THE UNEXPECTED SETBACK TO BENGALURU - COVID-19 DISASTER MANAGEMENT REVIEW

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ABSTRACT

Introduction: Negative impact of COVID-19 exist in every place of the Indian[1] subcontinent. Chennai, Mumbai and Delhi were affected so badly in Quarter 2 with a huge number of cases; however, Kolkata and Bangalore were doing good with a smaller number of cases. At Bangalore, as on 15 June 2020, the situation was good[2] and by end of June 2020, the COVID-19 situation of Bangalore started towards the negative side as the number of cases is increasing more. By the last week of October, the number of confirmed cases came down.

Aim: The primary objective of the research paper is to explore the current state of COVID-19 pandemic of Bangalore by comparing the previous months. We attempt to explain how the condition was good till June and how badly it was affected by the huge number of cases (4-5 times) from June end onwards. Further, we predict the confirmed cases and death rates for the forthcoming days for Bangalore.

Technique, Sample and method: For this research work, we have used the data from 15 June 2020 to 26 October 2020 from the government of Karnataka and Bruhat Bengaluru Mahanagara Palike[3] (BBMP). To forecast the COVID-19 cumulative confirmed and death cases for Bangalore and Other major cities (for comparison), we have used FORECAST.ETS function in Microsoft Excel. The forecasting is estimated till 31 December 2020.

Results: By 15 Nov 2020, the forecasted cumulative cases would be 368264 in the Bangalore city. By 30 Nov 2020, the forecasted cumulative cases would be 398929. By 15 Dec 2020, the forecasted cumulative cases would be 429594 and by 31 Dec 2020, the forecasted cumulative cases would be 462303. If the situation goes bad due to various reasons, the number of cumulative cases may go up to 634462. The average COVID-19 case growth of Bangalore is 141% (Average from June to Oct 2020).

Conclusion: When Major cities of India were doing bad in terms of COVID-19, Bangalore was doing well for the first few months. From June end onwards, the covid-19 cases increased in Bangalore by 4-5 times which is unexpected. By the end of October, the rate of COVID-19 increase is comparatively less than the previous months. For now, COVID-19 situation may be under control to some extent, however, that does not mean that this scenario will continue. At any point in time, the situation may go back to the worst condition as similar to the second wave of COVID-19 is being encountered by the European countries. Proactive approaches and pandemic management strategies should be in place to manage the worst situation. People and the economy affected badly due to COVID-19 already and it may not be feasible to suffer once again.

KEYWORDS: *Bengaluru, COVID-19, Coronavirus, Cumulative cases, Deaths.*

INTRODUCTION

Bengaluru[4] (Bangalore) is one of the most developing cities in India. Bangalore is located in Karnataka state and 5th largest city across the country. Bangalore is also known as 'Garden city' of India because of the huge number of trees and wonderful greenery. Pensioners used to consider Bangalore as their Paradise. Bengaluru is also known as the "Silicon Valley of India" for the growth of IT sector in India. Bangalore is the capital of Karnataka and renamed as "Bengaluru" in 2014. Various Indian technological organisations such as ISRO, Infosys, Wipro, and Hindustan aeronautics limited, are headquartered in the city. Bangalore is the demographically diverse city and it has one of the most highly educated workforces in the world. Multiple educational and research institutions located in Bangalore, such as Indian Institute of Science, Indian Institute of Bangalore, NIAS, TIFR, ISEC, IITB, NID R&D, NLSIU and NIMHANS. Many public sector organisations such as Bharat Electronics, Bharat Heavy Electricals Limited, Bharat Earth Movers Limited and National Aerospace Laboratories (NAL) are located in the city. Bangalore gets rain for 60 days per year over the last ten years (average). Bangalore is known for its excellent climate round the year. The temperature of the Bangalore city varies from 18 C to 38 C and

ranges from 12 C to 25 C in summer and winter respectively. There is a continuous inflow of population right from the year 1901 to 2001. The population of the city was 1,63,000 in 1901 and It was 95,88,910 in 2011. During the 1990s, due to the information technology revolution, the usage of land in Bangalore increase by 123%. Bangalore city become major technology hub after Boston, London and California. Bangalore city is the home for over 650 Indian and multinational companies. Bangalore

is contributing 35% of India's software exports. Peenya was Asia's largest industrial zone located in Bangalore with an area of 1,485 acres, and Peenya Industrial Area has a total of 6000 manufacturing units. It is important to note that the Peenya is currently India's 66th most polluted industrial sector. Apart from Peenya, there are so many industrial layouts such as Whitefield, Bommasandra, Nelamangala, Kumbalagodu, Jigani, Veerasandra, Harohalli, Bidadi and Hoskote.
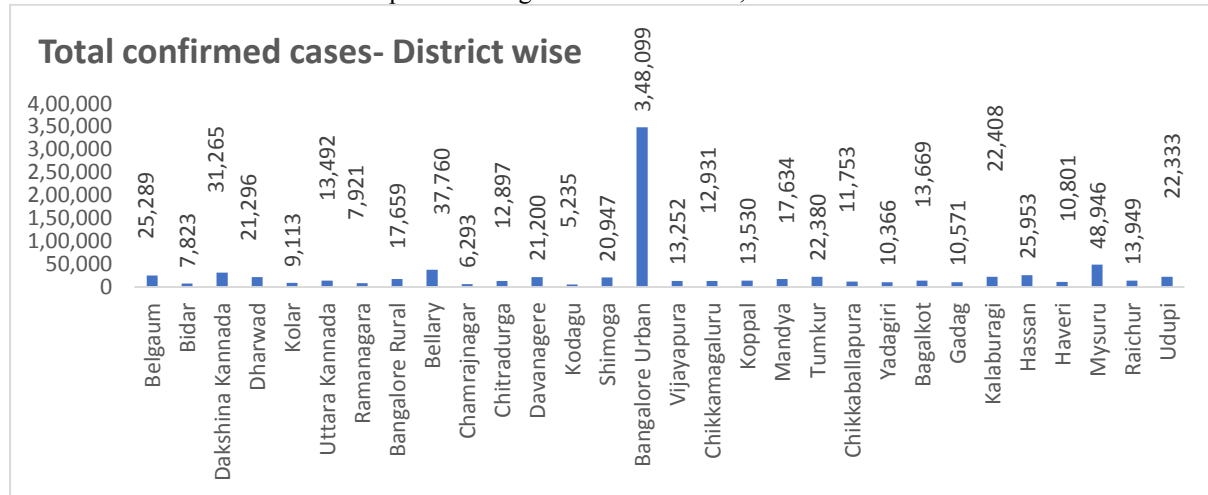

