	Death Rate (per 100)	Cure Rate (per 100)
22	Maharashtra	604358	20265	428514	1012607	3.35	70.9
32	Tamil Nadu	343945	5886	283937	621996	1.71	82.55
1	Andhra Pradesh	296609	2732	209100	502977	0.92	70.5
18	Karnataka	233283	4062	148562	377783	1.74	63.68
38	Uttar Pradesh	158216	2515	104808	260509	1.59	66.24
11	Delhi	153367	4214	138301	287454	2.75	90.18
40	West Bengal	119578	2473	89703	206808	2.07	75.02
4	Bihar	106307	468	76452	182291	0.44	71.92
35	Telangana	93937	711	72202	165428	0.76	76.86
13	Gujarat	79710	2800	62595	139505	3.51	78.53
3	Assam	79667	197	56734	136204	0.25	71.21
30	Rajasthan	62630	887	47654	109397	1.42	76.09
27	Odisha	62294	353	43780	105721	0.57	70.28
36	Telangana***	57142	480	42909	99571	0.84	75.09
33	Telangana	54059	463	41332	94928	0.86	76.46

4.12 Sample tested for Covid-19 in India in which the state Maharashtra has maximum number of tested samples in all over the country India.

Sample Tested for COVID-19 in India (Day Wise)

