

Study on the Selected Descriptive Epidemiological Aspects of Covid-19 in Red Zone Districts of Rajasthan

By

Himadri Verma

*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

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TO WHOMSOEVER MAY CONCERN

This is to certify that**Himadri Verma**.....
student of MBA Hospital and Health Management from The IIHMR University, Jaipur has
undergone internship training at NHM Rajasthan from 11th March to 11th June

The Candidate has successfully carried out the study designated to her during internship
training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

Dr. P.R. Sodani
Dean, Academics and Student Affairs
The IIHMR University, Jaipur

Dr. Sameer Phadnis
Associate Professor
The IIHMR University, Jaipur

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled A study on the selected descriptive epidemiological aspects of Covid-19 in red zone districts of Rajasthan and submitted by HIMADRI VERMA, Enrollment No 0750, under the supervision of Dr. Sameer Phadnis 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 study on the selected descriptive epidemiological aspects of Covid-19 in red zone districts of Rajasthan.

Background- Coronavirus, that is technically termed as SARS-CoV-2 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. According to a study, 'The COVID-19 pandemic may be controlled if the Government of India takes proactive steps to aggressively implement a lockdown in the country and extend it further.' (Sunita Tiwari et al., 2020) Rajasthan reported its index case on 2nd March in its capital, Jaipur. In some districts more number of cases were seen rising when compared to the other districts of the state. On 1st May, government has categorized the districts on the basis of red zone, orange zone and green zone till the 21st of May and made the different strategies for each zone. So this study is conducted to assess the selected descriptive epidemiological aspects of Covid-19 among the red zone districts of Rajasthan.

Objectives-

- To assess the confirmed vs death cases in all the red zone districts.
- To assess the death to case ratios in all the red zone districts.
- To analyze the epidemic trend of coronavirus by focusing on the case fatality rates and growth rates in the cases among the red zone districts.
- To ascertain time trend in growth rate of confirmed Covid-19 cases in selected districts of Rajasthan
- To identify if there is any correlation between the growth rate and sample collection.

Methodology- The study design used is descriptive study where the secondary data was collected from the MOHFW and NHM Rajasthan websites on the daily basis and analyzed from MS Excel software. All the visuals are developed from Tableau software. The data covers the population in all the 8 red zone districts and exclude the population from 25 districts of Rajasthan that are coming under the green and orange zone criteria. The duration of the study is three months starting from 11th March to 11th June where the data was collected for 3-week duration, from 3rd May to 25th May.

Results- With regard to the objectives of the study, it can be concluded that, Jaipur has shown the highest increase in the number of confirmed cases and deaths when compared to the other districts. To prevent the further occurrence of new cases, all the measures should be taken to restrict the further growth rate. The two districts, **Nagaur and Bharatpur** has shown a great rise in the growth rate and the chart that is showing a correlation between the growth rate and the sample collected hints that if more of the test is conducted, growth rate must fall. The Death to case ratios are calculated with respect to the new deaths occurring, to the new cases occurring for the same disease in a given period of time. So if this ratio shows a decrement, this implies that the growth rate is declining. **Jaipur, Kota and Nagaur** have shown a potential in increasing their death to case ratios that should be taken under the consideration. To increase the recovery rate, case fatality rates should be monitored for districts including **Jaipur and Kota**, having highest among the other districts and the potential districts including **Nagaur and Bharatpur** should be a main focus.

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 study on the selected descriptive epidemiological aspects of Covid-19 in red zone districts of Rajasthan.", 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. Sameer Phadnis**, Associate Professor, IIHMR University for providing me with guidance and keeping me on the right path that helped me finish the project.

ABOUT THE ORGANISATION

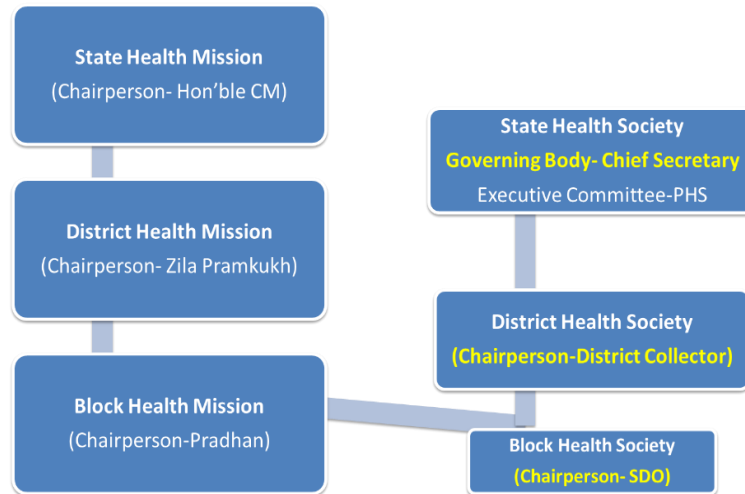
The National Health Mission (NHM) was launched on 1st May 2013 by the Government of India defining two sections as the National Rural Health Mission (NRHM launched in 2005) and the National Urban Health Mission (NUHM launched in 2013).