Figure 1. Karnataka confirmed cases – District Wise (As on 8 Nov 2020)[12]

Worldwide, India is in second place next to the USA in terms of highest COVID-19 cases. Soon India[5] may take the first place globally. Within India, Karnataka is in second place with 8,53,796 cases, as on 12 November 2020. District wise COVI-19 confirmed cases of Karnataka as on 8 November 2020 details given in figure 1. It is obvious that the Bangalore urban is at the top level with 3.48 lakhs confirmed cases. Being a capital of the state, with a huge population, high population density and the high number of travellers to the city, no need to surprise about the higher number of confirmed cases in Bangalore than any other part of Karnataka.

The first case of Novel Corona Virus infection, which has caused a pandemic[6] resulting in catastrophic health implications and human miseries throughout the globe, was detected in the state on 8 March 2020. It was a case of an international traveller returning to Bengaluru Urban. Since then the state has relied on 5Ts of tracing, testing, tracking, treatment and technology to tackle COVID-19. A robust surveillance system with an elaborate contingency plan is in place for limiting the spread of the disease. As on 30 April 2020, the number of COVID-19 cases in Bangalore was 138. As on 1 June 2020, the number of cases in Bangalore was 386, whereas the number of cases was more in other major cities, Chennai-14799, Mumbai -39686 Delhi-19844 and Kolkata-2125. As on 15 June 2020, among the five major cities considered, Bangalore had 732 confirmed cases compared to Mumbai which was affected severely with 58226 cases, Delhi with 41182

cases, Chennai with 31896 cases and Kolkata was in 4th place with 3672 cases. Being a silicon valley of India and with a huge number of people roaming around, the fewer number cases in Bangalore was appreciated by the media, medical authorities and various government agencies. However, within a month, Bangalore's COVID-19 situation changed drastically. As on 26 Oct 2020, the number of cumulative cases is 327376 which is the evidence for the drastic change in the number of cases.

OBJECTIVES

- To understand how Bangalore was changed from Good to bad situation in terms of COVID-19 cumulative cases.
- To predict the future state of Bangalore regarding COVID-19 situation.

Approach

We have taken June 2020 as a base for this comparative study. The number of COVID-19 cases of every 15 days considered to compare the rate of growth for Major cities such as Bangalore, Chennai, Kolkata, Mumbai and Delhi. Our primary aim is to see how Bangalore was good with a smaller number of cases in June 2020 and how bad it is in October 2020 and what was the percentage of case increase throughout this period. Also, based on the current data (June to Oct 2020), we forecasted the number of confirmed cases and death cases for Bangalore till 31 December 2020.

COVID-19 SITUATION OF BANGALORE

COVID-19 impacted most of the countries globally[10]. As on 15 June 2020, Karnataka was in 10th place with the 7213 confirmed cases in India[11]. Within Karnataka state, Bangalore was in 4th place with 732 cases next to Udupi, Kalaburagi and Yadagiri districts. Mumbai[7] was one of the severely affected cities with 58226 cases, Delhi[8] with 41182 cases and Chennai[9] with 31896 cases. Kolkata was in 4th place with 3672 cases. (figure 2 left side image) Within 15 days (i.e on 30 June 2020), the number of cases of Bangalore raised to 4555 from 732 (522% increase), whereas the number of cases of Kolkata increased to 5573 from 3672 (35% increase). The number of cases in Chennai increased from 31896 to 55969 which is around 75.4% increase. Similarly, the number of cases in Delhi increased from 41182 to 83077 which is more than 100% increase and the number of cases of Mumbai Increased from 58226 to 75539 which is around 30% increase(figure 2 right side image). During this period, Bangalore has seen a huge number of case increase and Mumbai have seen a lesser rate of increase.

Figure 2. No of COVID-19 cases in Bangalore and other major cities (June 2020)[12]

By end of June 2020, the number of cases of Bangalore was 4555, however, on 15 July 2020, the number of cases is 22994 which is more than 404% Increase. The number of cases of Kolkata was 5573, however, on 15 July 2020, the number of cases is 10550 which is close to 89.3% Increase. By end of June 2020, the number of cumulative cases of Chennai was 55969 and by 15 July 2020, the number of cumulative 79662 which is above 42.3% increase. (figure 2 right side image and figure 3 left side image) Similarly, By end of June 2020, the number of cumulative cases of Mumbai were 75539 and by 15 July 2020, the number of cumulative 95100 which is around 26% increase. By end of June 2020, the number of cumulative cases of Delhi was 83077 and by 15 July 2020, the number of cumulative 115346 which is around 39% increase. So for the period of 30 June 2020 to 15 July 2020, the increase of COVID-19 cases of all other cities are lesser than 100%, however, the growth rate of Bangalore was 404% which is an unusual pattern.
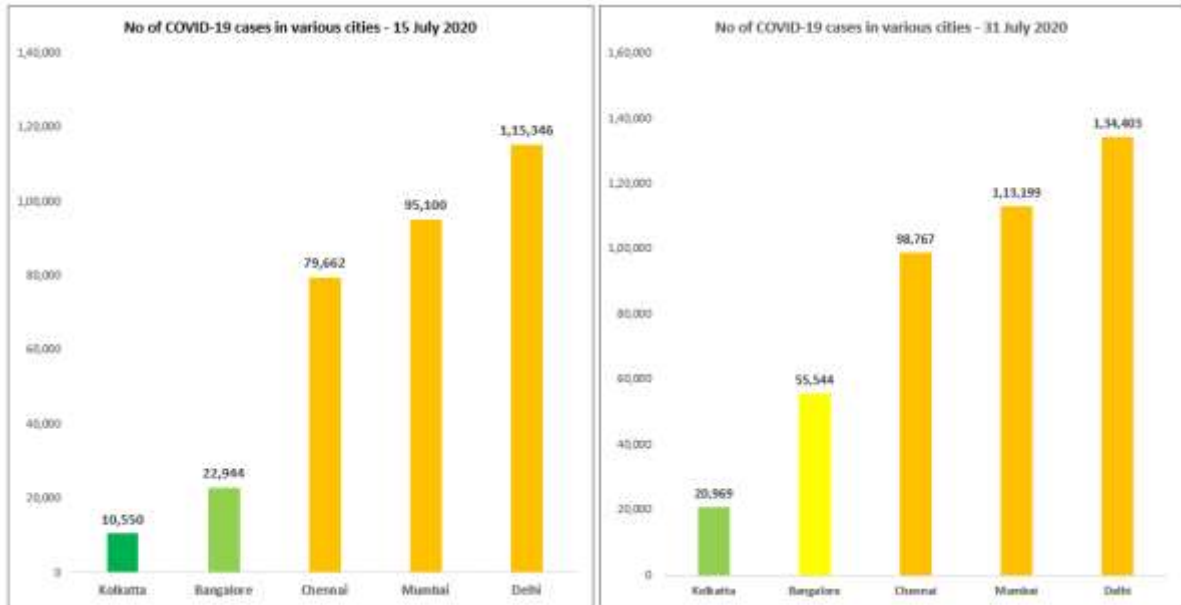
Figure 3. No of COVID-19 cases in Bangalore and other major cities (July 2020)[12]