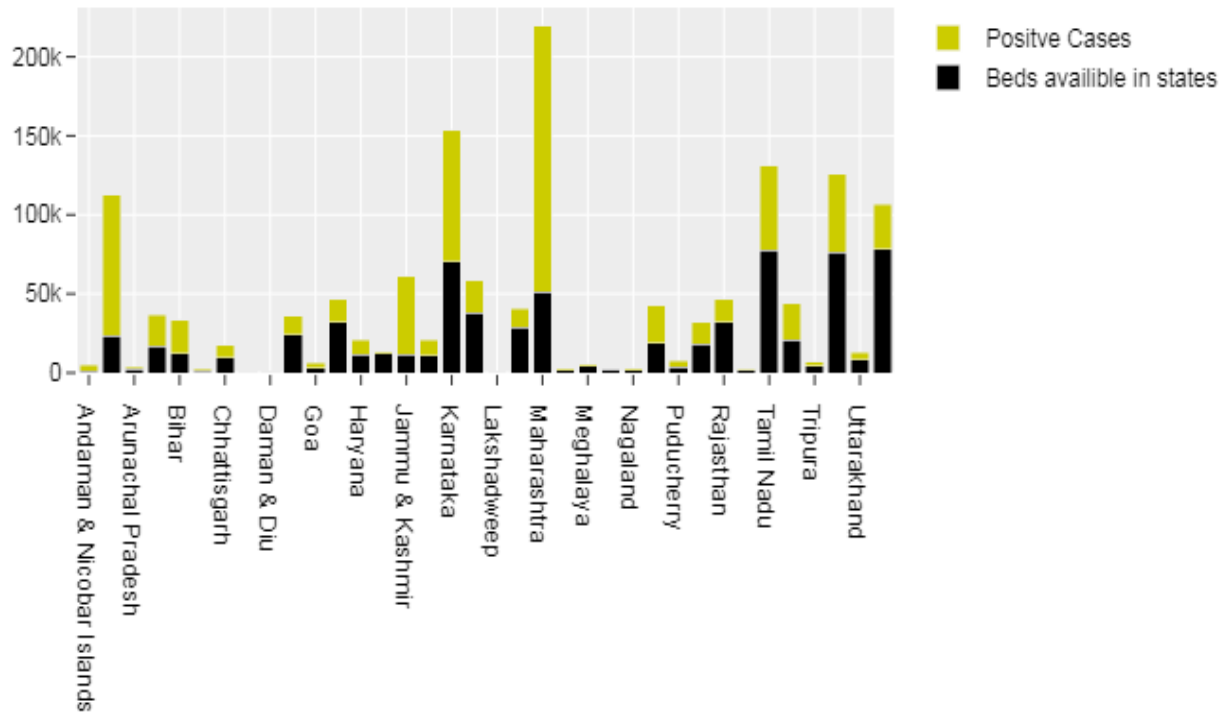


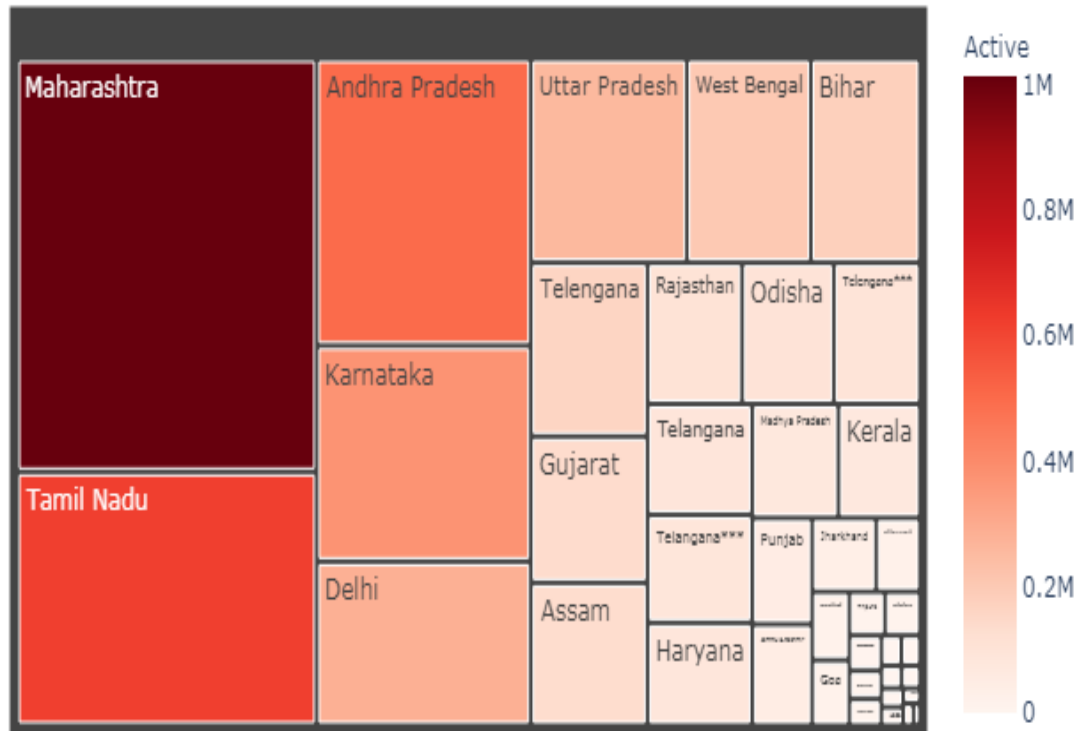
Fig. 4.10 The bar chart shows the sample tested for COVID-19 in India

