Comparative Study of Rajasthan with Respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their Response Towards Covid-19, A Pandemic

By

Chetak Singh Rana

Dissertation submitted in partial fulfillment of the requirements of the degree

MBA Hospital and Health Management

Academic year, 2018-2020

The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: **www.iihmr.edu.in**

Comparative Study of Rajasthan with Respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their Response Towards Covid-19, A Pandemic

By

Chetak Singh Rana

Dissertation submitted in partial fulfillment of award of

MBA Hospital and Health Management

Academic year, 2018-2020

National Health Mission, Rajasthan

The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: **www.iihmr.edu.in**

Government of Rajasthan
National Health Mission, Rajasthan
Department of Medical, Health & FW, Swasthya Bhawan, Jaipur
Tel.No.0141-2229108,EmailID:spm_raj.nrhm@yahoo.com

No. F 2 (153) NHM/SPM/2020/ 312 Dated: 10/06/2020

This certificate is awarded to

Dr. Chetak Singh Rana

Pursuing MBA-Hospital & Health Management from IIHMR University, Jaipur

In recognition of having successfully completed his

Dissertation & Internship in the department of

National Health Mission, Rajasthan

and has successfully completed his Project on

A Comparative study of Rajasthan with respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their response towards Covid-19, a Pandemic

Date : 11th March to 10th June, 2020

He comes across as a committed, sincere & diligent person who has a strong drive and zeal for learning.

We wish him all the best for future endeavors.

Special Secretary
Medical, Health & Family Welfare
Mission Director, NHM
Rajasthan

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled A Comparative study of Rajasthan with respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their response towards Covid-19, a Pandemic. and submitted by CHETAK SINGH RANA, Enrollment No 0735, under the supervision of Dr. Pankaj Gupta for award of MBA in Hospital and Health of the University carried out during the period from 11th March to 11th June, embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Signature

ABSTRACT

Title- A Comparative study of Rajasthan with respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their response towards Covid-19, a Pandemic.

Background- Coronavirus, that is technically termed as Covid-19 is an infectious disease that was first identified in December 2019 in Wuhan, China and was declared pandemic by WHO on March 11, 2020. India reported its index case on 30th January 2020 in Kerala, who was a student returned from Wuhan and then the spread happens to all the states. To prevent the further spread, government has imposed a nationwide lockdown in four phases till 31st May. With respect to the confirmed cases, Maharashtra, Tamil Nadu, Delhi, Gujarat and Rajasthan are the top 5 States/UT where highest number of confirmed cases are found. So an analytical study is done to compare their response towards Covid-19 in lockdown 1.0, 2.0 and 3.0, considering the confirmed cases, confirmed cases per million, percentage of infected people and recovery rate.

Objectives-

- To assess the confirmed cases in the specified states/UT.
- To assess the confirmed cases per million in the specified states/UT.
- To assess the percentage of infected people in the specified states/UT.
- To assess the recovery rate among the infected population in the specified states/UT.

Methodology-
Study Design- Analytical Study

- **Inclusion criteria:**
  Population of top 5 states/UT having highest number of Covid-19 confirmed cases that will include Maharashtra, Delhi, Tamil Nadu, Gujarat, Rajasthan.

- **Exclusion criteria:**
  Population of the remaining states/UT.

Study Tools-

Data Collection- Data was collected from MOHFW and NHM Websites of the respective states/UT.
Data Analysis- Software's including MS Excel, Tableau were used.
Duration of Study- 11th March to 11th June where data was taken from **25th March to 17th May**.
Data Analysis Plan - Data is collected from MOHFW and NHM websites of the respective states/UT day wise and will be analyzed in MS Excel with visuals developed in Tableau software.

Results- Since at the start, analysis depicts that Rajasthan has shown a progressive growth in the confirmed cases, it can reflect that the infection rate among the population is higher, but when the percentage of infected people and confirmed cases per million was analyzed and compared with other states, it is shown that Rajasthan is the state having least number of infected people as well as confirmed cases per million. On the other hand, Rajasthan has recovered highest number of confirmed cases, which implies that although the percentage increment in the number of confirmed cases was higher amid the three lockdowns, Rajasthan is better prepared and is efficient in implementing the strategies to combat with the Covid-19.

ACKNOWLEDGEMENT

I would like to extend my sincere thanks to our institute, Institute of Health Management Research, Jaipur for designing the curriculum in such a way that we can get enough health related information and apply the relevant concepts by providing us with 3 months of dissertation.

I would like to extend my deepest thanks to **Dr Jalaj Vijay**, State Program Manager, NHM Rajasthan for supporting and providing me a wonderful opportunity to do this project with the title " A Comparative study of Rajasthan with respect to Maharashtra, Tamil Nadu, Delhi and Gujarat to their response towards Covid-19, a Pandemic.", and which has helped me do a lot of research and come to know about many new things. I am very grateful to him for making familiar with information from the various departments working under the organization. My sincere thanks for allowing me to conduct a study on Covid-19, and giving me guidance and opportunity to work.

My sincere thanks to my respected mentor, **Dr. Pankaj Gupta**, President, IIHMR University for providing me with guidance and keeping me on the right path that helped me finish the project.

ABOUT THE ORGANISATION

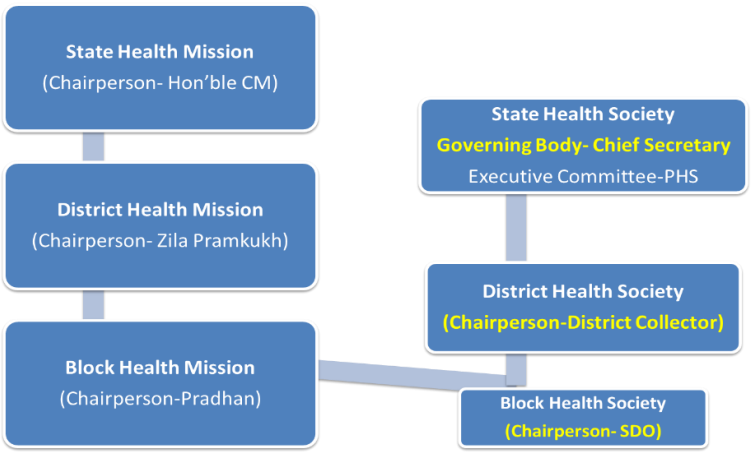
The National Health Mission (NHM) was launched on 1st May 2013 by the Government of India defining two sections as the National Rural Health Mission (NRHM launched in 2005) and the National Urban Health Mission (NUHM launched in 2013).

It is a national effort to ensure effective health care delivery through a variety of interventions at the same time, at home, in the community, and by monitoring health system levels.

OBJECTIVES

- Reduced infant mortality rate (IMR) and Maternal Mortality Ratio (MMR).
- Universal access to public health services such as women's health, children's health, water, sanitation and hygiene, immunization and nutrition.
- Prevention and control of communicable and non-communicable diseases, including endemic diseases.
- Access to integrated comprehensive primary healthcare.
- Sustainability of population, gender and equality of people.
- Renew local and high-quality health traditions.
- Promotion of healthy lifestyles.