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

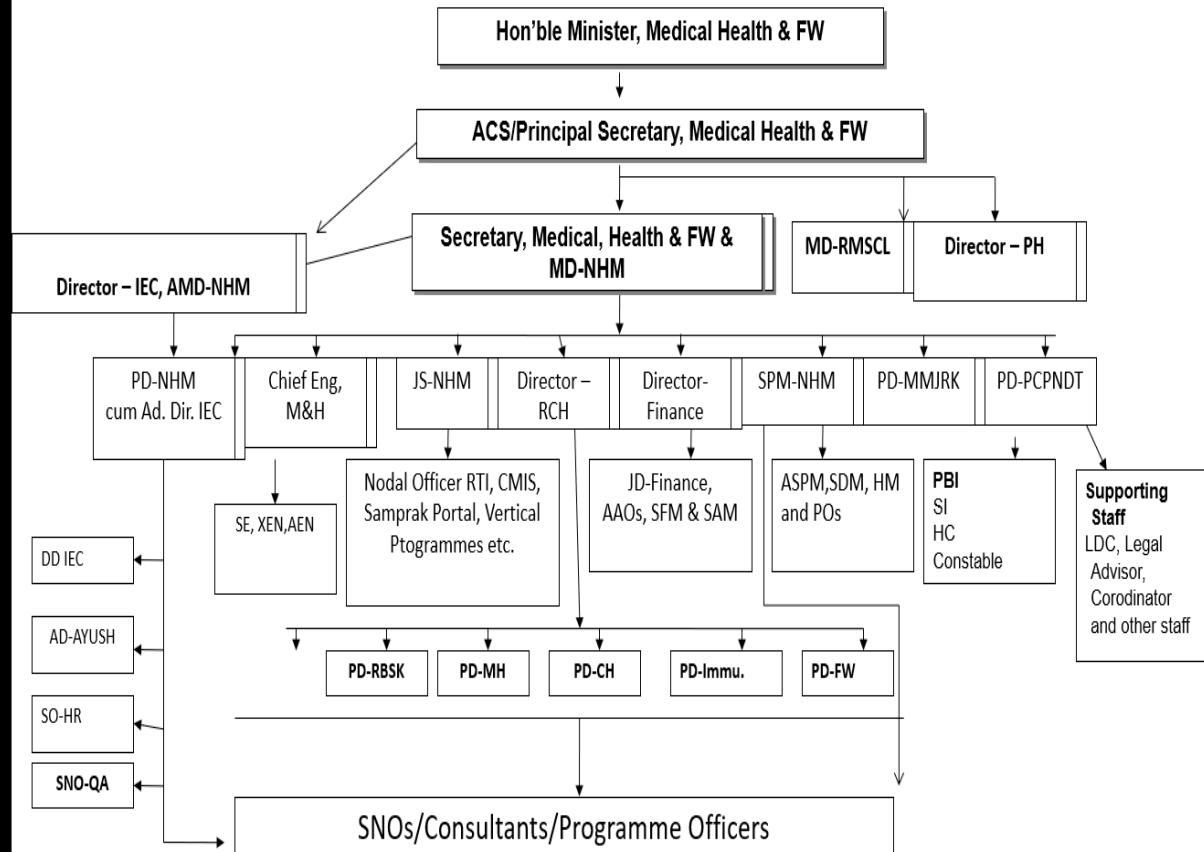


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ABBREVIATIONS

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

CHAPTER 1

INTRODUCTION

1.1 Background

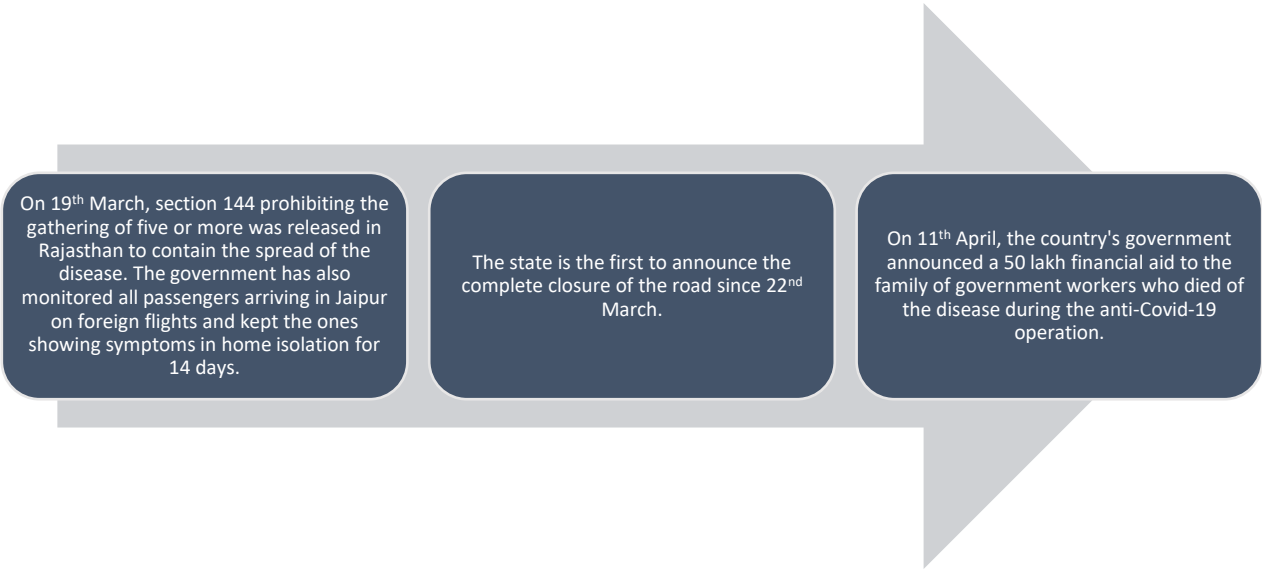
From Epidemic to a Pandemic, Outbreak of novel Coronavirus that is technically termed as SARS-CoV-2 has originated from the Wuhan City of Hubei Province of China and is rapidly infecting the other parts of the world.

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.

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.

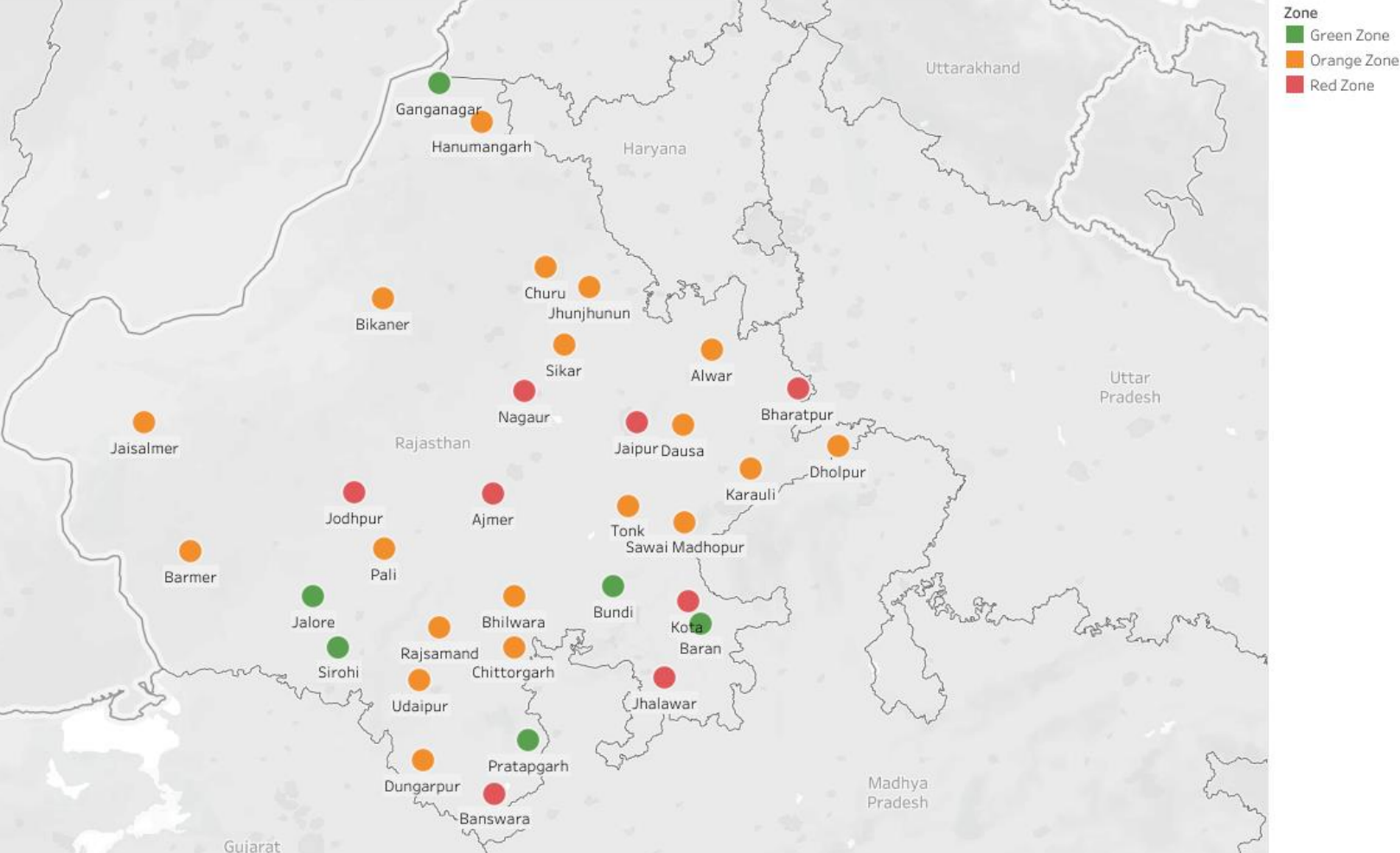


Figure 1.1.2 1: Classification of the state districts zone wise

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 Non Pharmaceutical Interventions for Covid-19

A WHO document titled “Calibrating long-term non-pharmaceutical interventions for COVID-19” has discussed the NPI’s, The Non Pharmaceutical Interventions to be taken by the countries to respond the Covid-19. There are 4 categories of interventions, of which key interventions are required to be focused. They are as followed-

Personal protective measures	Environmental NPI's	Physical distancing measures	Travel related measures
•Hand hygiene •Respiratory etiquette •Face masks	•Surface and object cleaning •Other environmental measures (eg. using UV light, increasing ventilation and modifyng humidity)	•Contact tracing •Isolation of sick individuals and vulnerable groups •Quarantine of exposed individuals (e.g. 14 days) •School measures and Closures •Workplace measures (e.g. encouraging teleworking from home, staggering shifts, and loosening policies for sick leave and paid leave) and closures. •Avoiding crowding (including closure of businesses and cancellation of events and mass gatherings)	•Travel advisories •Entry and exit screening •Internal travel restrictions •Border closures

1.2 Rationale

Out of the 33 districts of Rajasthan, 8 districts are categorized into red zone, 19 as orange zone and 6 as green zone. Most of the activities are made prohibited in these 8 red zone districts and they are the main focus of government. These districts are the main contributor for deciding the state statistics for Covid-19 and efforts should be made to improve their epidemiological aspects first. So with the help of this study, descriptive epidemiological aspects of Covid-19 in red zone districts of Rajasthan can be studied by comparing the death to case ratios, case fatality rates and growth rates of Covid-19 among all the 8 districts of Rajasthan.

1.3 Aim

To describe selected descriptive epidemiological aspects of the 8 red zone districts of Rajasthan during their categorization.

1.4 Research Question

What are the selected descriptive epidemiological aspects of Covid-19 in the red zone districts of Rajasthan?