4.13 State wise data for Covid-19

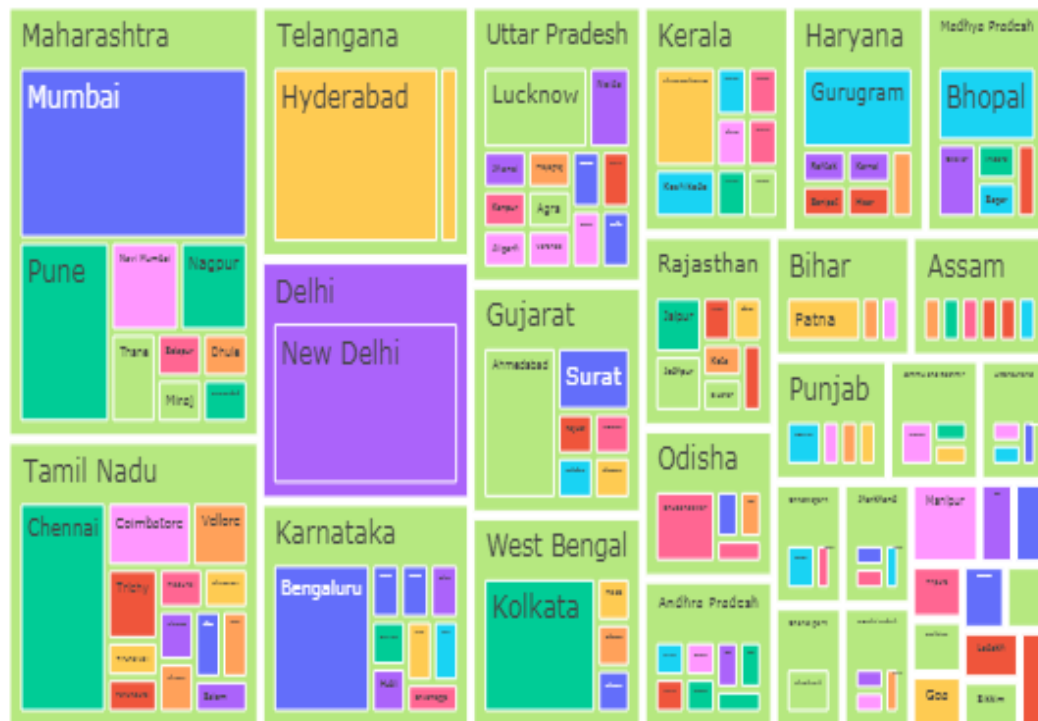
Table 4.2 State wise data for COVID-19

	date	state	cured	deaths	confirmed
5331	2020-08-18	Telangana	72202	711	93937
5332	2020-08-18	Tripura	5404	62	7409
5333	2020-08-18	Uttarakhand	8485	158	12493
5334	2020-08-18	Uttar Pradesh	104808	2515	158216
5335	2020-08-18	West Bengal	89703	2473	119578

4.14 Tree map for various affected states in India in which Maharashtra state is the most affected followed by the state Tamilnadu.



4.15 ICMR lab tests for various states in India shows the Tree Map in which Maharashtra has highest testing conducted in the country followed by Hyderabad, Pune, New Delhi and Tamilnadu state for the COVID-19.



4.16 Medical facility functioning below TREE MAP shows that Uttar Pradesh state has the highest number of PHC's functioning with only 1 doctor available at the particular area also Chhattisgarh state has the highest number of state functioning without doctor followed by other states.

Sample Tested for COVID-19 in India (Day Wise)