MISSION STRUCTURE



Organogram

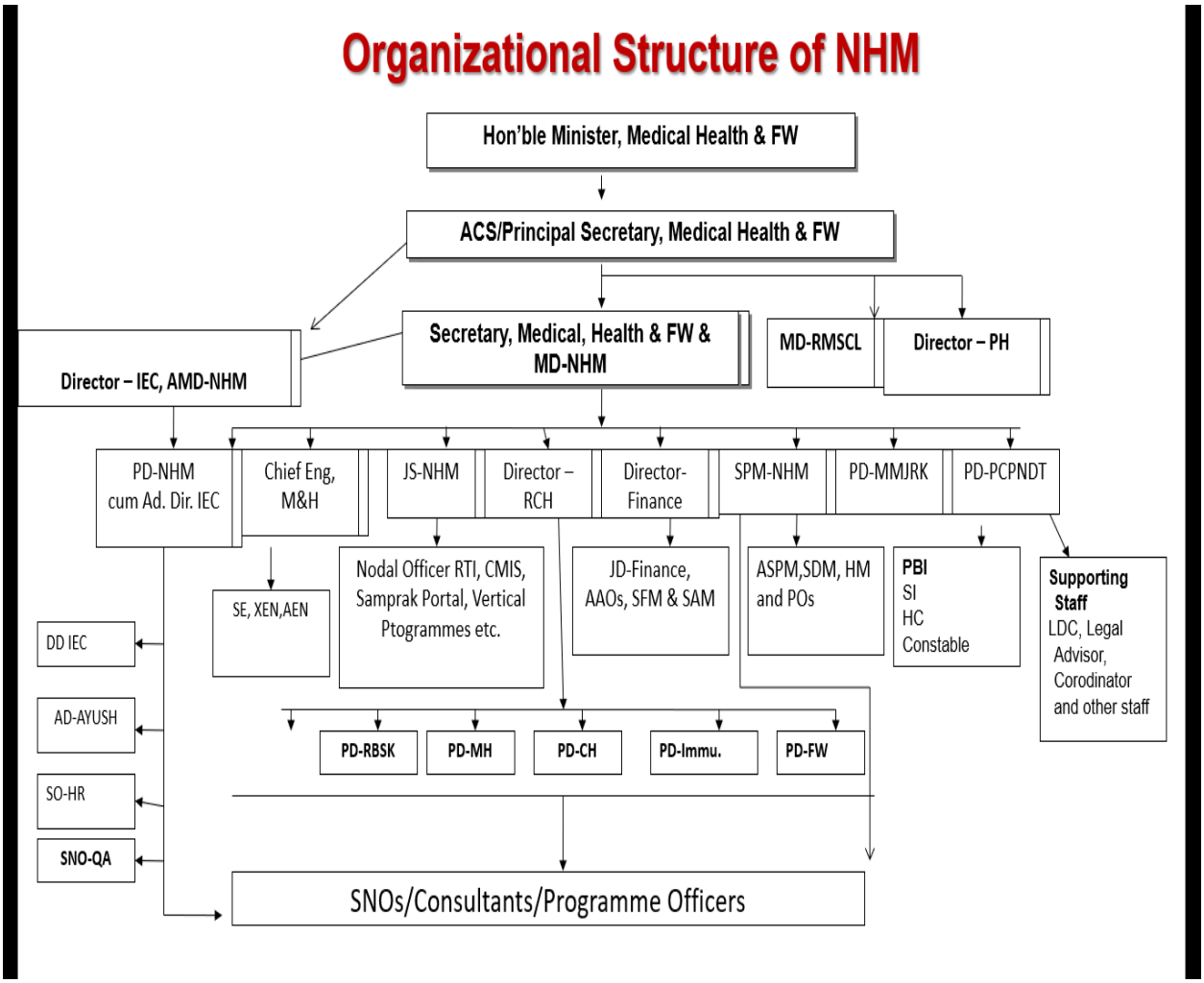

Organizational Structure of NHM
Hon'ble Minister, Medical Health & FW
ACS/Principal Secretary, Medical Health & FW
Secretary, Medical, Health & FW & MD-NHM
MD-RMSCL
Director – PH
Director – IEC, AMD-NHM
PD-NHM cum Ad. Dir. IEC
Chief Eng, M&H
JS-NHM
Director – RCH
Director-Finance
SPM-NHM
PD-MMJRK
PD-PCPNDT
SE, XEN,AEN
Nodal Officer RTI, CMIS, Samprak Portal, Vertical Ptogrammes etc.
JD-Finance, AAOs, SFM & SAM
ASPM,SDM, HM and POs
PBI
SI
HC
Constable
Supporting Staff
LDC, Legal Advisor, Corodinator and other staff
DD IEC
AD-AYUSH
SO-HR
SNO-QA
PD-RBSK
PD-MH
PD-CH
PD-Immu.
PD-FW
SNOs/Consultants/Programme Officers

Table of Contents

ABOUT THE ORGANISATION 7
Organogram 8

CHAPTER 1 14
1.1 Background 14
1.1.1 Response of the Rajasthan Government 14
1.1.2 Classification of the state districts 15
1.1.3 The Lockdown 16
1.2 Rationale 17
1.3 Research Question 17
1.4 Objectives 17

CHAPTER 2 18
Literature Review 18
2.1 How other countries are dealing with Covid-19 19

CHAPTER 3 20
Methodology 20
3.1 Study Area: 20
3.2 Study Design: 20
3.3 Study Duration: 20
3.4 Data Collection Method: 20
3.5 Data Type: 20
3.6 Data Analysis: 20
3.7 Operational Definitions: 21

CHAPTER 4 22
Results 22
4.1 Increment in the Confirmed Cases 23
4.2 Confirmed per million 25
4.3 Percentage of infected people 27
4.4 Recovery Rate 29

CHAPTER 5 31
Discussion 31

CHAPTER 6 32
Conclusion 32

CHAPTER 7 33
Bibliography 33

LIST OF FIGURES

Figure 1.1.2 1: Classification of the state districts zone wise 15
Figure 1.1.2 2: Shifting pattern in different zones 16

Figure 1.1.3. 1: Lockdown 16

Figure 3.3. 1: Study duration 20

Figure 4.1. 1: Increment of Confirmed cases in Lockdown 1.0 23
Figure 4.1. 2: Increment of Confirmed cases in Lockdown 2.0 23
Figure 4.1. 3: Increment of Confirmed cases in Lockdown 3.0 24

Figure 4.2. 1: Confirmed per million in Lockdown 1.0 25
Figure 4.2. 2: Confirmed per million in Lockdown 2.0 25
Figure 4.2. 3: Confirmed per million in Lockdown 3.0 26

Figure 4.3. 1: Percentage of infected people till Lockdown 1.0 27
Figure 4.3. 2: Percentage of infected people till Lockdown 2.0 27
Figure 4.3. 3: Percentage of infected people till Lockdown 3.0 27

Figure 4.4. 1: Recovery Rate in Lockdown 1.0 29
Figure 4.4. 2: Recovery Rate in Lockdown 2.0 29
Figure 4.4. 3: Recovery Rate in Lockdown 3.0 30

LIST OF TABLES

Table 4. 1: Results with respect to three lockdowns 22

Table 4.1. 1: Increment in the Confirmed cases. 24

Table 4.2. 1: Confirmed per million cases with respect to the three Lockdowns. 26

Table 4.3. 1: Percentage of Infected people with respect to the three Lockdowns. 28

Table 4.4. 1: Recovery Rate 30

Table 5. 1: Marks assigned to each state 31

ABBREVIATIONS

COVID-19	Coronavirus disease of 2019
WHO	World Health Organization
MOHFW	Ministry of Health and Family Welfare
AYUSH	Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy
NHM	National Health Mission
NFSA	National Food Security Act
SEIR Model	Susceptible, Exposed, Infected and Resistant Model
MERS	Middle-East Respiratory Syndrome
SARS	Severe Acute Respiratory Syndrome
NCP Report	National Commission on Population Report

CHAPTER 1
INTRODUCTION

1.1 Background

From Epidemic to a Pandemic, Outbreak of novel Coronavirus that is technically termed as Covid-19 has originated from the Wuhan City of Hubei Province of China and is rapidly infecting the other parts of the world.

India reported its first case on 30th January 2020 in Kerala, who was a student returned from Wuhan. With no significant rise in the month of February, new cases started coming under the limelight from 4th March onwards. Government, as a result has imposed immediate travel restrictions, sealed the borders, Janta Curfews to a lockdown that was “tough and timely” as stated by WHO. These interventions have reduced the spread to a great extent when compared with the other countries.

The Prime Minister’s office and MOHFW are closely monitoring the situation and intensifying preparedness and response efforts.

Rajasthan reported its index case on 2nd March in its capital, Jaipur. Till 30th April, 2584 were confirmed cases with 58 deceased.

1.1.1 Response of the Rajasthan Government

On 19th March, section 144 prohibiting the gathering of five or more was released in Rajasthan to contain the spread of the disease. The government has also monitored all passengers arriving in Jaipur on foreign flights and kept the ones showing symptoms in home isolation for 14 days. The state is the first to announce the complete closure of the road since 22nd March. The country's government has also announced two months' free money for families covered under the NFSA. On 11th April, the country's government announced a 50 lakh financial aid to the family of government workers who died of the disease during the anti-Covid-19 operation.