From 15 to 31 July 2020, there was around 10400 cases increase in Kolkata (around 100% increase). The number of cases increased from 22994 to 55544 in Bangalore (141% increase). There was around 24% increase in Chennai during this period (79662 to 98767). The number of cases increased from 95100 to 113199 in Mumbai which is around 19% increase. In Delhi, there was an increase from 115346 to 134403 which is around 16.5% increase. (figure 3) During 15 to 31 July 2020, Bangalore was the city which was affected by the huge number of confirmed cases. (141% increase)

By end of July to 15 August 2020, The number of cases increased in Kolkata from 20969 to 31085 which is a 48% increase. The number of cases increased in Bangalore from 55544 to 87680 which is around 58% increase. The number of cases increased in Chennai from 98767 to 114260 which is around 12% increase. The number of cases increased in Mumbai from 113199 to 128535 which is around 15.6% increase. The number of cases increased in Delhi from 134403 to 150652 which is around 12% increase. During this period also, Bangalore and Kolkata are the cities affected badly with a greater number of cases. (figure 3 right side image and figure 4 left side image)
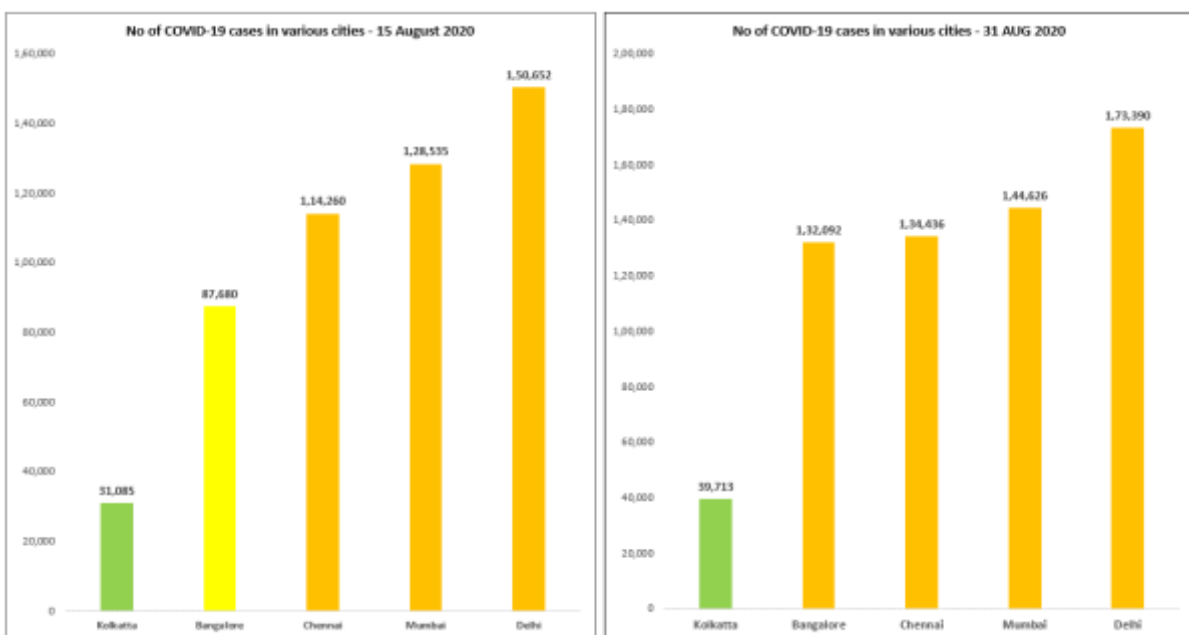

Figure 4. No of COVID-19 cases in Bangalore and other major cities (August 2020)[12]

From 15 to 31 August 2020, The rate of increase in the confirmed cases in Kolkata from 31085 to 39713 which is around 27.7%. The rate of increase in the confirmed cases in Bangalore from 87680 to 132092 which is around 50.6%. The rate of increase in the confirmed cases in Chennai from 114260 to 134436 which is around 17.6%. The rate of increase in the confirmed cases in Mumbai from 128535 to 144626 which is around 12.5%. The rate of increase in the confirmed cases in Delhi from 150652 to 173390 which is lesser than 15% (figure 4). During this period, Bangalore and Kolkata are the cities affected badly with a greater number of cases and Mumbai had a lesser growth rate.