1.5 Objectives

- To assess the confirmed vs death cases in all the red zone districts.
- To assess the death to case ratios in the red zone districts.
- To analyze the epidemic trend of coronavirus by focusing on the case fatality rates and growth rates in the cases among the red zone districts.
- To ascertain time trend in growth rate of confirmed Covid-19 cases in selected districts of Rajasthan
- To identify if there is any relation between the growth rate and sample collection.

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 29 th 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_0 (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 22 nd Jan to 3 rd 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.

CHAPTER 3

Methodology

3.1 Study Area:

Covid-19

3.2 Study Design:

Study design used is **Analytical study**, as here the information from the **secondary data**, that is already available from the reliable sources were taken and then analyzed, to make a critical evaluation.

- **Inclusion criteria:**
Population of red zone districts in Rajasthan.
- **Exclusion criteria:**
Population of orange and green zone districts in Rajasthan.

3.3 Study Duration:

This study was carried from 11th March to 11th June that is a 3-month time duration, where the data was analysed week-wise, from **3rd May to 25th May**.

3.4 Data Analysis Plan:

The study is conducted to assess the trend of Covid-19 in the red zone districts of Rajasthan after their categorization. So the data is collected for 3 weeks, from 3rd May to 25th May and analyzed from the MS Excel Software with all the visuals are made from Tableau Software. The data was analysed as per the objectives. The total confirmed cases, death cases, new cases, new deaths were recorded on the daily basis

3.5 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.

Death to case ratio- The death-to-case ratio is the number of deaths attributed to a particular disease during a specified time period divided by the number of new cases of that disease identified during the same time period.

Case Fatality rate- The case-fatality rate is the proportion of persons with a particular condition (cases) who die from that condition.

CHAPTER 4

Findings

The following parameters can be used as the selected descriptive epidemiological aspects of Covid-19 among the red zone districts of Rajasthan-

1. Total number of confirmed and death cases
2. Emergence in the new positive cases
3. Emergence in the new deaths
4. Death to case ratios
5. Case Fatality Rates
6. Total number of Covid-19 tests conducted
7. Increments in the sample collection
8. Growth rate of the Covid-19 confirmed cases
9. Growth rates and the sample collection
10. Districts with high growth rate

4.1 Total number of confirmed and death cases

Confirmed vs Deaths

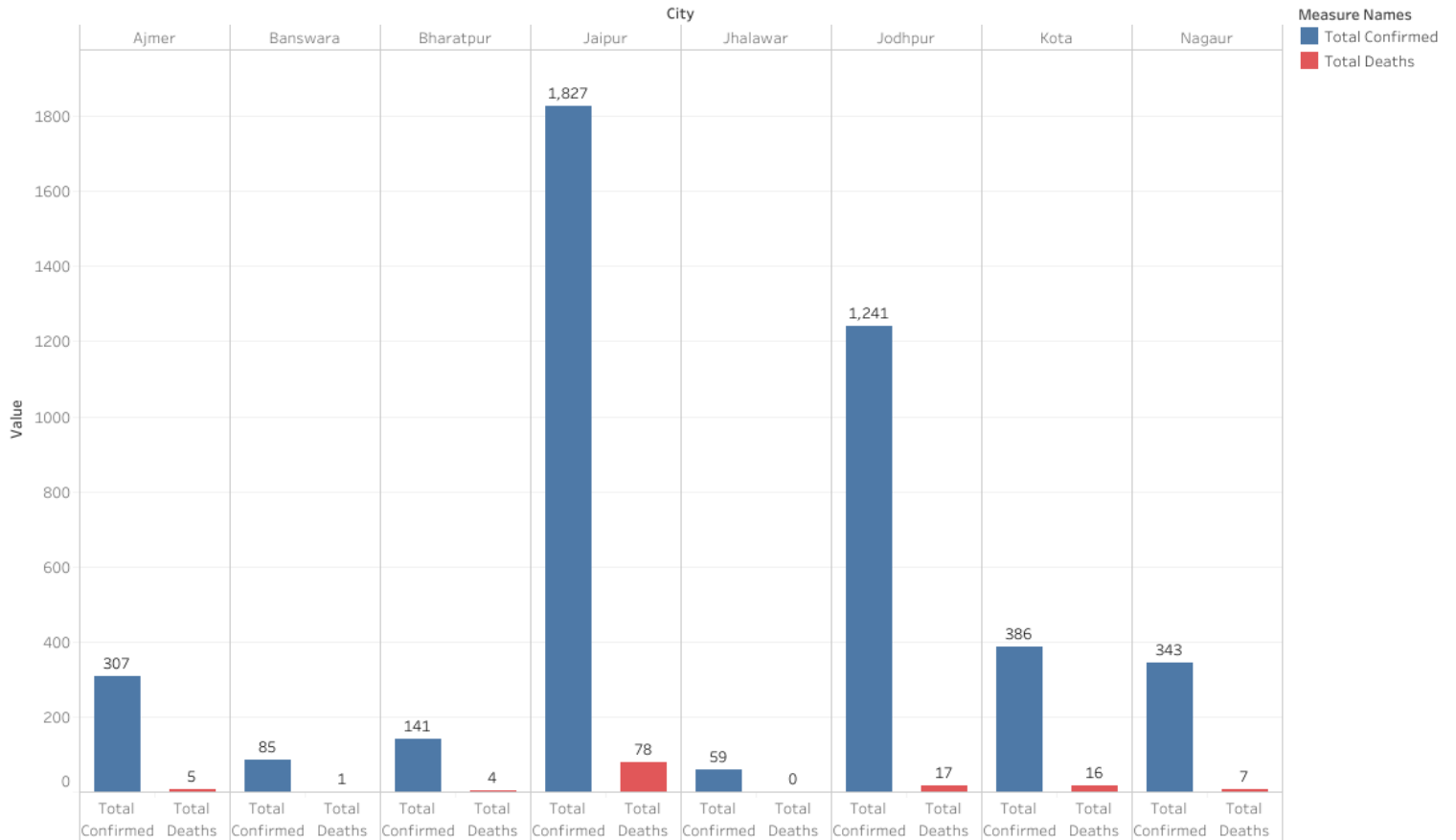


Figure 4.1. 1 The graph showing total number of confirmed cases and deaths due to Covid-19 in the red zone districts of Rajasthan.

The graph depicts that Jaipur has the highest number of confirmed cases as well as deceased within the specified timeframe wherein Jhalawar has the least

These cases are reported by 25th May from the start of the spread.