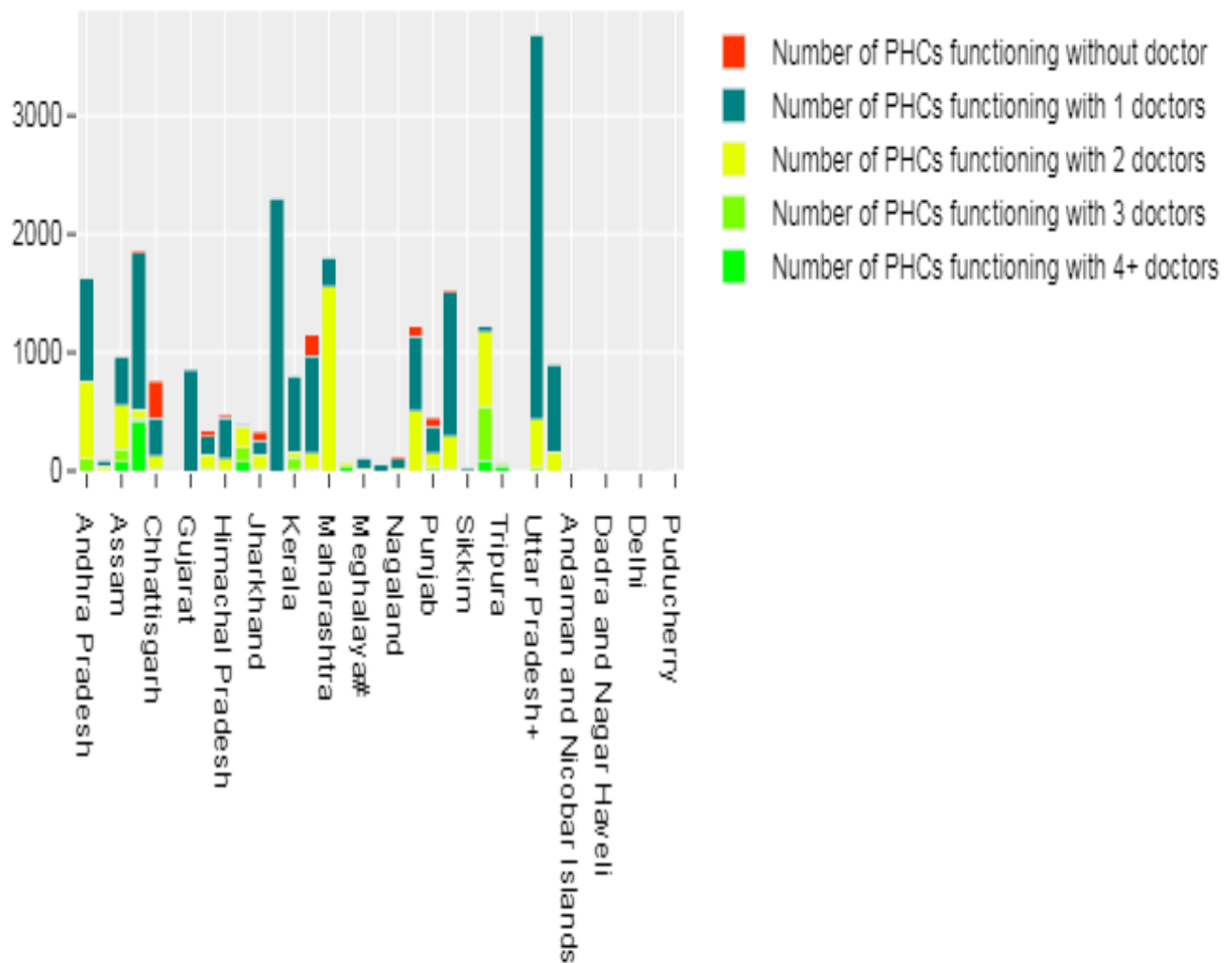


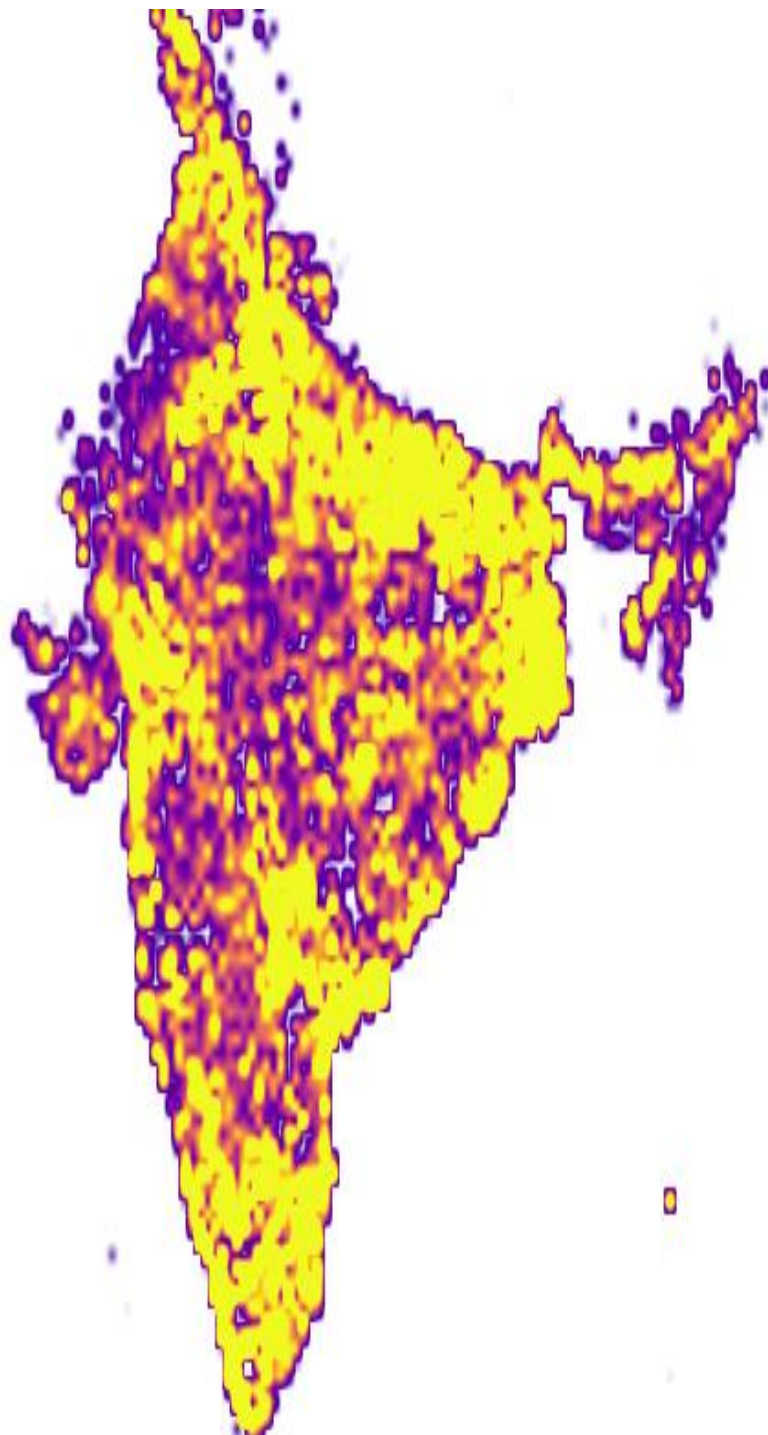
Fig. 4.11 Bar Chart shows the number of sample tested for COVID-19 in India.