By the end of August 2020 till 15 Sep 2020, The rate of increase in the confirmed cases in Kolkata from 39713 to 47141 which is around 18.7% increase. The rate of increase in the confirmed cases in Bangalore from 132092 to 176712 which is 33.7%. The rate of increase in the confirmed cases in Chennai from 134436 to 149583 which is around 11.2%. The rate of increase in the confirmed cases in Mumbai from 144626 to 172010 which is around 19%. The rate of increase in the confirmed cases in Delhi from 173390 to 221533 which is around 27.7%(figure 4 right side image and figure 5 left side image). During this period also, Bangalore is the city affected badly with a greater number of cases and Chennai had a lesser growth rate.
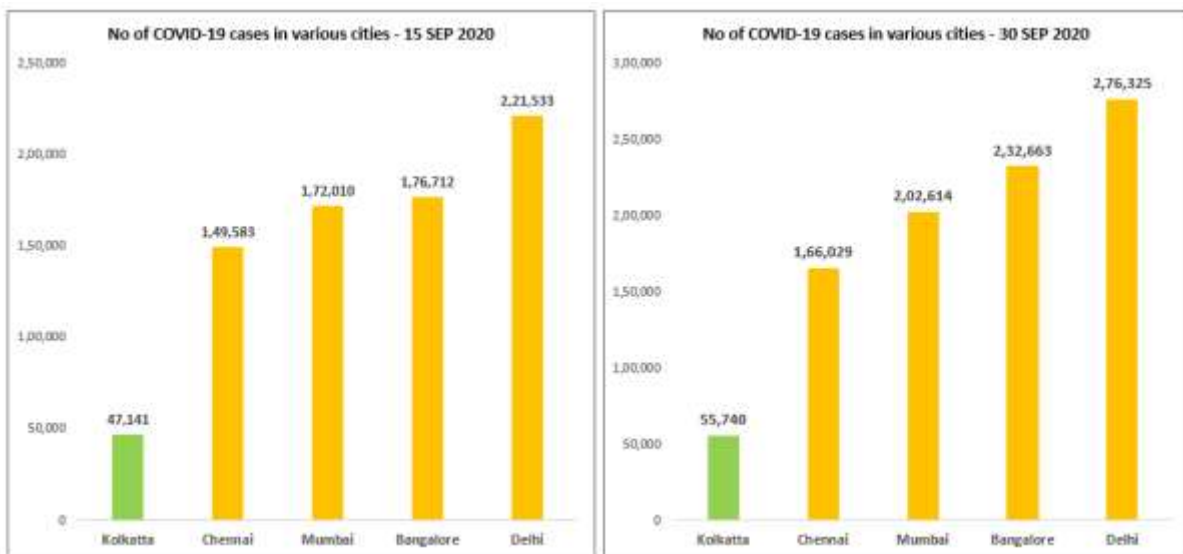

Figure 5. No of COVID-19 cases in Bangalore and other major cities (Sep 2020)[12]

From 15 Sep to 30 Sep 2020, The rate of increase in the confirmed cases in Kolkata from 47141 to 55740 which is around 18.2%. The rate of increase in the confirmed cases in Bangalore from 176712 to 232663 which is around 31.6%. The number of cases increased in Chennai from 149583 to 166029 which is around 11%. The number of cases increased in Mumbai from 172010 to 202614 which is around 17.8%. The number of cases increased in Delhi from 221533 to 276325 which is around 24.7% (figure 5). Still, during this period, Bangalore is the city affected badly with a greater number of cases. i.e with 31.6% case increase and Chennai maintained with 11% case increase.

From 30 Sep to 15 Oct 2020, The number of cases increased in Kolkata from 55740 to 66682 which is around 19.6%. The number of cases increased in Bangalore from 232663 to 297193 which is above 27.7%. The number of cases increased in Chennai from 166029 to 185573 which is around 7%. The number of cases increased in Mumbai from 202614 to 234602 which is around 15.7%. The number of cases increased in Delhi from 276325 to 317548 which is around 15%(figure 5 right side image and figure 6 left side image). Yet during this period, Bangalore is the city affected badly with a greater number of cases. i.e with 27.7% case increase and Chennai have seen a lesser rate of cases. i.e 7%.
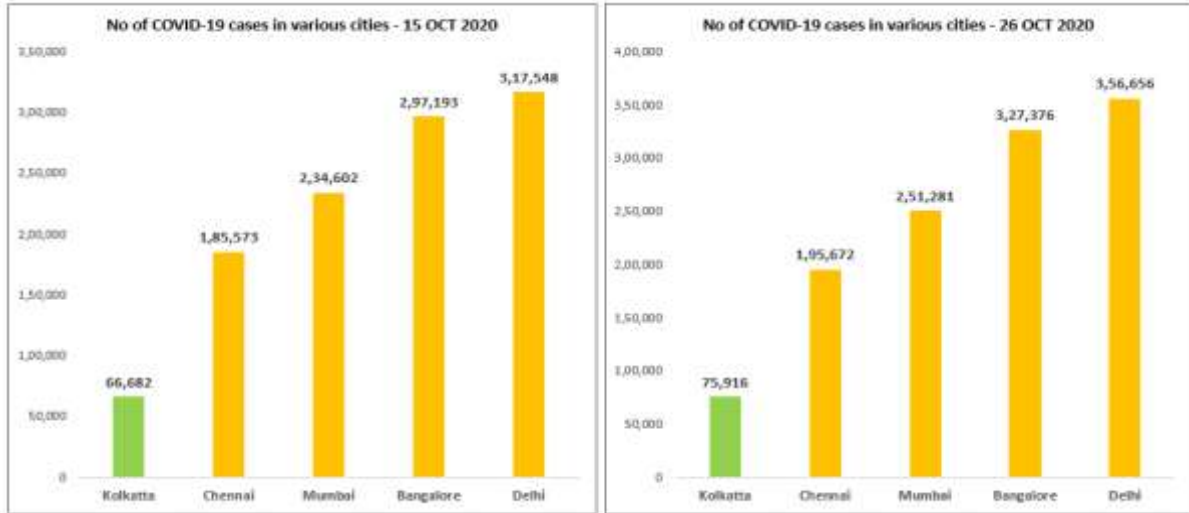
Figure 6. No of COVID-19 cases in Bangalore and other major cities (Oct 2020)[12]

From 16 Oct to 26 Oct 2020, The number of cases increased in Kolkata from 66682 to 75916 which is around 13.8%. The number of cases increased in Bangalore from 297193 to 327376 which is about 10.1%. The number of cases increased in Chennai from 185573 to 195672 which is around 5.4%. The number of cases increased in Mumbai from 234602 to 251281 which is around 7%. The number of cases increased in Delhi from 317548 to 356656 which is around 12.3% (figure 6). During this period, Kolkata is the city affected badly with a greater number of cases. i.e with 13.8% case increase, Delhi is in second place with 12.3% and this is the duration where Bangalore was able to maintain with the lower growth rate. i.e 10.1%.