4.2 Emergence in the new positive cases

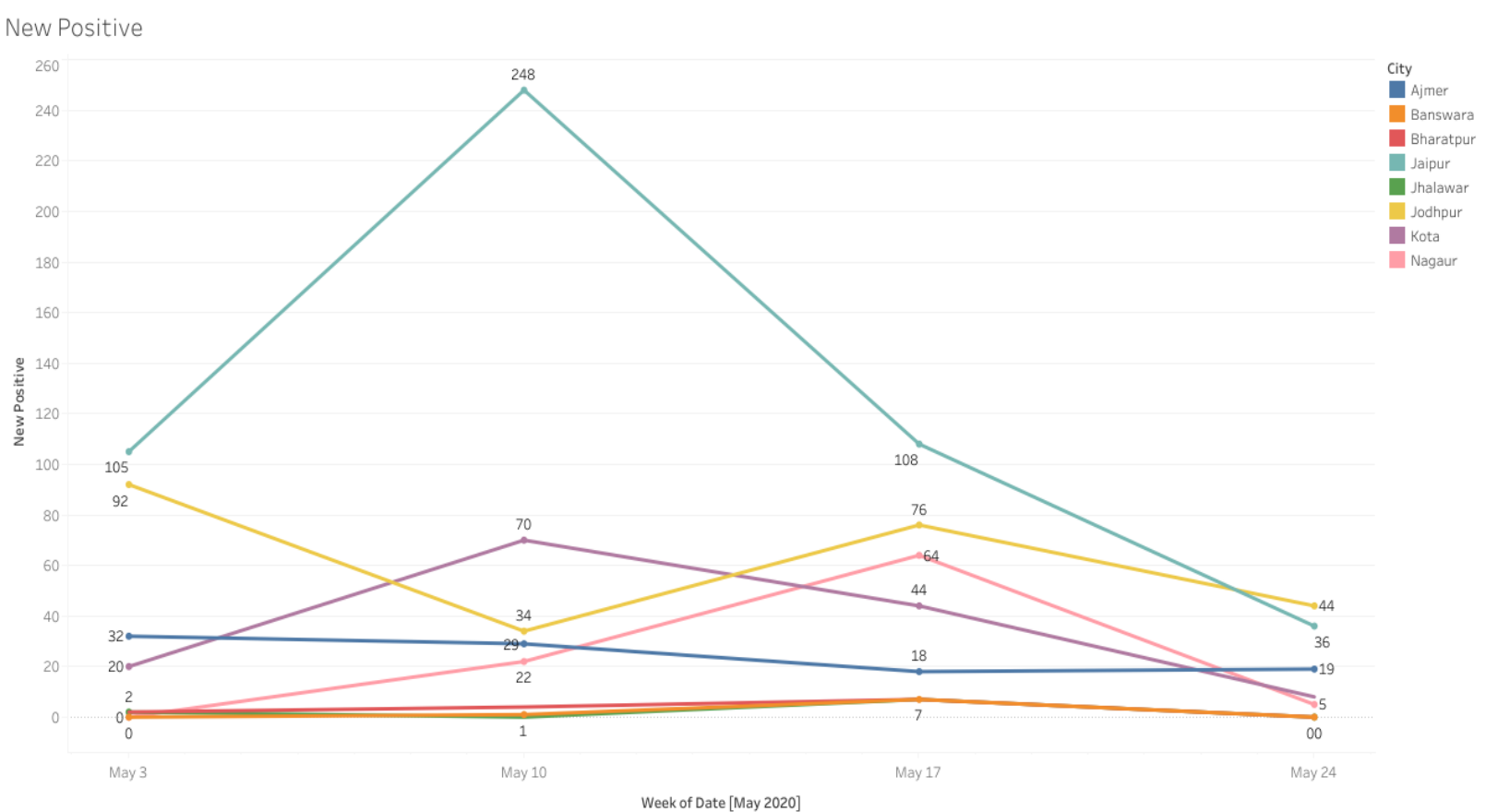


Figure 4.2. 1 Emergence in the new positive cases of Covid-19 in the red zone districts of Rajasthan

This graph depicts the new positive cases that have appeared within one-week time period for the three weeks.

Jaipur and Kota, both the districts have shown a rise in the cases within the first week of categorization and then a drop in the number of new cases is seen afterwards.

Jodhpur has shown a fall within the first week, then a rise in the second week and again a fall in the occurrence of new cases after the categorization.

Ajmer has shown a continuous decrement till the second week and a stabilized situation till the third week.

In **Nagaur**, the cases were continuously rising till the second week and shown a decrement in the third week.

Banswara, Bharatpur and Jhalawar has shown the least occurrence of new cases.

4.3 Emergence in the new deaths

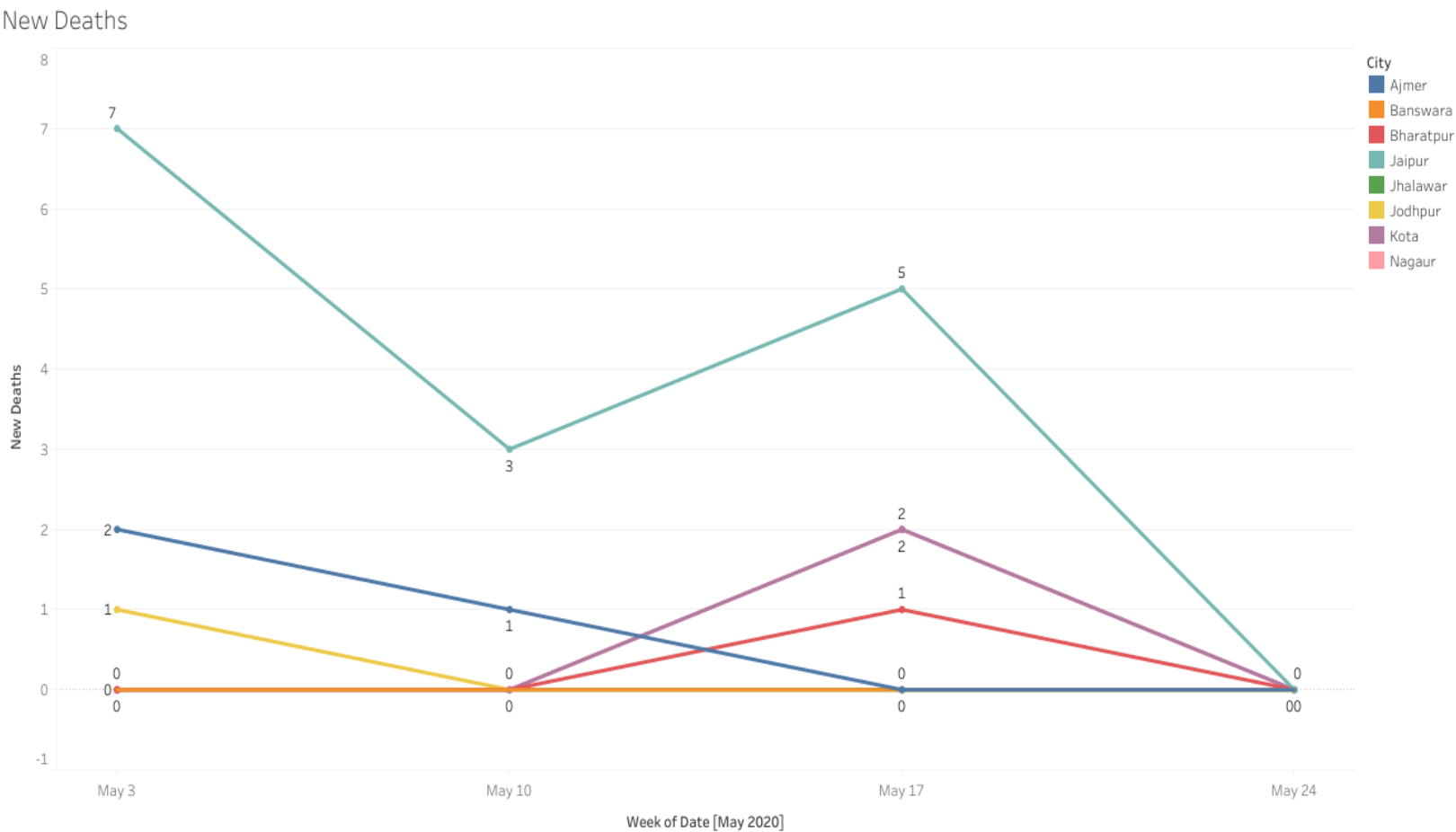


Figure 4.3. 2 Emergence in the new deaths due to Covid-19 in the red zone districts of Rajasthan

This graph shows that by 3rd May, **Jaipur** had 7 deceased, with **Ajmer** 2 and **Jodhpur** 1. Within the first week of categorization, the rate of new deaths occurrence decrease with 3 new deaths in Jaipur, 1 in Ajmer and 0 in Jodhpur.

In **Jaipur, Kota and Bharatpur**, a rise in the new deaths is seen from 10th May to 17th May, the second week, that has fallen to 0 deaths in the third week.

Jodhpur, with 1 death on 3rd May has not shown any new death in the next three weeks.

Banswara, Jhalawar and Nagaur has not reported any deaths till 24th May.