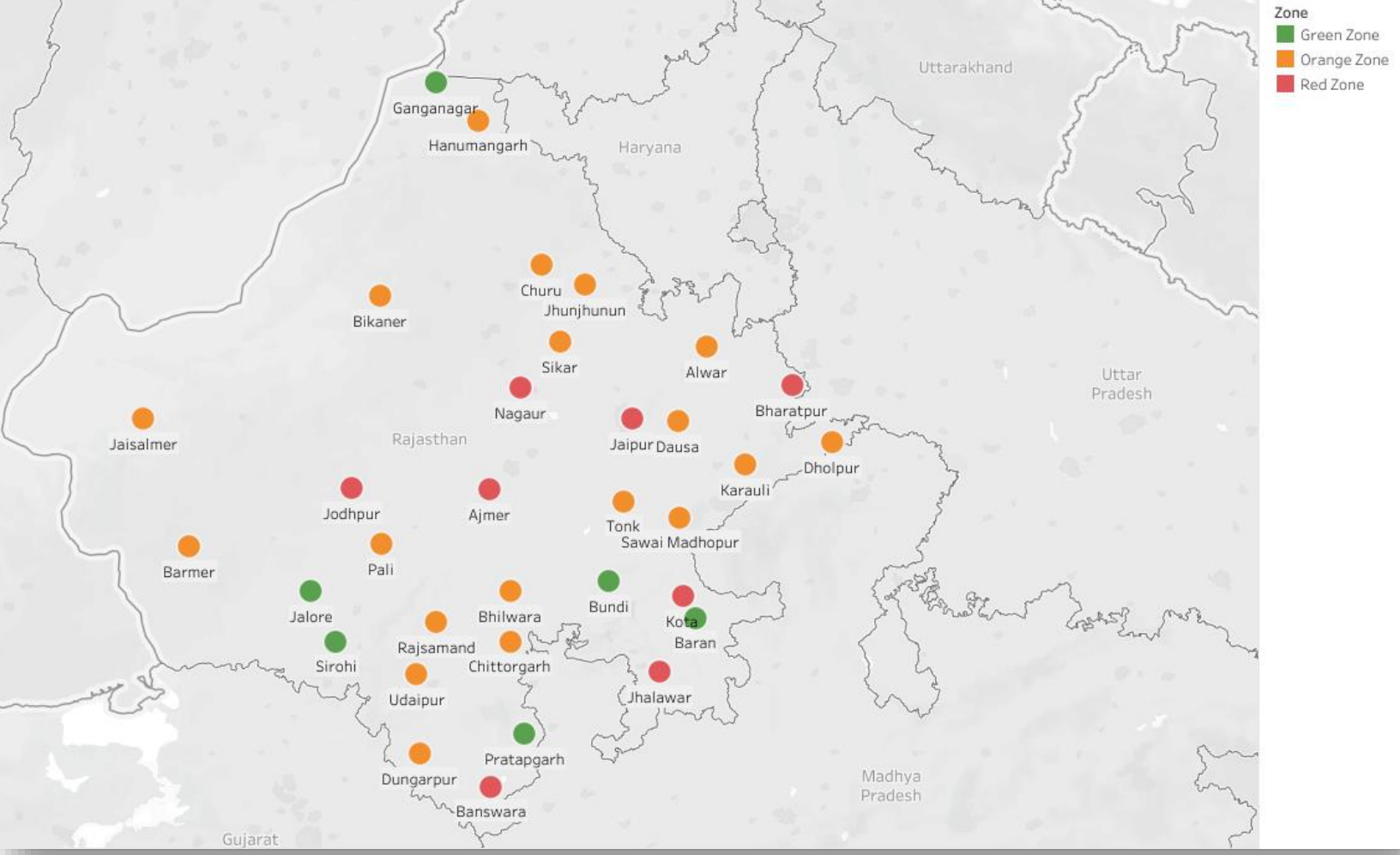


Figure 1.1.2 1: Classification of the state districts zone wise

1.1.2 Classification of the state districts

On May 1st, the state's districts were divided into three zones by the Union Health Ministry, Rajasthan had 8 red zones, 19 orange zones, and 6 green zones as shown in the Map.

The criteria for dividing the above districts into the three different zones as defined by MOHFW was that-

- The Districts with high cases contributing to 80% of Coronavirus cases for each state in the country or districts with doubling rate < 4 days lie in the Red Zone.
- The Districts with a limited number of cases in the past and with no Upsurge in positive cases recently would be included under the Orange Zone.
- The Districts with no coronavirus positive case will be included under the Green Zone.

Figure 1.1.2 2: Shifting pattern in different zones

Red Zone can be shifted to Orange Zone if no new Coronavirus positive case was reported in the past 14 days and to the Green Zone if no new Coronavirus positive case was reported in the past 28 days. Similarly, the Orange Zone can be shifted to Green Zone if no new Coronavirus positive case was reported in the past 14 days.

1.1.3 The Lockdown

Figure 1.1.3. 1: Lockdown

To avoid the corona spread further, Indian government imposed a nationwide lockdown. Lockdown 1.0 was from 25th march to 14th April. Since no decrement was seen in the cases, the Lockdown was further extended from 15th April to 3rd May as Lockdown 2.0, then Lockdown 3.0 from 4th May to 17th May and now Lockdown 4.0 from 17th May to 31st May.

1.2 Rationale

MOHFW data implies that states/UT including **Maharashtra, Delhi, Tamil Nadu, Gujarat and Rajasthan** comes under the top 5, having highest number of coronavirus confirmed cases. So this study is done as a comparative study of Rajasthan with respect to Maharashtra, Tamil Nadu, Delhi and Gujrat to their response towards Covid-19.

1.3 Research Question

How Rajasthan is responding to the Covid-19 outbreak with respect to the other states/UT with highest number of confirmed cases?

1.4 Objectives

- To assess the confirmed cases in the specified states/UT.
- To assess the confirmed cases per million in the specified states/UT.
- To assess the percentage of infected people in the specified states/UT.
- To assess the recovery rate among the infected population in the specified states/UT.

CHAPTER 2

Literature Review

Title	Authors	Study Location	Sampling Methodology	Salient Features
Estimating clinical severity of Covid-19 from the transmission dynamics in Wuhan, China.	Joseph T. Wu, Kathy Leung, Mary Bushman, Nishant Kishore, Rene Niehus, Pablo M. de Salazar, Benjamin J. Cowling, Marc Lipsitch & Gabriel M. Leung	Wuhan City, China	Systematic sampling	This study estimated the overall symptomatic case fatality rate of Covid-19 in Wuhan as 1.4% and death rate as 11% as on 29th February. Compared to those aged 30–59 years, those aged below 30 and above 59 years were 0.6 (0.3–1.1) and 5.1 (4.2–6.1) times more likely to die after developing symptoms. The risk of symptomatic infection increased with age.
Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy.	Graziano, Onder,Giovanni, Rezza, Silvio Brusaferro	Italy	A subsample of 355 patients with COVID-19 who died in Italy underwent detailed chart review.	This study estimated the case fatality rate as 7.2% where the people aged 90 and above had fatality rate as 22.7%
SEIR and Regression Model based COVID-19 outbreak predictions in India	Gaurav Pandey, Poonam Chaudhary, Rajan Gupta, Saibal Pal.	India	Covid-19 confirmed cases, recovered cases and death cases data of initial 2 months.	This study estimated the value of R_O (Reproduction Number) to be 2.02 with the help of SEIR Model.
Outbreak trends of Coronavirus (COVID-19) in India: A Prediction	Sunita Tiwari , Sushil Kumar , Kalpna Guleria	India	Covid-19 confirmed cases, recovered cases and death cases data from 22nd Jan to 3rd April 2020 was taken.Time series forecasting Methodology was used.	This study predicted the outbreak to be controlled around the end of the May and if not so, then India will face shortage of hospitals.

2.1 How other countries are dealing with Covid-19

According to the Worldometers.info website, as of 8 April 2020, 209 countries worldwide had reported over 1.4 million cases of coronavirus (Covid-19). More than 400,000 of these are in the United States (with 12,857 deaths). This was followed by European countries such as Spain, Italy, France and Germany. China, where the infection originated, ranks 6th on the list.

The measures adopted by **China** at this stage include the rapid expansion of testing facilities, the construction of new hospital capacities and the closure of schools, between January and March. China's response to reducing contact between the public by keeping the lockdown to manage the spread of the disease eventually became a guide for the spread of the epidemic to other countries as well.

By the first week of April, **South Korea** had tested less than one percent of its 51 million population. From a peak of 909 cases per day in February, South Korea has now been able to reduce it to less than 100 per day, and it is also without a lockdown. The country handled it with aggressive testing, tracing and quarantine. High-risk patients are preferred in the hospital. Desh also uses the mobile app to track people locked at home.

More than 17,000 people have died of coronavirus in **Italy**, which is the biggest crisis for the European nation. As of April 8, there were World War II cases with a total of 135,000 cases. Its political class has forgotten the crisis and condemned it. Taking timely measures to prevent outbreaks. He is accused of underestimating the virus.

In early February, the **German** government announced that it was setting up a special crisis group to spread Kovid-19 in the country. To date, more than 107,000 cases have been reported in Germany, with a death rate of 1.8%. One cause of lower mortality in Germany (compared to Italy or Spain) is the average age of infection (49 years). Another reason why the country's strong public health system has been able to cope with the crisis. The government has launched a strong social promotion campaign and encouraged people to self-isolate.

There are more than 400,000 coronavirus cases in the **United States of America**, and as of April 8, more than 12,800 people have died. In New York on March 16 alone, there were over 50 meetings, closed theaters, bars and restaurants. The US government has not been charged until recently. Adequate testing that stops the actual understanding of the spread of the epidemic. The Trump administration has come under fire for a team dealing with the epidemic. Leader vacuum is filled by state governors, but they are struggling with the lack of necessary supplies such as masks, PPEs and ventilators.

CHAPTER 3

Methodology

3.1 Study Area:

Covid-19

3.2 Study Design:

Study Type used is Analytical study, because here the information that is already available from the reliable sources were taken and then analyzed, to make a critical evaluation.

- **Inclusion criteria:**
  Population of top 5 states/UT having highest number of Covid-19 confirmed cases that will include Maharashtra, Delhi, Tamil Nadu, Gujarat, Rajasthan.
- **Exclusion criteria:**
  Population of the remaining states/UT.

3.3 Study Duration:

The study duration was from 11th March to 11th June wherein the data was collected from 25th March to 17th May week-wise and analyzed.