COMPARISON OF COVID-19 TREND OF BANGALORE WITH OTHER MAJOR CITIES

Figure 7 shows the trend[12] of Bangalore, Kolkata, Chennai, Mumbai and Delhi from June to October 2020. From June onwards, most of the times, Delhi is at the top level (Yellow) and Kolkata is at a lower level (Orange). If we look at the graph of Bangalore, it was at the bottom in the 1st half of June 2020 till end of July 2020 and from August 2020 onwards, the number of cases has grown exponentially, and now, it is almost near to Delhi. Whereas the graph is in the linear pattern for Chennai and Mumbai.
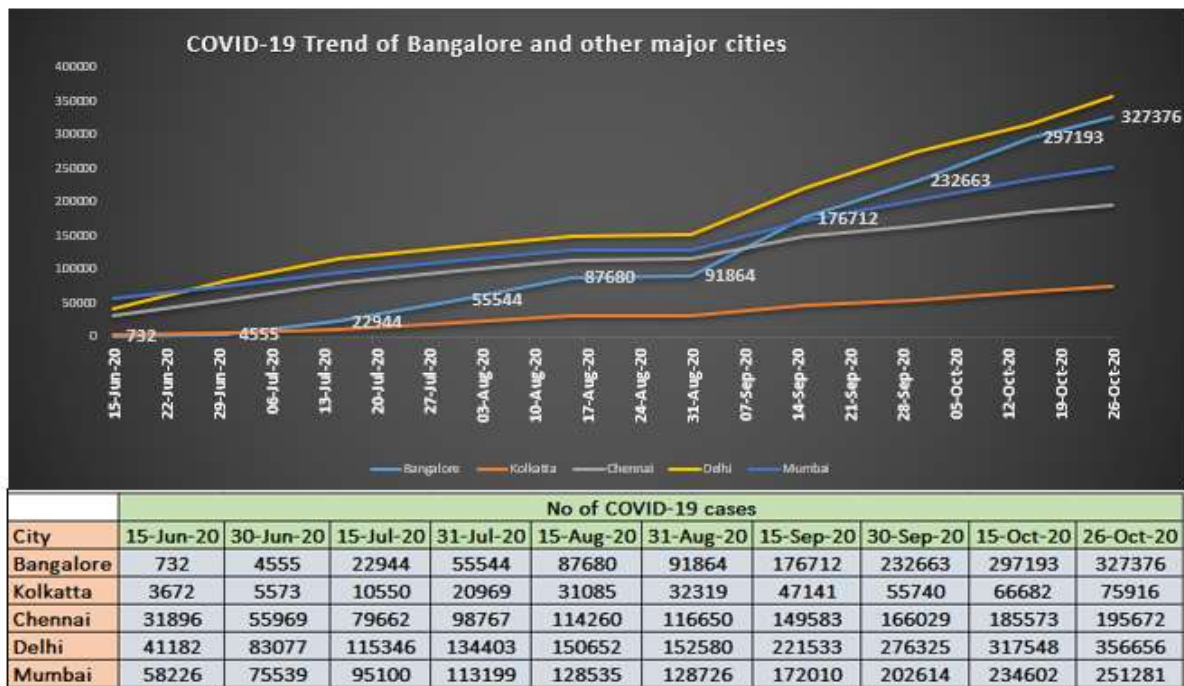

City	15-Jun-20	30-Jun-20	15-Jul-20	31-Jul-20	15-Aug-20	31-Aug-20	15-Sep-20	30-Sep-20	15-Oct-20	26-Oct-20
				No of COVID-19 cases						
Bangalore	732	4555	22944	55544	87680	91864	176712	232663	297193	327376
Kolkatta	3672	5573	10550	20969	31085	32319	47141	55740	66682	75916
Chennai	31896	55969	79662	98767	114260	116650	149583	166029	185573	195672
Delhi	41182	83077	115346	134403	150652	152580	221533	276325	317548	356656
Mumbai	58226	75539	95100	113199	128535	128726	172010	202614	234602	251281

Figure 7. COVICD-19 trend of Bangalore and other major cities (June to Oct 2020)[12]

Figure 8 left side image shows the rate of COVID-19 case growth of Bangalore, Kolkata, Chennai, Mumbai and Delhi. Right side image shows the % of case growth in all those cities compared with the previous 15 days duration. The city which has the highest rate of growth is indicated in orange colour and the city which has the lowest case growth is indicated in green colour. Example: During 16-31 August 2020, Bangalore's rate of growth was 50.6 % compared with the duration of 1-5 August 2020, it is the highest among all five cities which is indicated in orange colour and Similarly, Mumbai had 12.5% rate of growth which is the lowest among all five cities which is indicated in green colour.
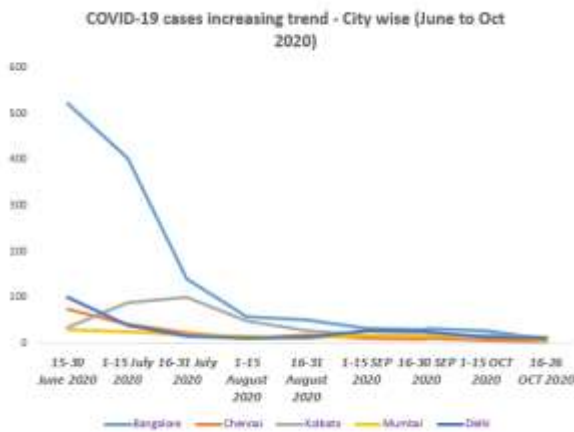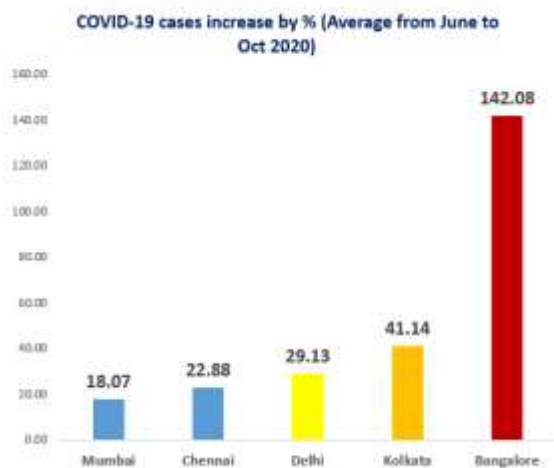