4.4 Death to case ratios

Death to Case Ratio

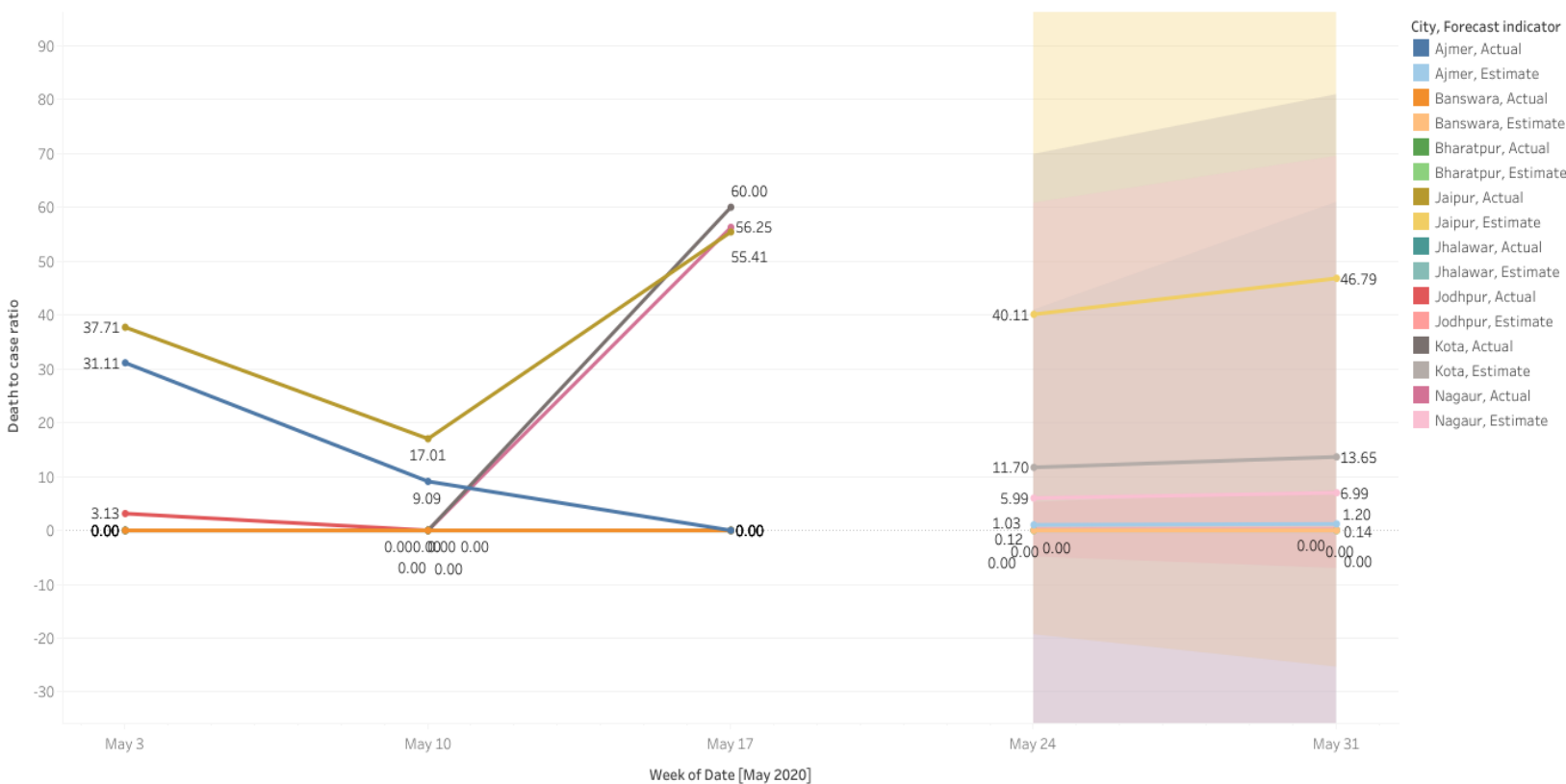


Figure 4.4. 1 Death to case ratios due to Covid-19 for the red zone districts of Rajasthan.

This graph shows the death to case ratios for the three-week period and a forecast for the upcoming week.

Here, **Jaipur, Ajmer and Jodhpur** has shown a decrement till first week. Ajmer was showing a continuous decrement afterwards, but **Jaipur** has shown an increment in the ratio with 56.25 from 17.01 on 17th May and a decrement to 40.11 on 24th May.

Huge rise is seen within the second week in **Kota, Nagaur** with 60 and 55.41 and then a decrease to 11.70 and 5.99 respectively in the third week.

With the help of the forecast indicator, it is shown that in the upcoming week, the highest rise in the death to case ratio can be seen in Jaipur.

Formula used-

$$\text{Death to case ratio} = \frac{\text{New Deaths} \times 100}{\text{New Positive}}$$

4.5 Case Fatality Rates

Case Fatality Rate

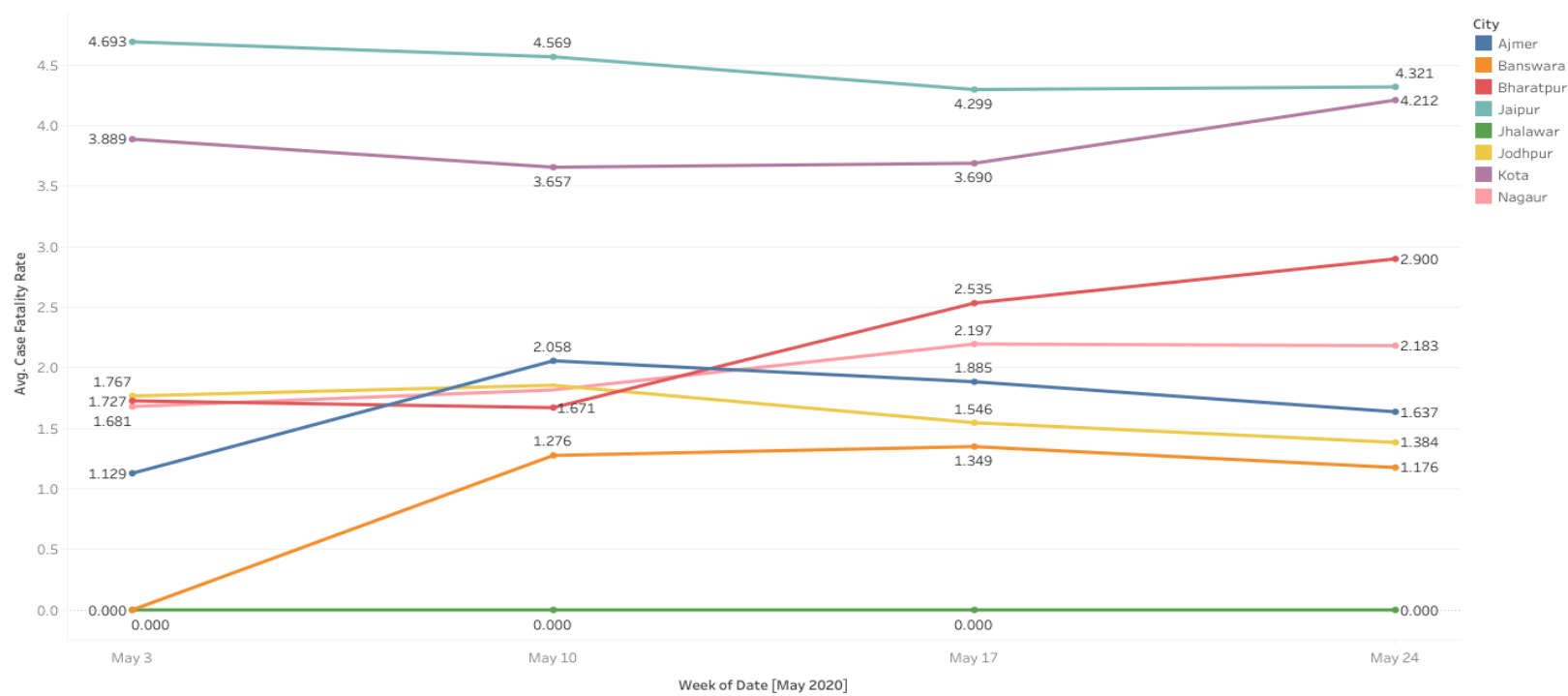


Figure 4.5. 1 Case Fatality rates with respect to Covid-19 for the red zone districts of Rajasthan.

The graph shows that **Jaipur and Kota** are the districts having Case Fatality rate higher when compared with other districts. Jaipur although has the highest case fatality rate but has shown decrement to 4.32 by 4.69 within the third week, wherein Kota has shown increment to 4.21 from 3.88.

In **Bharatpur and Nagaur**, case fatality rate began to increase after the first week till the second week, with a slight decrease in Nagaur and increase in Bharatpur after third week.

Case Fatality rate in **Ajmer and Jodhpur** was at peak by the end of first week and has shown a fall afterwards.

Banswara has shown highest increment in case fatality rate among all the districts with a rise to 1.17 from 0 after the three weeks of categorization.

Jhalawar has shown no change in the case fatality rate till the end of third week.