The assessment is done on the basis of 3 lockdown phases as followed

LOCKDOWN	TIME DURATION
1.0	25th March to 14th April
2.0	15th April to 3rd May
3.0	4th May to 17th May

Figure 3.3. 1: Study duration

3.4 Data Collection Method:

Data was collected from the MOHFW and NHM Websites of the respective states/UT on the daily basis and analyzed further.

3.5 Data Type:

Since the Data was taken at regular basis from the reliable source websites, so it is a Secondary Data.

3.6 Data Analysis:

Data was analyzed through MS Excel Software, and all the visuals were made from Tableau Software.

3.7 Operational Definitions:

Epidemic- It refers to a situation when a disease spread affects a large number of people within a Community, Population or a Region.

Pandemic- It refers to a situation when a disease spread affects a large number of people within multiple countries or continents.

Outbreak- The Disease Outbreak refers to the sudden occurrence in the disease cases that has exceeded the number to be expected.

Coronavirus- Coronaviruses are a large family of viruses that can cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory illnesses ranging from common cold to very severe diseases such as MERS and SARS. The newly discovered coronavirus causes coronavirus infection that is technically termed to be Covid-19.

Quarantine- It refers to separating the people by restricting their movement, who may have exposed to an infectious disease and can be a causal of the potential risk to spread the disease among the other people.

Isolation- It refers to separating the people who are suffering from an infectious disease to the people who are not having any sufferings as such.

Index Case- It is defined as the first case reported in a group of related cases in a contagious disease spread.

Lockdown- With regard to the Covid-19, Restriction in the movement activities to stop the further spread of any contagious disease among the people.

Social Distancing- With regard to the Covid-19, It is defined as the physical distance that has to be maintained to prevent the transmission of any contagious disease.

CHAPTER 4

Results

LOCKDOWN 1.0												
Name of the State	Confirmed Cases			Active Cases			Recovered			Deceased		
	25th March	14th April	Increase	25th March	14th April	Increase	25th March	14th April	Increase	25th March	14th April	Increase
Rajasthan	38	206	168	35	180	145	3	25	22	0	1	1
Tamil Nadu	26	1204	1178	24	1111	1087	1	81	80	1	12	11
Delhi	35	1561	1526	28	1500	1472	6	31	25	1	30	29
Gujarat	38	650	612	37	563	526	0	59	59	1	28	27
Maharashtra	122	2680	2558	119	2244	2125	1	259	258	2	177	175

LOCKDOWN 2.0												
Name of the State	Confirmed Cases			Active Cases			Recovered			Deceased		
	15th April	3rd May	Increase	15th April	3rd May	Increase	15th April	3rd May	Increase	15th April	3rd May	Increase
Rajasthan	1076	2886	1810	918	1459	541	147	1356	1209	11	71	60
Tamil Nadu	1242	3023	1781	1110	1614	504	118	1379	1261	14	30	16
Delhi	1578	4549	2971	1505	3123	1618	41	1362	1321	32	64	32
Gujarat	766	5428	4662	669	4096	3427	64	1042	978	33	290	257
Maharashtra	2916	12974	10058	2435	10312	7877	295	2115	1820	186	547	361

LOCKDOWN 3.0												
Name of the State	Confirmed Cases			Active Cases			Recovered			Deceased		
	4th May	17th May	Increase	4th May	17th May	Increase	4th May	17th May	Increase	4th May	17th May	Increase
Rajasthan	3061	5202	2141	1546	2026	480	1438	3045	1607	77	131	54
Tamil Nadu	3550	11224	7674	2110	6973	4863	1409	4172	2763	31	79	48
Delhi	4898	9755	4857	3403	5405	2002	1431	4202	2771	64	148	84
Gujarat	5804	11380	5576	4290	6222	1932	1195	4499	3304	319	659	340
Maharashtra	14541	33053	18512	11494	24168	12674	2465	7688	5223	582	1197	615

Table 4. 1: Results with respect to three lockdowns

The above table shows the state wise increase in confirmed cases, active cases, recovered cases and deceased in the three lockdowns.

The values in the yellow colored cells shows the highest increase for that parameter.

By taking these parameters as the foundation, further analysis will be conducted for the three lockdowns on the basis of-

- Increment in confirmed cases
- Confirmed cases per million
- Percentage of infected people
- Recovery rate