4.17 Below table values for the state and union territory death with comparison to the state in India

Table 4.2 Table shows the number of confirmed and deaths in India

State/Union Territory		Confirmed	Deaths	Cured	Active	Death Rate (per 100)	Cure Rate (per 100)
22	Maharashtra	604358	20265	428514	1012607	3.35	70.9
32	Tamil Nadu	343945	5886	283937	621996	1.71	82.55
1	Andhra Pradesh	296609	2732	209100	502977	0.92	70.5
18	Karnataka	233283	4062	148562	377783	1.74	63.68
38	Uttar Pradesh	158216	2515	104808	260509	1.59	66.24
11	Delhi	153367	4214	138301	287454	2.75	90.18
40	West Bengal	119578	2473	89703	206808	2.07	75.02
4	Bihar	106307	468	76452	182291	0.44	71.92
35	Telengana	93937	711	72202	165428	0.76	76.86
13	Gujarat	79710	2800	62595	139505	3.51	78.53
3	Assam	79667	197	56734	136204	0.25	71.21
30	Rajasthan	62630	887	47654	109397	1.42	76.09
27	Odisha	62294	353	43780	105721	0.57	70.28
36	Telengana***	57142	480	42909	99571	0.84	75.09
33	Telangana	54059	463	41332	94928	0.86	76.46

India Map showing the number of positive cases and death cases with respect to number of state in the country India.



4.18 STATE WISE CONFIRMED, DEATH AND CURED CASES of 2019-nCoV**

Table 4.3 Table depicts state wise confirmed death and cured cases for the COVID-19

State/Union Territory		Confirmed	Deaths	Cured	Active	Death Rate (per 100)	Cure Rate (per 100)
22	Maharashtra	604358	20265	428514	1012607	3.35	70.9
32	Tamil Nadu	343945	5886	283937	621996	1.71	82.55
1	Andhra Pradesh	296609	2732	209100	502977	0.92	70.5
18	Karnataka	233283	4062	148562	377783	1.74	63.68
38	Uttar Pradesh	158216	2515	104808	260509	1.59	66.24
11	Delhi	153367	4214	138301	287454	2.75	90.18
40	West Bengal	119578	2473	89703	206808	2.07	75.02
4	Bihar	106307	468	76452	182291	0.44	71.92
35	Telangana	93937	711	72202	165428	0.76	76.86
13	Gujarat	79710	2800	62595	139505	3.51	78.53
3	Assam	79667	197	56734	136204	0.25	71.21
30	Rajasthan	62630	887	47654	109397	1.42	76.09
27	Odisha	62294	353	43780	105721	0.57	70.28
36	Telangana***	57142	480	42909	99571	0.84	75.09
33	Telangana	54059	463	41332	94928	0.86	76.46
34	Telangana***	52466	455	40334	92345	0.87	76.88
14	Haryana	48040	550	40610	88100	1.14	84.53
21	Madhya Pradesh	46385	1128	35025	80282	2.43	75.51
19	Kerala	46140	169	30025	75996	0.37	65.07
29	Punjab	32696	863	20180	52013	2.64	61.72
16	Jammu & Kashmir	28892	548	21296	49640	1.9	73.71
17	Jharkhand	23752	250	15051	38553	1.05	63.37
7	Chhattisgarh	16025	150	10598	26473	0.94	66.13
39	Uttarakhand	12493	158	8485	20820	1.26	67.92
12	Goa	11994	111	8058	19941	0.93	67.18