| Period | COVID-19 cases increase by % | | | | |
	Bangalore	Chennai	Kolkata	Mumbai	Delhi
15-30 June 2020	522	75.4	35	30	100
1-15 July 2020	404	42.3	89.3	26	39
16-31 July 2020	141	24	100	19	16.5
1-15 August 2020	58	12	48	15.6	12
16-31 August 2020	50.6	17.6	27.7	12.5	15
1-15 SEP 2020	33.7	11.2	18.7	19	27.7
16-30 SEP 2020	31.6	11	18.2	17.8	24.7
1-15 OCT 2020	27.7	7	19.6	15.7	15
16-26 OCT 2020	10.1	5.4	13.8	7	12.3
AVERAGE CASE INCREASE	142.08	22.88	41.14	18.07	29.13

Figure 8. COVID-19 rate of cases increases in Bangalore and other major cities (June to Oct 2020)[12]

During 15-30 June, Bangalore has seen the highest growth rate which is 522% and it was 10% during 16-26 Oct 2020 which is the lowest. Severity came down in 1st half of July by around 20% so it was around 404% growth rate and it was 141% in the second half of July 2020. From August till 1st half of Oct 2020, the growth rate varied between 30-50% approximately.

City	COVID-19 cases increase by % (Average from June to Oct 2020)
Bangalore	142.08
Chennai	22.88
Kolkata	41.14
Mumbai	18.07
Delhi	29.13

Figure 9. COVID-19 average rate of cases increases in Bangalore and other major cities (Average June to Oct 2020 [12]

From June to Oct 2020, on average COVID-19 growth rate of Bangalore is 142.08% which is the highest among all 5 cities. Mumbai is at 18.07% which is the lowest, however, the number of cases grown so much in Mumbai before June and it is under control after June. Kolkata has seen around 41% case growth and Delhi has grown with 29.14%. (figure 9)

COVID-19 TREND OF BANGALORE (Lockdown and Unlocking)

It was a surprising pattern that was maintained at Bangalore from the beginning till lockdown 5.0. Lockdown was there across the country, however, many of the major cities affected badly with huge number of cases but Bangalore was one of the cities which was under control with a smaller number of COVID-19 cases. Until lockdown 5.0, Bangalore had

358 cumulative cases. When the first unlock announced it was 4555 cumulative cases in the garden city. So this indicates that during lockdown 5.0, the number of cases started increasing with multiple folds due to the reason that the unlock 5.0 was announced with lot of relaxations.
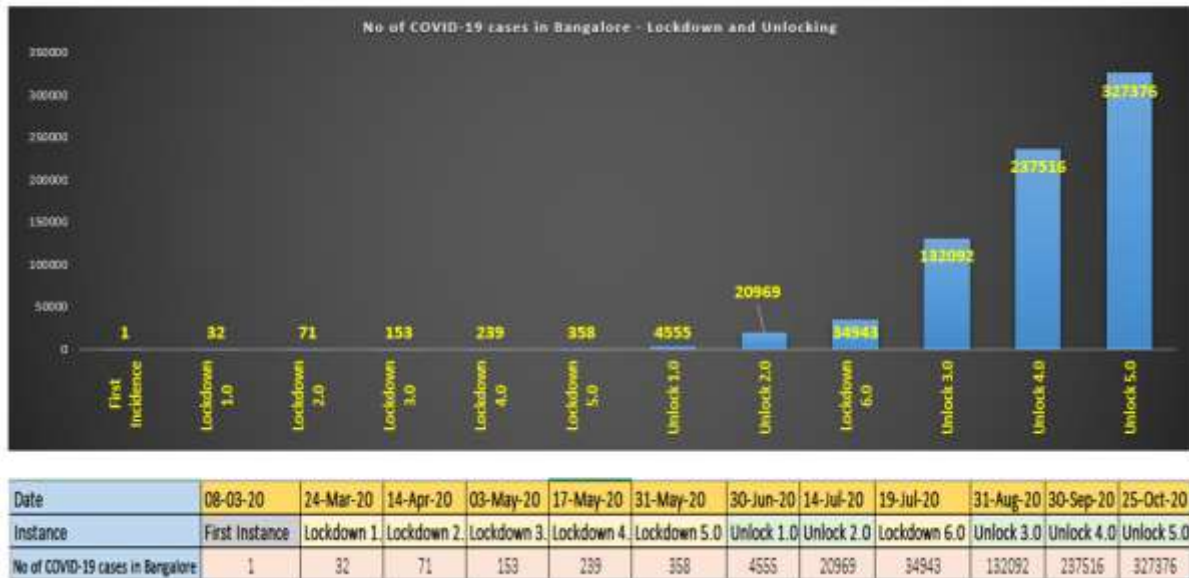

Date	08-03-20	24-Mar-20	14-Apr-20	03-May-20	17-May-20	31-May-20	30-Jun-20	14-Jul-20	19-Jul-20	31-Aug-20	30-Sep-20	25-Oct-20
Instance	First Instance	Lockdown 1.	Lockdown 2.	Lockdown 3.	Lockdown 4.	Lockdown 5.0	Unlock 1.0	Unlock 2.0	Lockdown 6.0	Unlock 3.0	Unlock 4.0	Unlock 5.0
No of COVID-19 cases in Bangalore	1	32	71	153	239	358	4555	20969	34943	132092	237516	327376

Figure 10. COVID-19 cases in Bangalore during and after lockdown[12]