FINDINGS

4.1 Increment in the Confirmed Cases

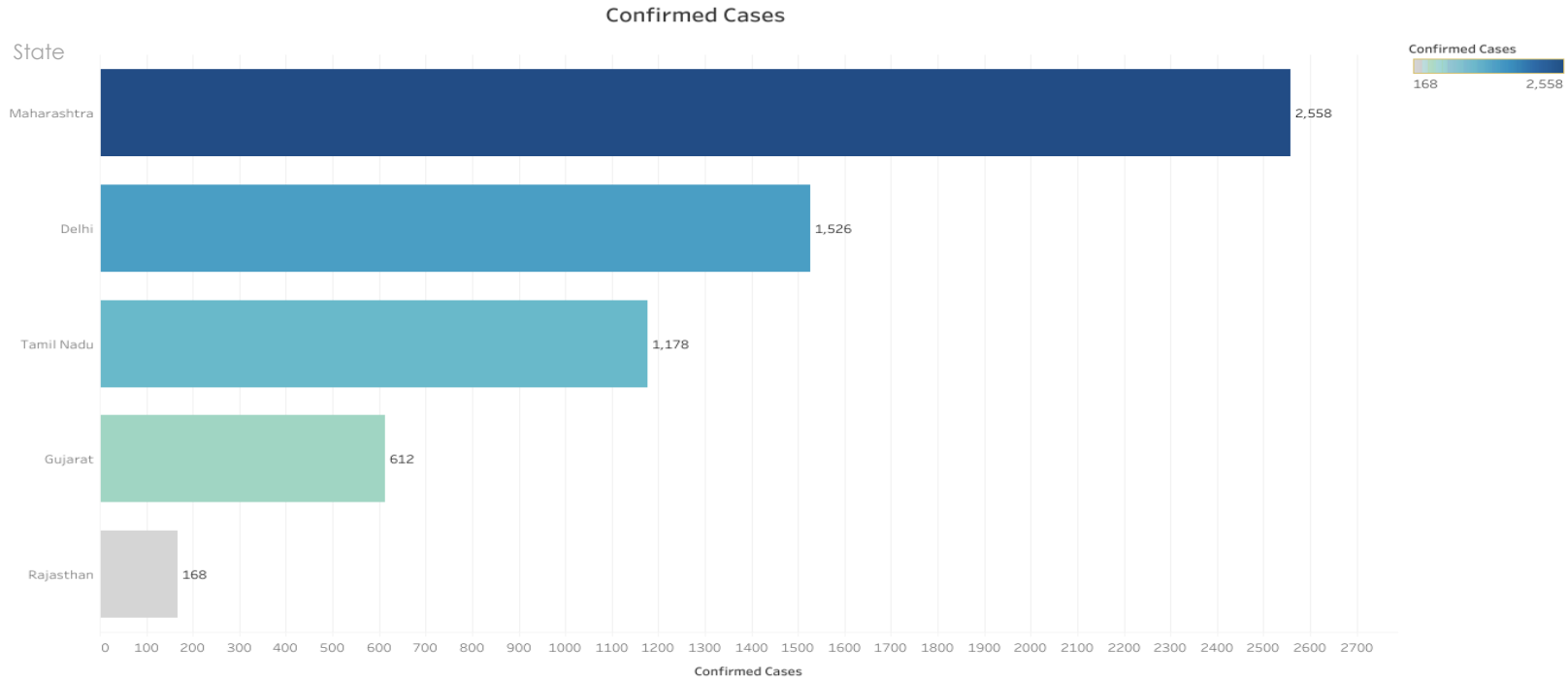


Figure 4.1. 1 : Increment of Confirmed cases in Lockdown 1.0

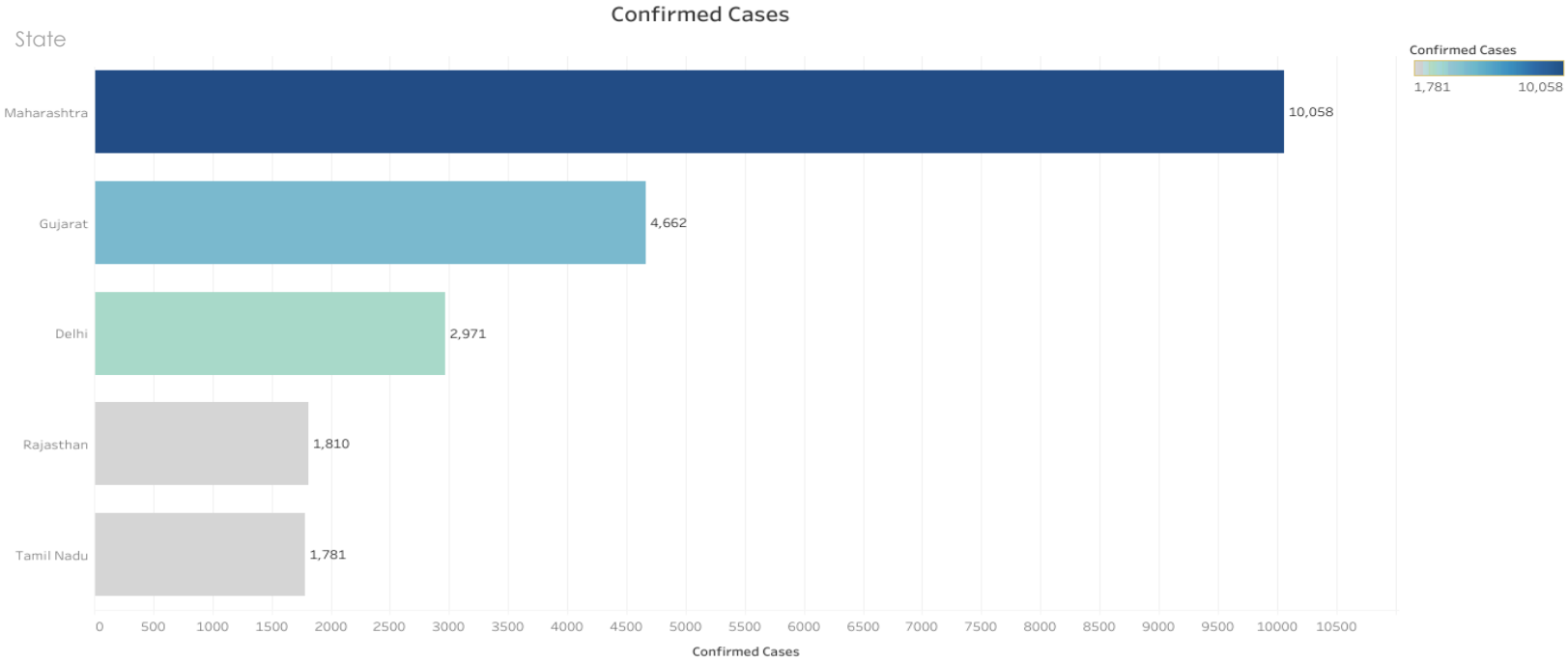


Figure 4.1. 2: Increment of Confirmed cases in Lockdown 2.0

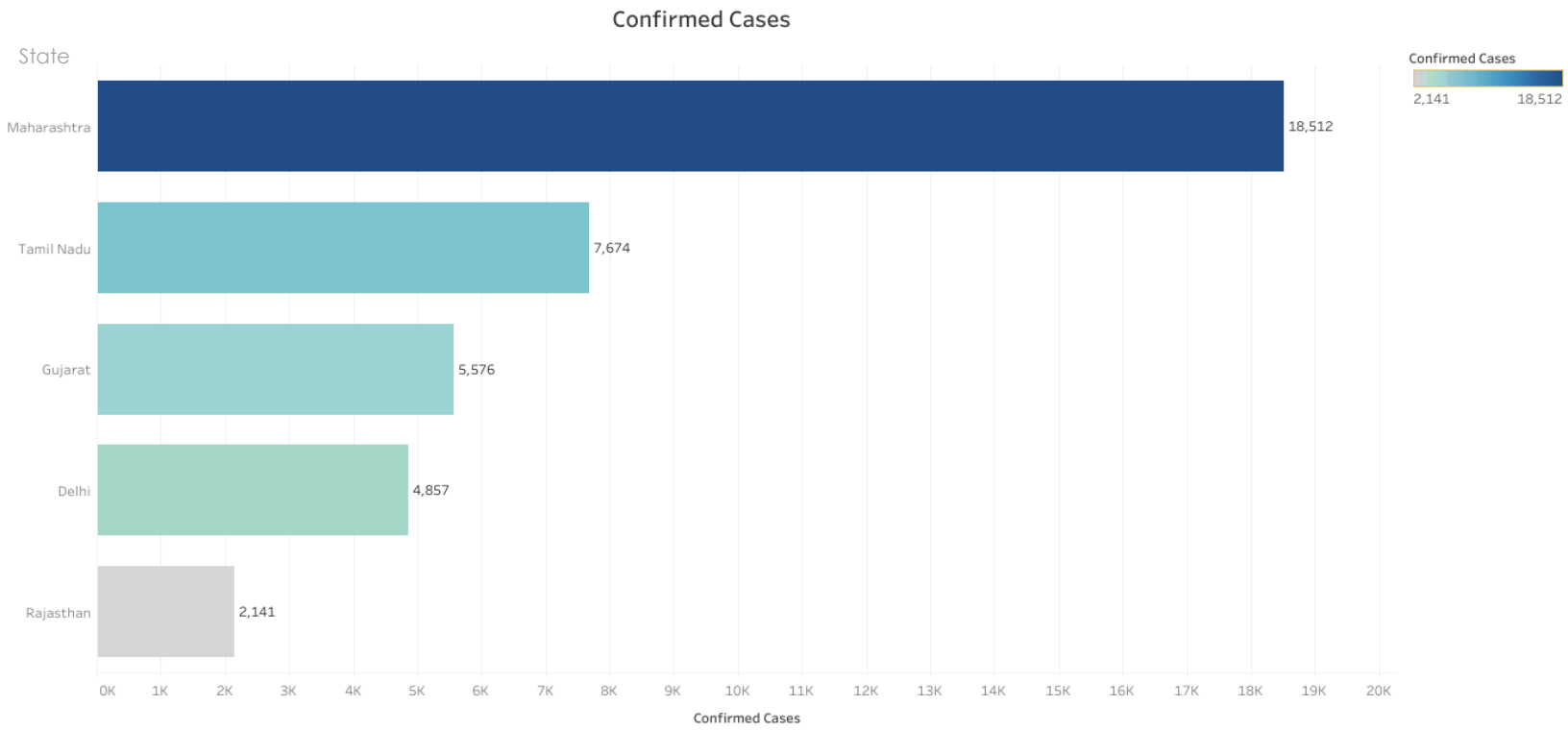


Figure 4.1. 3: Increment of Confirmed cases in Lockdown 3.0

Table 4.1. 1: Increment in the Confirmed cases.

Increment in the Confirmed Cases				
Name of the State	LOCKDOWN			
	1.0	2.0	3.0	% Increment in cases from 1.0 to 3.0
Rajasthan	168	1810	2141	1274.40
Tamil Nadu	1178	1781	7674	651.44
Delhi	1526	2971	4857	318.28
Gujarat	612	4662	5576	911.11
Maharashtra	2558	10058	18512	723.69

Total number of Confirmed cases were recorded on the start of the lockdown and on the last day, and then the increment in the number was calculated.

The above data implies that Rajasthan has shown the highest increment in the number of cases and Delhi has shown the least increment amid the third lockdown when compared to other states.