5	Cases being reassigned to states	9265	0	0	9265	0	0
28	Puducherry	8029	114	4627	12542	1.42	57.63
37	Tripura	7409	62	5404	12751	0.84	72.94
23	Manipur	4687	17	2734	7404	0.36	58.33
15	Himachal Pradesh	4174	19	2834	6989	0.46	67.9
26	Nagaland	3455	8	1530	4977	0.23	44.28
2	Arunachal Pradesh	2741	5	1893	4629	0.18	69.06
0	Andaman & Nicobar Islands	2445	29	1325	3741	1.19	54.19
6	Chandigarh	2216	30	1183	3369	1.35	53.38
20	Ladakh	1966	14	1368	3320	0.71	69.58
9	Dadra & Nagar Haveli & Daman & Diu	1908	2	1459	3365	0.1	76.47
24	Meghalaya	1418	6	679	2091	0.42	47.88
31	Sikkim	1187	1	701	1887	0.08	59.06
25	Mizoram	789	0	372	1161	0	47.15
8	Dadar Nagar Haveli	26	0	2	28	0	7.69
10	Daman & Diu	2	0	0	2	0	0

5. DISCUSSION

1. The numbers haven't grown as quickly as many expected them to, an indicator that suggests the lockdown may have helped reduce the spread of the virus.
2. But worryingly, the lockdown doesn't seem to have led to a downward trend in the number of new cases, as All India Institute of Medical Services Director Randeep Guleria, who is part of the country's core Covid-19 team, has noted.
3. If you compare the number of daily new cases in India with other countries that went into a lockdown, often a lot less restrictive than India's, they have tended to see an initial spike in cases followed by a peak after which number of new cases begins to come down.
4. "According to figures shared by the Union Health ministry, the 7-day compounded daily growth rate of Covid-19 cases started dipping on April 8," reported the Indian Express. "The overall downward trend continued till May 1 when the curve started rising again. Since May 3, the 3-day CDGR curve has remained above the 7-day CDGR."
5. What this means is that even when India pulled out the nuclear option – a national lockdown that would mean the entire economy remains shut leaving millions in distress – the virus has continued to grow.
6. The idea of flattening the curve through social distancing – as we explained back at the start of March – is to reduce the number of people who get infected at the same time, so that the health system is not suddenly overwhelmed in a way that might lead to avoidable deaths.
7. A lockdown is the most extreme version of social distancing, since it is government mandated and comes at considerable cost to the economy and individuals. Its aim is to buy time for the authorities to prepare for a further outbreak and for health departments to ready hospitals and infrastructure for a deluge of patients.
8. Authorities around the country have begun to prepare hospitals and care centres to treat Covid-19 patients. Some of this appears to have happened later than expected, with the Centre only enumerating health infrastructure at the district level in week five of the lockdown.
9. Although some of that may have been down to India's decision to prevent people from coming into the country and locking down early into the spread of the virus, many theories went around suggesting that maybe Indians had some sort of immunity to the disease, or that it didn't spread as easily in hotter places.
10. There is as yet no conclusive evidence to suggest that Indians have any sort of natural immunity to the virus. Other theories have also yet to be substantiated, such as the suggestion that India's lower numbers may have been aided by the BCG vaccine – meant to protect against tuberculosis.
11. Finally, the government has pushed Aarogya Setu, a contact-tracing app, as a solution to the virus, just as it used the idea of a lockdown as a weapon with which to defeat Covid-19.
12. The novel coronavirus spread so rapidly that it has changed the rhythm of the globe. Whether from the perspective of a single country or multilateral levels, the solidity of international relations has been put under test. The most obvious consequences include economic recession, a crisis of global governance, trade protectionism and increasing