There were 20969 cases when unlocking 2.0 announced which is 4 times higher than the previous unlocking. Since the COVID-19 cases are high, the BBMP announced lockdown 6.0 for a week and there were 34943 cases at that time. At the time of unlocking 3.0, the number of cumulative cases was 132092 which is around 4 times and as on 25 Oct 2020, the number of cumulative cases is 327376 in the city. Positive rate from sampling test was pretty low in May or before that (1.17%). It was increased in June 2020 to 7% and huge spike in July 2020. i.e 24.15%. (figure 11).
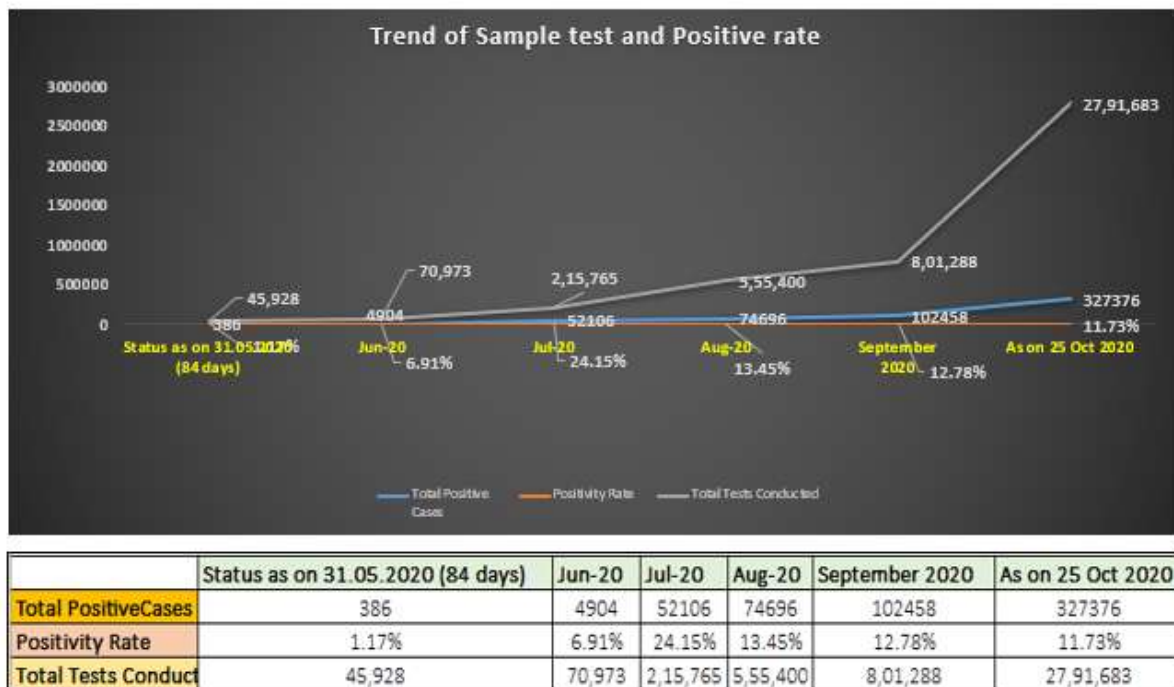

	Status as on 31.05.2020 (84 days)	Jun-20	Jul-20	Aug-20	September 2020	As on 25 Oct 2020
Total PositiveCases	386	4904	52106	74696	102458	327376
Positivity Rate	1.17%	6.91%	24.15%	13.45%	12.78%	11.73%
Total Tests Conduct	45,928	70,973	2,15,765	5,55,400	8,01,288	27,91,683

Figure 11. COVID-19 sample test and positive rate trend in Bangalore[12]

From August onwards, the positive rate from the sample tested has come down, i.e 13.45% in August,12.78% in September and 11.73% in October 2020. (figure 11). From the trend, we can assume that it will further come down in November 2020. Figure 12 shows the trend of cumulative confirmed cases and death cases from the beginning till 26 October 2020. From the pattern, we can clearly understand that the case growth and death counts are in exponential pattern with constant increase.
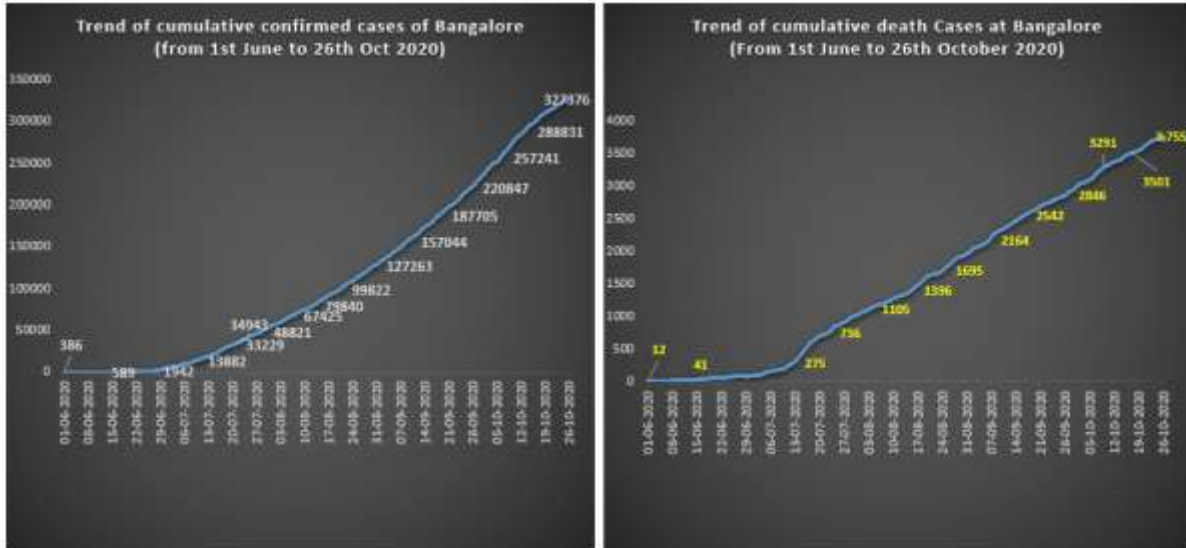