4.2 Confirmed per million

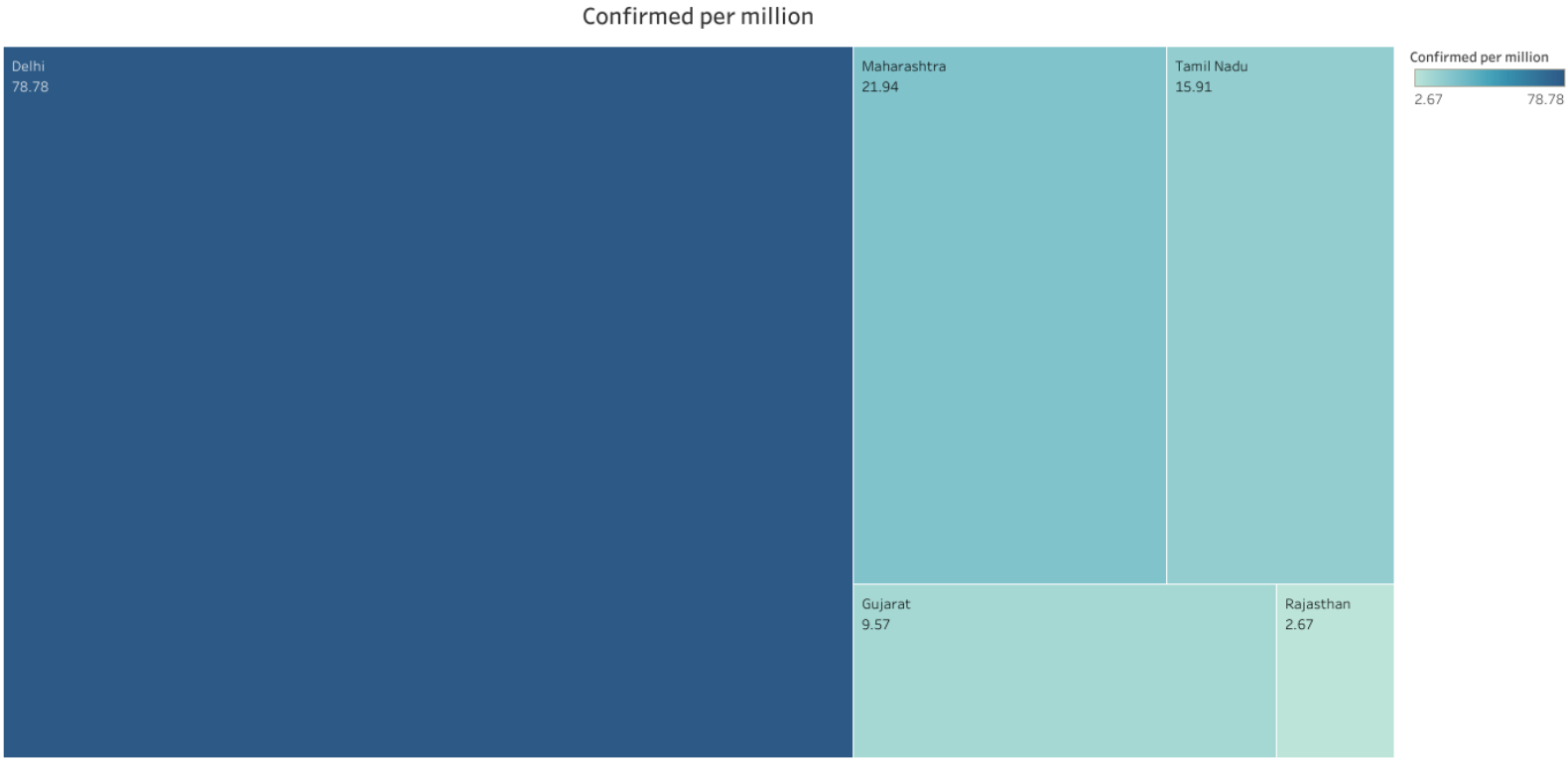


Figure 4.2. 1: Confirmed per million in Lockdown 1.0

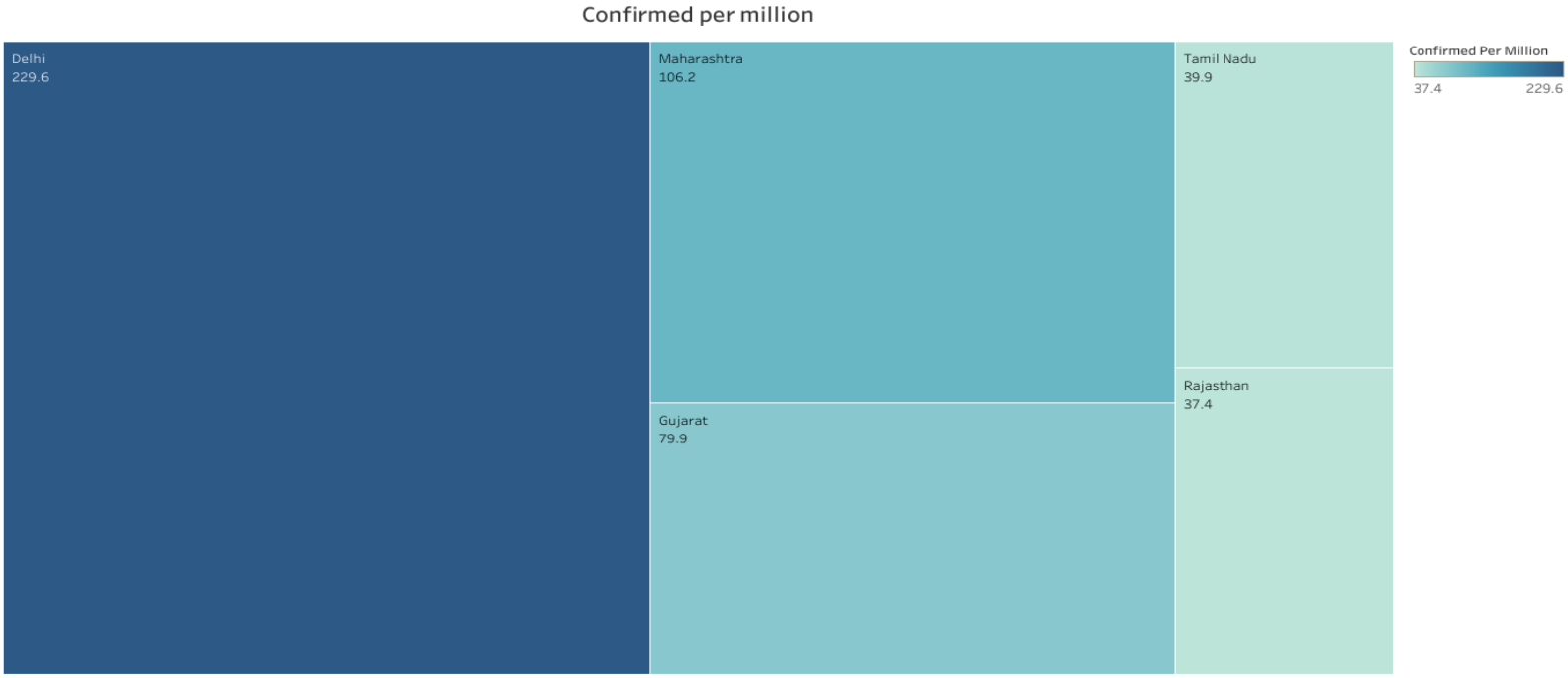


Figure 4.2. 2: Confirmed per million in Lockdown 2.0

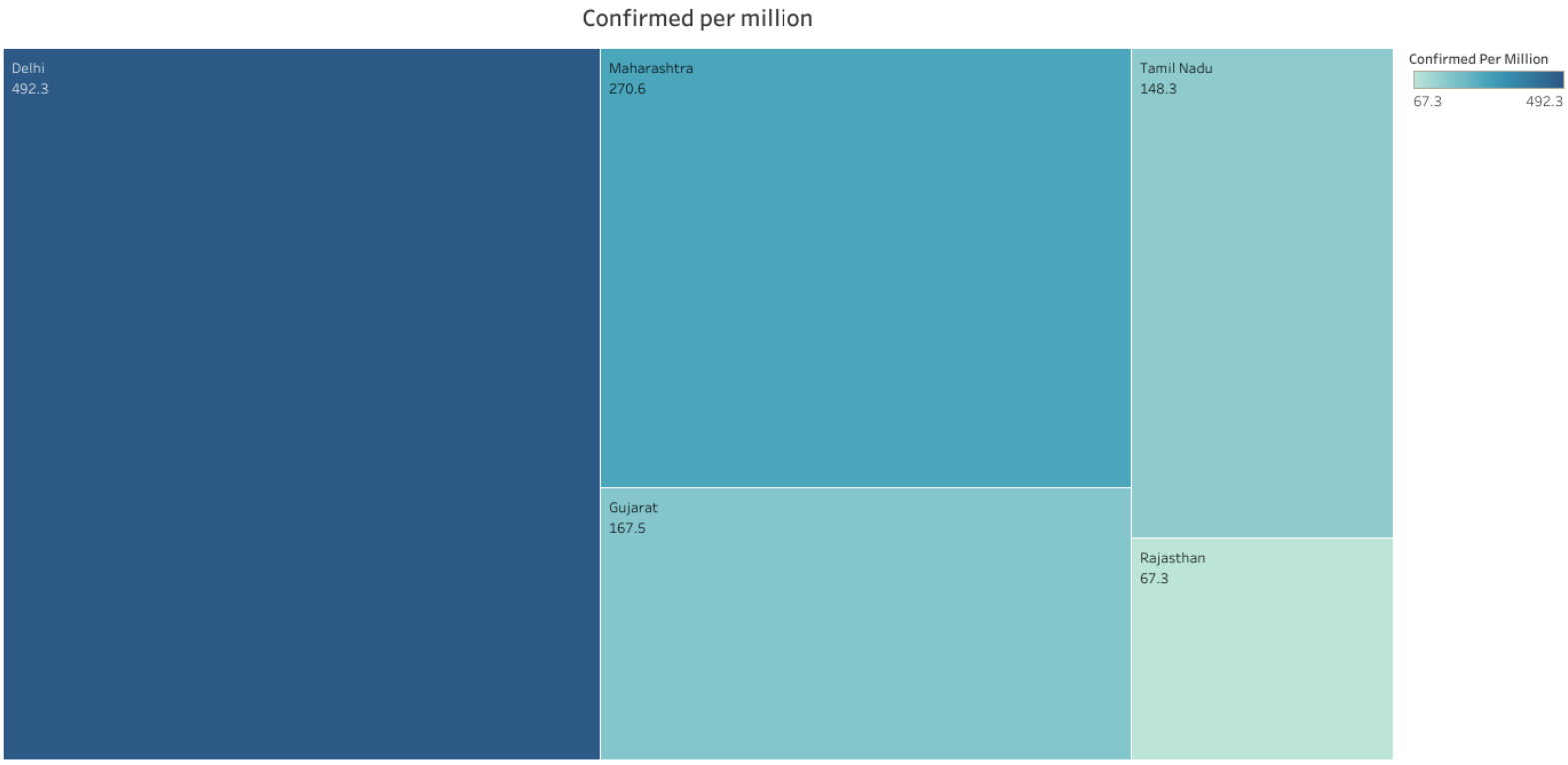


Figure 4.2. 3: Confirmed per million in Lockdown 3.0

Table 4.2. 1: Confirmed per million cases with respect to the three Lockdowns.