isolationist sentiment. People-to-people, cultural and travel exchanges have all been restricted. Nonetheless, this is just a tip of the iceberg.

13. After we overcome the pandemic, which will surely happen, we must carry out a comprehensive evaluation of the world's ability to maintain stability when faced with similar challenges in the future. We must also craft measures to cope with these challenges together. But perhaps at the current phase, we can already draw some conclusions.
14. A pandemic is not new in human history. But what makes the COVID-19 pandemic special is that it takes place in an unprecedented backdrop when the interconnectivity and interdependence between people, between countries and between continents are so deep. The achievements people have made in technology, intelligence and transportation make them both physically and psychologically globalized.
15. As a result, some "man-made" consequences have been added to the natural effect caused by the virus. These "man-made" consequences are a result of the zero-sum mentality that humans, or precisely some humans, refuse to give up even when faced with common disasters. Nonetheless, to overcome the visible consequences caused by COVID-19, countries are urged to stay more united than ever and to gather all strengths and resources.
16. Russia has always firmly opposed such an inhumane approach, and this is completely unacceptable when humanity is facing a disaster. Because of this, at the virtual meeting of G20 leaders on March 26, President Vladimir Putin proposed establishing "green corridors free of trade wars and sanctions" that would ensure supplies of medication, food, equipment and technology.
17. The pandemic has once again debunked the long-held myth in the West about the "end of history," an all-powerful model of hyper-liberal development, based on the principles of individualism, and a firm belief in the ability to solve all problems through the market alone.
18. I believe if the EU countries can join this work, then they will also benefit from it. By participating in common efforts, they will be able to secure their rightful place in a new, more equitable and democratic, multi-centric world order. It is time for Europeans to stop breaking away from their own continent, to stop peeping into the world's survival landmarks and to invite external military presence.
19. Everyone wants to turn the page on COVID-19 as soon as possible. But lessons are inevitable. And it's up to each of us to decide if those lessons are right. Throughout its long history, Russia has repeatedly faced the most dangerous challenges that threaten its survival. And each time, it not only rose from the ashes and emerged stronger, but it also set an example to other nations in terms of humanity and selflessness.
20. That is why our country, as an important international center, exporter and guarantor of security, will continue to advance a constructive and unified agenda and to play a balanced and coordinating role in international affairs.

6. CONCLUSION

1. Flourish Bar Chart determines the state wise breakdown for the confirmed cases in India Country till the data available. We have also introduced the state wise vs date wise chart which is showing the growing trend of the cases in the particular state wise in the whole country with maximum of 211987 cases registered in the state Maharashtra followed by Tamilnadu and Delhi.
2. India's Condition for the COVID-19 testing which determines the date wise and particular individual tested is 609917 and till 23rd August 2020 daily deceased was 846 persons in India.
3. Plot shows the testing history for India Covid-19 conditions in which it depicts the testing pattern and the persons tested positive date wise and population wise in the plot.
4. India COVID-19 testing shows number of confirmed cases, recovered patients and deceased patients which is increasing day by day. But we can also predict that till date the recovered trend is increasing also with the number of increased positive patients as well. Well that is good news for Country India.
5. Cumulative positive cases over time which shows the Maharashtra state is the highest leading state in the country followed by state Tamilnadu and Haryana. Number of confirmed deaths are also increased to 20000 persons in the particular state which is higher than ever before in the country India.
6. Cumulative death cases over time which shows the Maharashtra state is the highest leading state in the country followed by state Tamilnadu and Haryana.
7. Cumulative recoveries over time since the day first was reported in India. The graph shows that the state Maharashtra has the highest recovered followed by the state Tamilnadu and Haryana which directly means the state which is having highest positive cases are also recovering in a very fast way.
8. Daily cases over time data shows that Goa state has an increasing number of persons around 12000 persons till date followed by the state Andhra Pradesh around 9000 cases.
9. Arunachal Pradesh, Goa and Andhra Pradesh shows that daily recoveries over time for 7-day rolling average which is around 10000 cases for Arunachal Pradesh State in India.
10. For the country India state wise sorted values per death rate and cure rate are given below in the table in which most confirmed cases are in the state Maharashtra with 604358 total confirmed cases positive for COVID-19 followed by the state Tamilnadu with 343945 number of cases register for the positive cases also 5886 deaths recorded all over the Tamilnadu state.
11. Tree map for various affected states in India in which Maharashtra state is the most affected followed by the state Tamilnadu.