Formula used-

$$\text{Case Fatality rate} = \frac{\text{Total deaths}}{\text{Total confirmed}} \times 100$$

4.6 Total number of Covid-19 tests conducted

Total sample collected

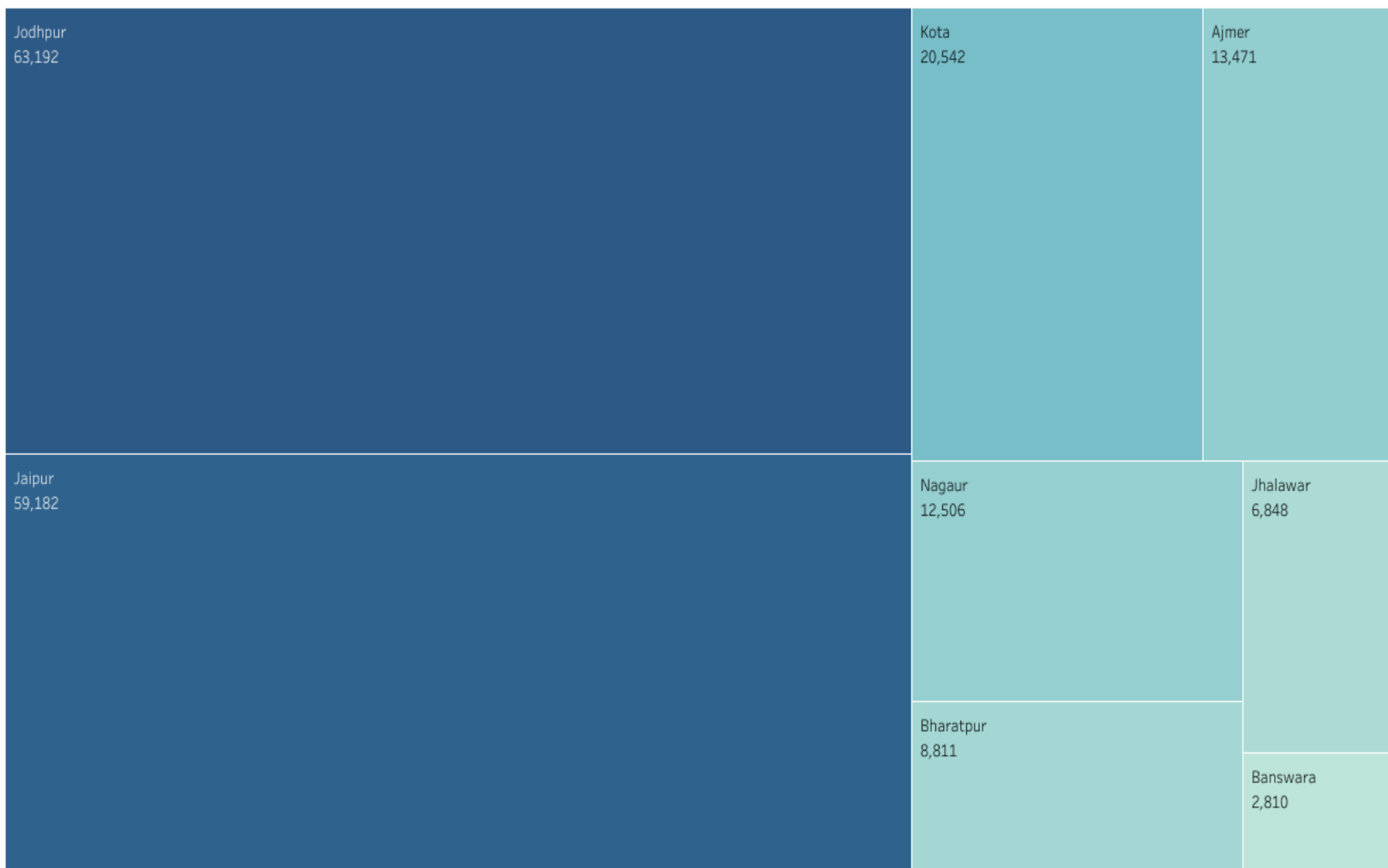


Figure 4.6. 1 Total number of Covid-19 tests conducted in the red zone districts of Rajasthan

The tree map shows the total sample collected till 25th May.

Jodhpur has tested highest number of samples as 63192, followed by **Jaipur** as 59182.

By 25th May, Rajasthan has tested total 327836 samples out of which, a total of 187362 samples were tested in the red zone districts that implies 57.15% of the total.

4.7 Increments in the sample collection

Increase in the sample collection

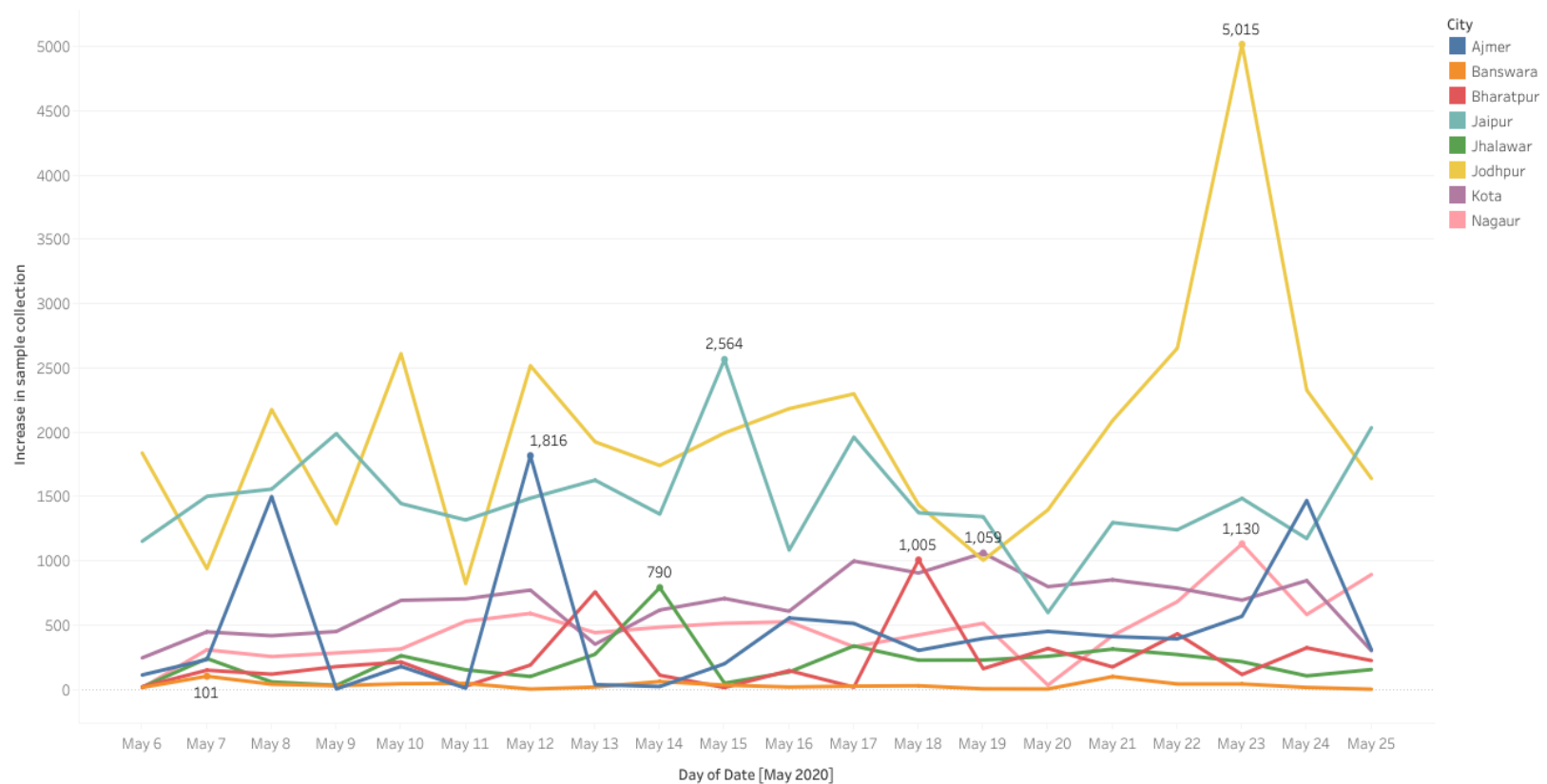


Figure 4.7. 1 Increments in the sample collection among the red zone districts of Rajasthan.

District	Day of the month with highest sample collection	Highest Increase
Jaipur	15th	2564
Jodhpur	23th	★ 5015
Kota	19th	1059
Ajmer	12th	1816
Bharatpur	18th	1005
Nagaur	23rd	1130
Banswara	7th	101
Jhalawar	14th	790

Table 4.7. 1 Highest increase with regard to day of sample collection

The above map depicts that Jodhpur has collected highest number of samples among all the districts.

This is a day wise graph that is showing highest sample collection or test done per district.