Confirmed per million				
Name of the State	Population*	LOCKDOWN		
		1.0	2.0	3.0
Rajasthan	77264000	2.67	37.35	67.33
Tamil Nadu	75695000	15.91	39.94	148.28
Delhi	19814000	78.78	229.59	492.33
Gujarat	67936000	9.57	79.90	167.51
Maharashtra	122153000	21.94	106.21	270.59

The Table shows that Rajasthan has the least and Delhi has the highest number of confirmed cases per million that implies that in Rajasthan, 67 people are infected with coronavirus per million where in Delhi, 492 people are infected in a million population.

FORMULA USED

$$\textbf{Confirmed per million} = \frac{\textbf{Confirmed cases by the end of the period}}{\textbf{Total Population}^{*}} \times 1000000$$

* based on 2019 population projection by NCP Report, MOHFW.

4.3 Percentage of infected people

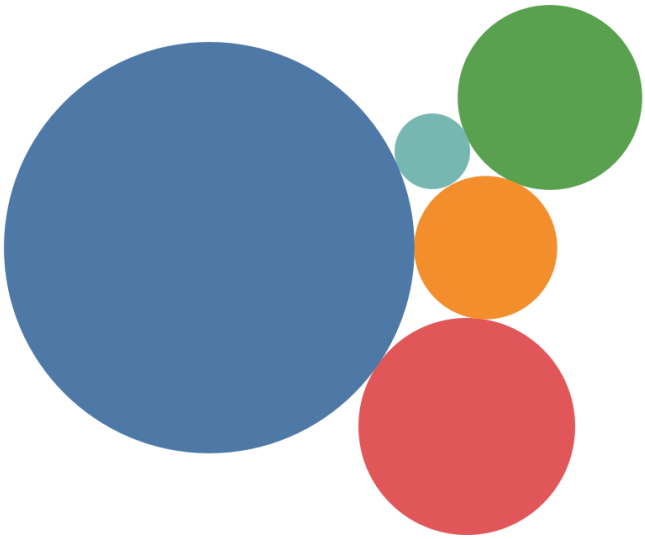


Figure 4.3. 1: Percentage of infected people till Lockdown 1.0

Figure 4.3. 2: Percentage of infected people till Lockdown 2.0

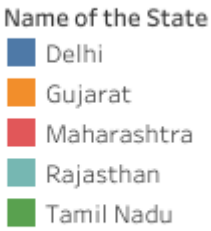


Figure 4.3. 3: Percentage of infected people till Lockdown 3.0

Percentage of infected people				
Name of the State	Population	LOCKDOWN		
		1.0	2.0	3.0
Rajasthan	77264000	0.0003	0.0037	0.0067
Tamil Nadu	75695000	0.0016	0.0040	0.0148
Delhi	19814000	0.0079	0.0230	0.0492
Gujarat	67936000	0.0010	0.0080	0.0168
Maharashtra	122153000	0.0022	0.0106	0.0271

Table 4.3. 1: Percentage of Infected people with respect to the three Lockdowns.

The above data shows that the Infection among the population has been rising progressively.

Rajasthan has least infection rate wherein Delhi has the most, when compared to the other 4 states/UT.

FORMULA USED

$$\textbf{Percentage of infected people} = \frac{\textbf{Confirmed cases by the end of the period}}{\textbf{Total Population}} \times 100$$