12. ICMR lab tests for various states in India shows the Tree Map in which Maharashtra has highest testing conducted in the country followed by Hyderabad, Pune, New Delhi and Tamilnadu state for the COVID-19.
13. Medical facility functioning below TREE MAP shows that Uttar Pradesh state has the highest number of PHC's functioning with only 1 doctor available at the particular area also Chhattisgarh state has the highest number of state functioning without doctor followed by other states.
14. Only 30 out of 174 countries for which data is available have a lower rate of testing than India. At 559 tests per million people, India is conducting far fewer tests than any major economy in the world.

7. REFERENCES

INTRODUCTION & GENERAL DETAILS:

1. <https://kashmirobsrver.net/2020/07/06/covid-19-india-surpasses-russia-as-third-worst-hit-country/>
2. https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Asia
3. <https://www.mohfw.gov.in/>
4. <https://www.ndtv.com/coronavirus/india-covid-19-tracker>
5. <https://www.grainmart.in/news/covid-19-coronavirus-india-state-and-district-wise-tally/>
6. <https://www.mygov.in/corona-data/covid19-statewise-status/>
7. https://www.who.int/docs/default-source/wrindia/situation-report/india-situation-report-29.pdf?sfvrsn=4dd9a8d6_2
8. <https://pib.gov.in/allRel.aspx>
9. [https://www.who.int/publications/i/item/emergency-global-supply-chain-system-\(covid-19\)-catalogue](https://www.who.int/publications/i/item/emergency-global-supply-chain-system-(covid-19)-catalogue)
10. <https://covid19.who.int/explorer>
11. <https://covid19.who.int/table>
12. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters?gclid=EAlaIQobChMI97ei1qCu6wIV2qmWCh22IwfHEAAYASAAEgK-f_D_BwE#virus
13. <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>
14. <https://www.covid19india.org/>

KAGGLE DATA SET:

1. <https://www.kaggle.com/imdevskp/covid19-corona-virus-india-dataset>
2. <https://www.kaggle.com/nitishabharathi/the-story-of-covid-19-in-india-eda-and-prediction/notebook>
3. <https://www.kaggle.com/duttadebadri/covid-19-analysing-growth-sir-modeling-india>

4. <https://www.kaggle.com/chekoduadarsh/epidemic-model-covid-19-india-visualizations>
5. <https://www.kaggle.com/sugandhkhobragade/covid-19-india-visualization-forecasting>
6. <https://www.kaggle.com/vikassingh1996/indiafightscorona-covid-19-comprehensive-study>
7. <https://www.kaggle.com/parulpandey/tracking-india-s-coronavirus-spread>
8. <https://www.kaggle.com/sudalairajkumar/covid19-in-india>
9. <https://www.kaggle.com/imdevskp/covid-19-in-india>

IMAGE SOURCE:

1. <https://www.grainmart.in/gm-demo/wp-content/uploads/2020/05/Coronavirus-India-Mask.jpg>
2. https://www.brookings.edu/wp-content/uploads/2020/04/AdobeStock_332298426.jpeg
3. <https://www.orfonline.org/expert-speak/covid-19-india-and-crisis-communication-64102/>
4. https://www.unicef.org/india/sites/unicef.org.india/files/styles/hero_mobile/public/PSS-ChildLine.PNG?itok=8PIRZfLA