4.8 Growth rate of the Covid-19 confirmed cases

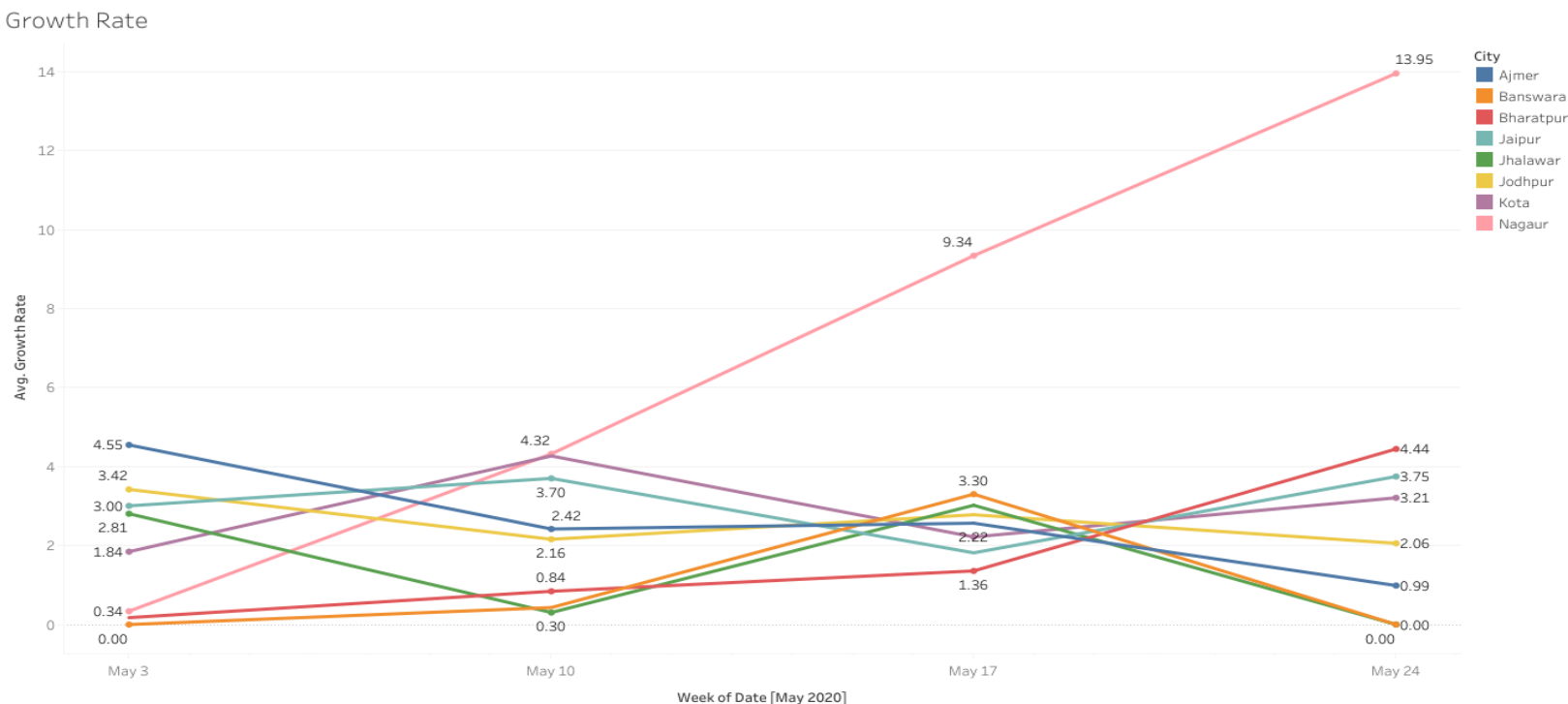


Figure 4.8. 1 Growth rate of the Covid-19 confirmed cases in the red zone districts of Rajasthan.

The graph shows growth rate with respect to confirmed cases in a week span.

Nagaur has shown highest growth rate from 0.34 on 3rd May to 13.95 on 24th May with a rise of 13.61% followed by **Bharatpur** with the rise of 4.44% within 21 days.

Although most number of confirmed cases are reported in **Jaipur**, but a little increase in growth rate is seen from the first week to the third week.

Ajmer, Jodhpur, and Jhalawar has shown a decrease in the growth rate by 3.56%, 1.36% and 2.81% respectively from first week to third week.

In **Banswara**, a continuous hike in the growth rate is seen till the second week that has fallen to 0 till the third week.

In **Kota**, increase in the number of cases were at peak by the end of the first week.

Formula used-

$$\text{Growth rate (per day)} = \frac{\text{Total confirmed cases on that day} - \text{Total confirmed cases on previous day}}{\text{Total confirmed cases on previous day}} \times 100$$

4.9 Growth rates and the sample collection

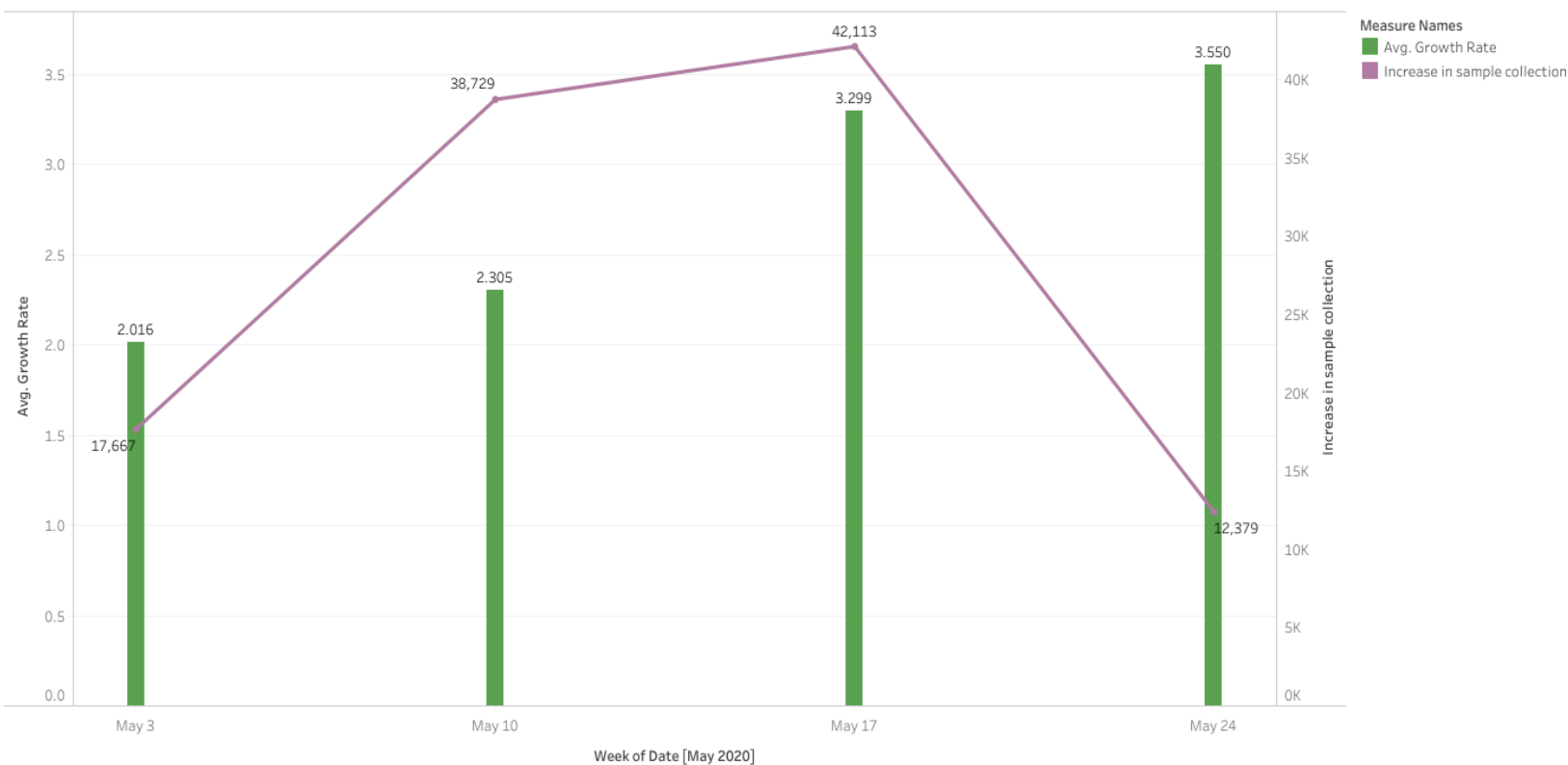


Figure 4.9. 1 Growth rates and the total number of sample collected in red zone districts of Rajasthan.

The graph portrays the relation of the growth rate with respect to the difference in sample collection.