4.4 Recovery Rate

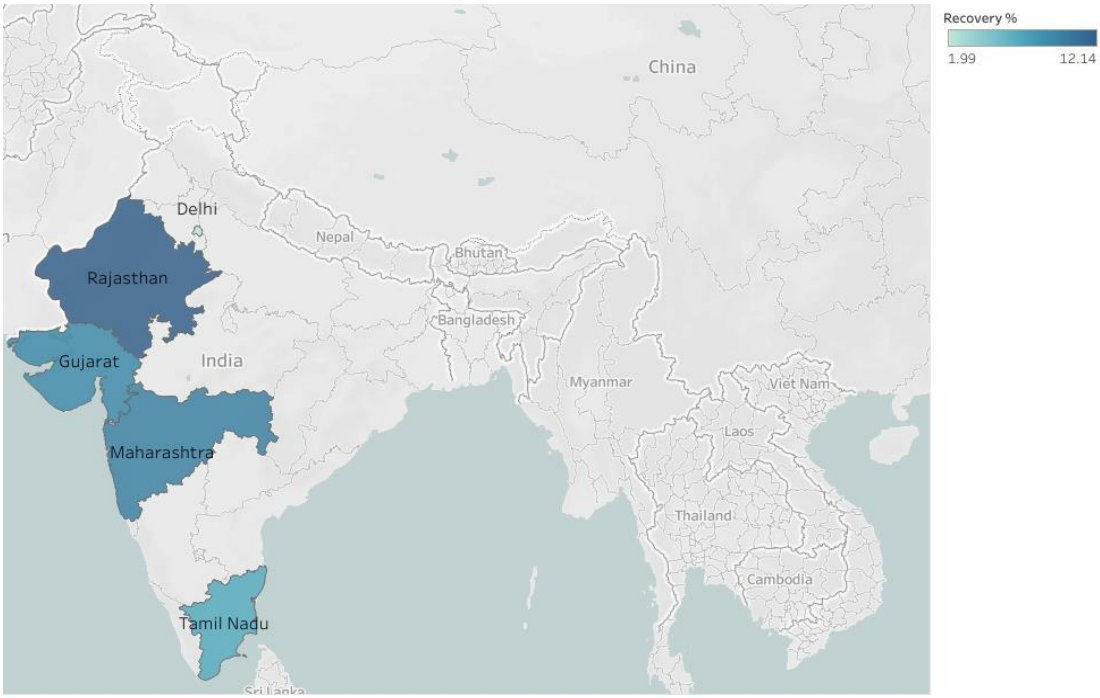


Figure 4.4. 1 : Recovery Rate in Lockdown 1.0

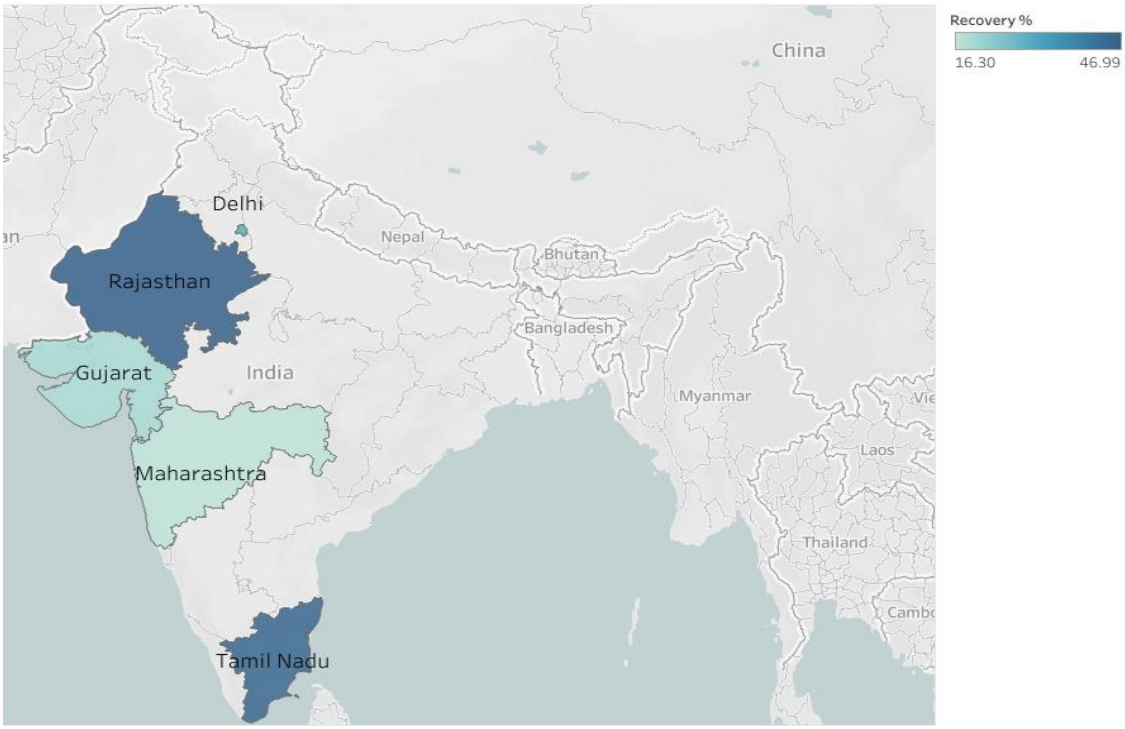


Figure 4.4. 2 Recovery Rate in Lockdown 2.0

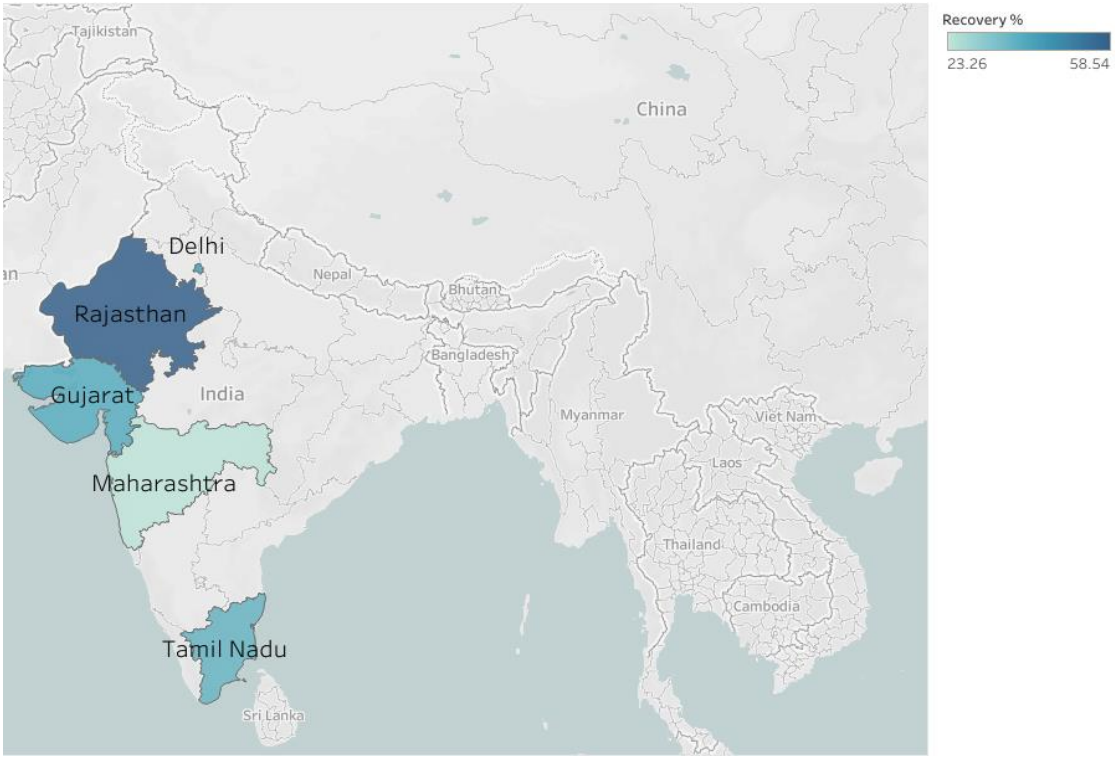


Figure 4.4. 3: Recovery Rate in Lockdown 3.0

Table 4.4. 1: Recovery Rate

Recovery Rate			
Name of the State	LOCKDOWN		
	1.0	2.0	3.0
Rajasthan	12.14	46.99	58.54
Tamil Nadu	6.73	45.62	37.17
Delhi	1.99	29.94	43.08
Gujarat	9.08	19.20	39.53
Maharashtra	9.66	16.30	23.26

The above graph shows that all the states/UT have shown a progressive increase in the Recovery rate amid all the lockdowns. Rajasthan has shown the highest increment in the recovery rate wherein Maharashtra has shown the least among all the 4 states/UT.

FORMULA USED

$$\textbf{Recovery Rate} = \frac{\textbf{Recovered cases by the end of the period} \times 100}{\textbf{Confirmed cases by the end of the period}}$$

CHAPTER 5

Discussion

Name of the State	Confirmed Cases	Confirmed per million	Percentage of infected people	Recovery rate	Marks
Rajasthan	1	5	5	5	16
Tamil Nadu	4	4	4	2	14
Delhi	5	1	1	4	11
Gujarat	2	3	3	3	11
Maharashtra	3	2	2	1	8

Table 5. 1: Marks assigned to each state

While considering the above results, states/UT are assigned marks on the basis of their response towards Covid-19. The state/UT who has shown greatest improvement among the other states was rewarded with highest marks, that is 5 and the state/UT who has shown the least improvement on the basis of that particular parameter will be awarded lowest marks that is 1.

As the above table depicts here that **Rajasthan has shown the highest increment in the number of confirmed cases** from lockdown 1.0 to lockdown 3.0, so here it is awarded with 1 wherein Delhi has shown the least increment, so awarded with 5.

Although **Rajasthan has shown the greatest increment in confirmed cases, but has the least number of confirmed cases per million** when compared to the other states/UT. In Rajasthan, 67 people get infected per million whereas in Delhi, 492 people are infected per million after the lockdown 3.0 resulting in Rajasthan to be awarded with 5 and Delhi to awarded with 1.

Similarly, **Rajasthan had the least percentage of infected people as calculated by considering population**, while Delhi has the greatest.

Recovery rate is the most important parameter here, that reflects the preparedness of state/UT towards a disease spread with respect to the WHO's 6 Health system building blocks including Service delivery, Health workforce, Health information system, Access to essential medicines, Financing and Leadership/Governance. **Rajasthan has shown a progressive improvement of 46% from lockdown 1.0 to lockdown 3.0 with respect to the recovery rate** that was the highest among all the 5 states/UT which implies that although in Rajasthan, a great increase in the number of confirmed cases were seen amid the three lockdowns, they also recovered those confirmed cases with a pace that none of the other 4 states/UT have done.

CHAPTER 6

Conclusion

Since at the start, analysis depicts that Rajasthan has shown a progressive growth in the confirmed cases, it can reflect that the infection rate among the population is higher, but when the percentage of infected people and confirmed cases per million was analyzed and compared with other states/UT, it is shown that Rajasthan is the state having least number of infected people as well as confirmed cases per million.

On the other hand, Rajasthan has recovered highest number of confirmed cases, which implies that although the percentage increment in the number of confirmed cases was higher amid the three lockdowns, Rajasthan is better prepared and is efficient in implementing the strategies to combat with the Covid-19.

Recommendations-

- Training sessions to be organized for Covid-19 Contact tracing.
- Covid-19 screening to be strategies by considering population density of that particular area.
- To enhance the recovery rate, immunity boosting formulation as recommended by AYUSH Ministry as 'AYUSH KWATH' should be given to the Covid-19 patients and suggested for the intake of the same to the population.
- An active inspection team should be made that visit the shops, offices, industries etc., where relaxation in lockdown rules were given to check whether the preventive measures are been taken there or not while carrying out their work.

CHAPTER 7

Bibliography

World Health Organization-India Situation Report. Available from: https://www.who.int/india/emergencies/coronavirus-disease-(covid-19)/india-situation-report

Ministry of Health and Family Welfare. Available from https://www.mygov.in/corona-data/covid19-statewise-status/

Department of Medical, Health and Family Welfare, Government of Rajasthan. Available from http://rajswasthya.nic.in/Index.htm

Wikipedia- COVID-19 pandemic in Rajasthan. Available from: https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Rajasthan

Public Health Department, Government of Maharashtra. Available from: https://arogya.maharashtra.gov.in/

Department of Health and Family Welfare, Government of NCT of Delhi. Available from: http://dshm.delhi.gov.in/

Health and Family Welfare Department, Government of Gujarat. Available from: http://hrms.guj.nic.in/HRMS_Main.aspx

Department of Health and Family Welfare, Government of Tamil Nadu. Available from: http://www.nrhmtn.gov.in/

Joseph T. Wu, Kathy Leung, Mary Bushman, Nishant Kishore, Rene Niehus, Pablo M. de Salazar, Benjamin J. Cowling, Marc Lipsitch & Gabriel M. Leung : Estimating clinical severity of COVID-19 from the transmission dynamics in Wuhan, China. Nature Medicine volume 26, pages506–510(2020)

Rajan Gupta, Gaurav Pandey, Poonam Chaudhary, Saibal Kumar Pal : SEIR and Regression Model based COVID-19 outbreak predictions in India. Available from : https://www.medrxiv.org/content/10.1101/2020.04.01.20049825v1

Sunita Tiwari , Sushil Kumar , Kalpna Guleria : Outbreak Trends of Coronavirus Disease-2019 in India: A Prediction. Available from : https://pubmed.ncbi.nlm.nih.gov/32317044/

Yaqing Fang, Yiting Nie, Marshare Penny: Transmission dynamics of the COVID-19 outbreak and effectiveness of government interventions: A data-driven analysis. Journal of Medical Virology, DOI: 10.1002/jmv.25750

Graziano Onder, Giovanni Rezza, Silvio Brusaferro: Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy. Available from: https://jamanetwork.com/journals/jama/article-abstract/2763667

Ayush Health Promotion Product-Ayush Kwath. Available from : http://www.ccras.nic.in/sites/default/files/Notices/25042020_Letter_to_States_UTs_for_Ayush_Kwath.pdf