It can be said that by the 3rd May, 17667 samples were collected. As the sample collection further increase to 38729, that is approx. 119% increment by the end of the first week, the growth rate is seen to be stabilized.

By the end of second week, 42113 new samples were collected that is only 9% increment than the previous one and a growth rate hike to 0.994% is observed.

By the end of third week, only 12379 new samples were collected that is 240% decrement in the sample collection and a hike in the growth rate is observed by 1.245% from the second week.

4.10 Districts with high growth rate

Districts with high growth rates

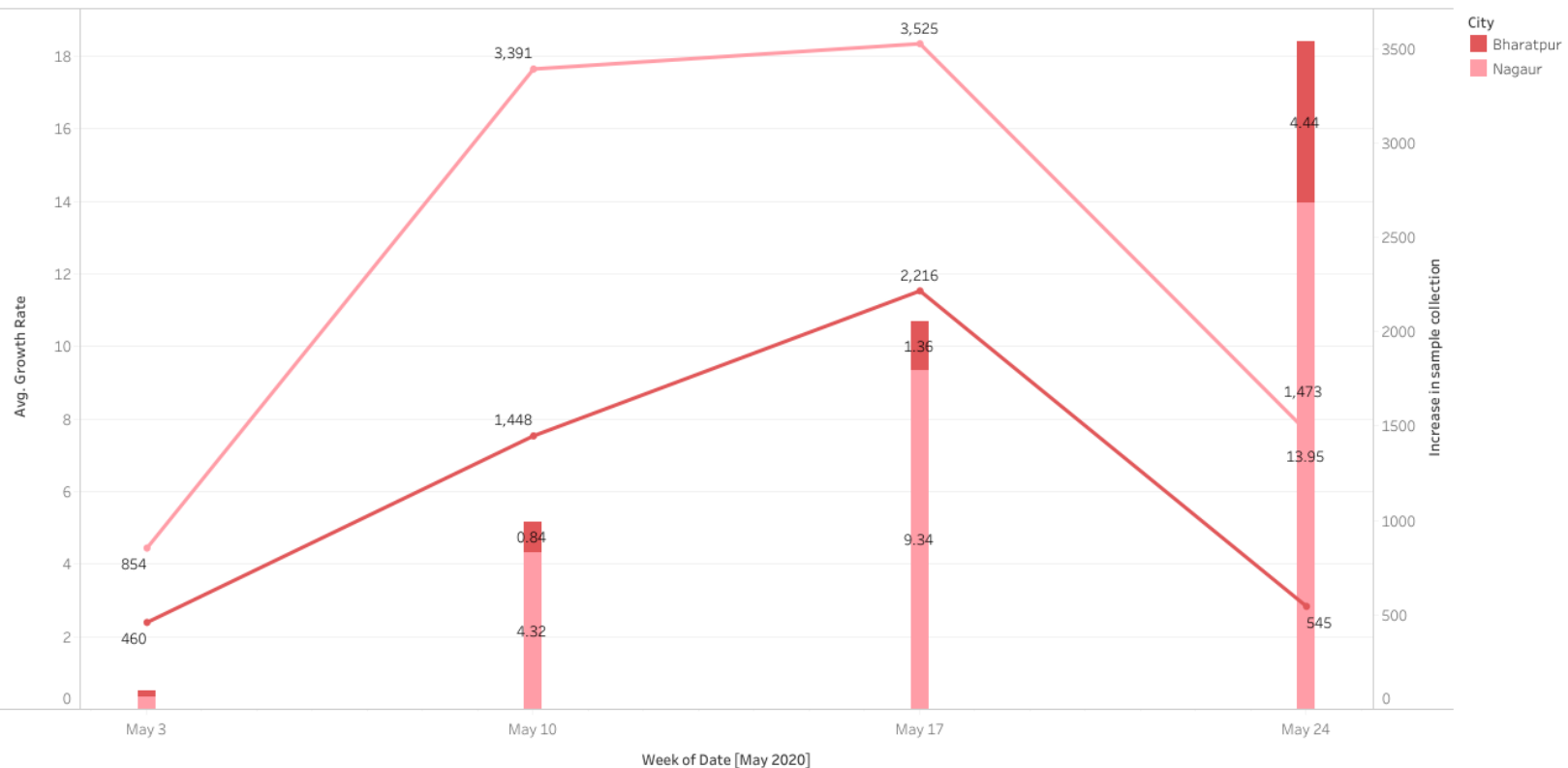


Figure 4.10. 1 Districts with high growth rate

The graph of the growth rate shows that Nagaur and Bharatpur are the two districts that have shown the highest increase among all the districts.

So this graph is showing the growth rates in the occurrence of new cases with respect to the increase in sample collection within the specified time period.

In Bharatpur, 460 samples were increased by 3rd May. The highest increase in the sample collection is done within the second week with 382% more than on the 3rd May. By the end of the third week only 545 new samples were collected that is a decrease of 75%. The growth rate is observed with the increase of 1.19% from the start of the first week till second week and a further increase to 3.08% by the end of third week.

In Nagaur, the maximum samples were collected in the second week with a rise in the growth rate by 5.02%. Within the third week, a decrease of 139% in the sample collection is observed with an increase of 4.61% in the growth rate.

CHAPTER 5

Discussion

After analyzing the 3-week data, following are the points that are meant to be discussed.

- Among all the districts, **Jaipur** and then **Jodhpur** have shown a high rise in the number of confirmed cases and deaths. **Jhalawar** has the least number of confirmed cases with no deaths till 25th May.
- The rate in the occurrence of new cases and new deaths have declined within the specified time period.
- The death to case ratio statistics are impacted in a negative sense by **Kota, Jaipur and Nagaur** with a huge rise seen in the ratio within the second week that may show a significant rise in the fourth week.
- **Jaipur** and **Kota** are the districts with case fatality rates higher than the other districts, wherein **Bharatpur, Nagaur** and **Banswara** are showing a high potential for the increase in their case fatality rates in future.
- **Jodhpur** and then **Jaipur** has tested the most number of samples with **Jodhpur** collected the highest number of samples, on 23rd May among all the districts.
- We can see many ups and downs in the line chart of the growth rate but two districts that are **Nagaur** and **Bharatpur**, have shown a high potential for the increase in growth rate in the future by showing a continuous increase from the first week to the third week with **Nagaur** the highest, 13.61.
- When growth rates are compared with the increase in the sample collection, week wise, it is observed that the growth rate is seen to be stabilized with the increase in the sample collection at 119% within the first week. A hike of 0.994% in the growth rate is observed when increase in the sample collection was done by 9% in the second week. By the third week, increase of 1.24% in the growth rate is observed with the decrease of 240% in sample collection. All the points imply that to decrease the growth rate, we have to increase the number of sample collection by almost double the rate within the one-week time.

CHAPTER 6

Conclusion

With regard to the findings of the study, it can be concluded that, Jaipur has shown the highest increase in the number of confirmed cases and deaths when compared to the other districts. To prevent the further occurrence of new cases, all the measures should be taken to restrict the further growth rate. The two districts, **Nagaur and Bharatpur** has shown a great rise in the growth rate and the chart that is showing a relation between the growth rate and the sample collected hints that if more of the test is conducted, growth rate must fall. The Death to case ratios are calculated with respect to the new deaths occurring, to the new cases occurring for the same disease in a given period of time. So if this ratio shows a decrement, this implies that the growth rate is declining. **Jaipur, Kota and Nagaur** have shown a potential in increasing their death to case ratios that should be taken under the consideration. To increase the recovery rate, case fatality rates should be monitored for districts including **Jaipur** and **Kota**, having highest among the other districts and the potential districts including **Nagaur** and **Bharatpur** should be a main focus.

RECOMMENDATIONS

- Training of the Trainer (TOT) sessions should be organized for building their capacities with respect to the contact tracing techniques.
- Find, test, isolate and care for cases and quarantine contacts to control transmission.
- Immunity Boosters should be given to the Covid-19 patients by prioritizing them on the basis of the severity levels.
- People are not wearing the masks properly. Either the mask is only covering the mouth not the nose and if covering, then only the tip of the nose, hanging loosely, not washing the mask properly if can be reused, touching the nearby area of the face while wearing the mask. So IEC's should be designed covering all these points.
- With the start of the Covid-19 outbreak in Rajasthan, Bhilwara emerged with highest number of cases for a short period of time and a sudden decrease is shown afterwards with a few number of new cases occurrence. So the strategies that were adopted there should be followed in all the districts.

CHAPTER 7

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