Figure 12. COVID-19 confirmed and death cases trend at Bangalore[12]

Forecasting analysis

In this paper, we have used forecasting[13] analysis technique in Microsoft excel for calculating the future state. This forecast is completely based on past data. For the confirmed cases forecast, we have given the actual forecasting and also, upper bound are indicated. Other than the recent data, there are various influential factors (lockdown tactics, speed of spread, advisories and regulations from the central and state governments, people's awareness and attitude in following practices, etc.) that can completely change the scenario which may lead to a drastic change in the forecasted data.
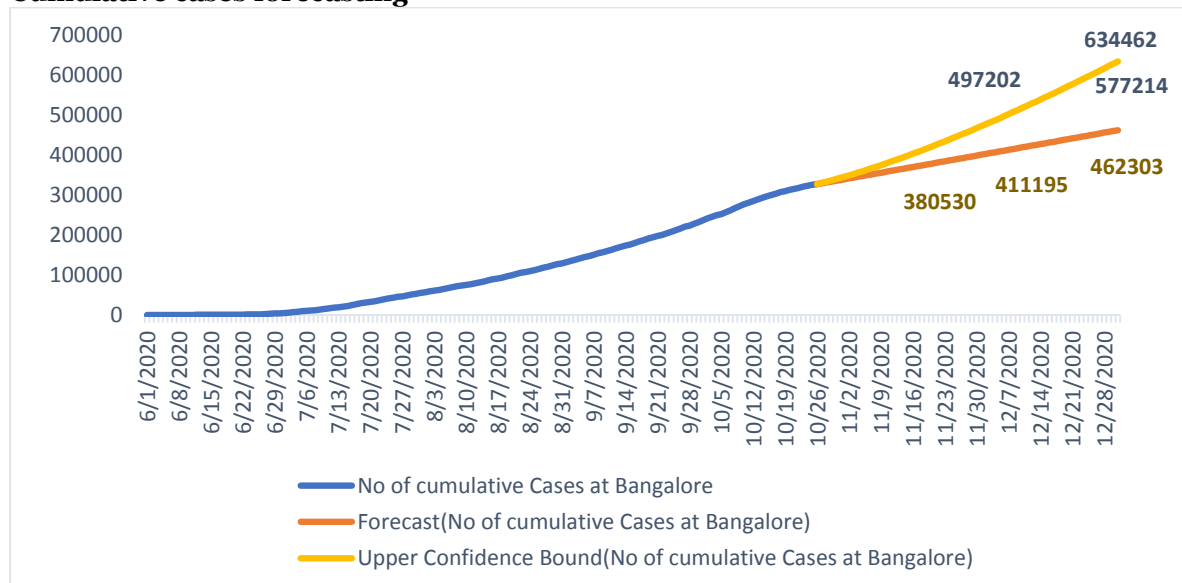
Cumulative cases forecasting

Figure 13. COVID-19 forecasted confirmed cases trend at Bangalore

Death cases forecasting

The number of cumulative death cases as on 26 Oct 2020 is 3755. The death cases trend from 1 June to 26 Oct 2020 indicated in the blue colour (figure). Based on the forecasting estimation, by 31 December 2020, the number of death cases of Bangalore may go up to 5645 (orange colour).
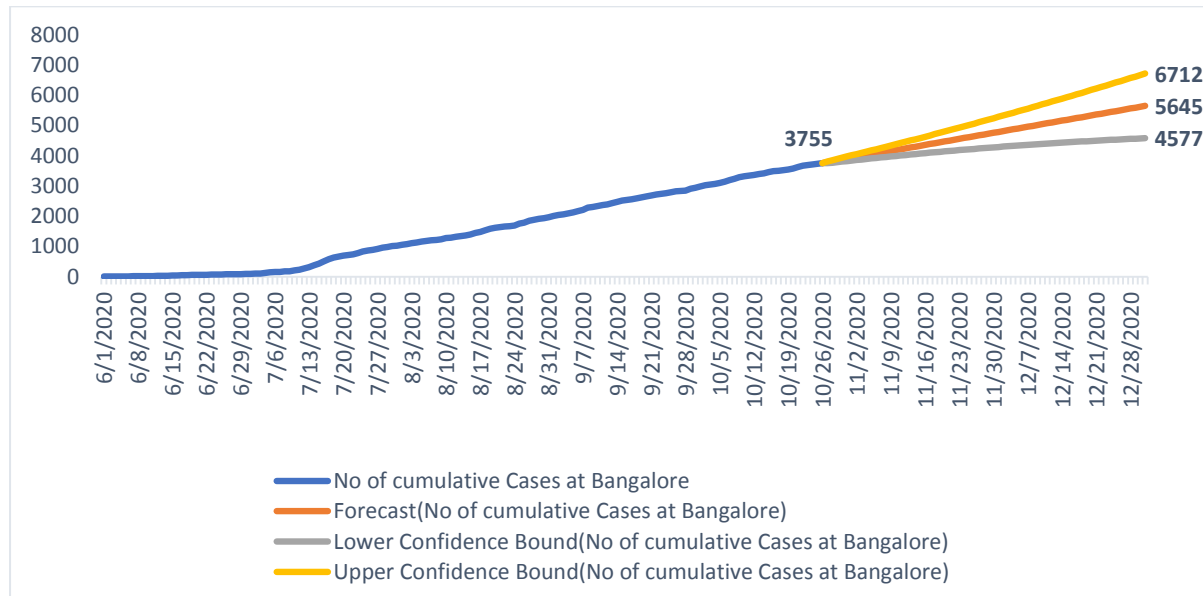

Figure 14. COVID-19 forecasted death cases trend at Bangalore

Due to various reasons, if the scenario goes bad then the number of deaths may go up to 6712 (yellow colour). It can be controlled at 4577 if the situation is under control due to various conditions and efforts (grey colour).

DISCUSSION AND INTERPRETATION

Closing schools in advance, shutting the big markets early in the first lockdown, permitting IT companies to allow their employees to work from home, strict lockdown process was discussed as reasons[14] for better control in Bangalore from March to May 2020. 358 cases for three months duration (March to May 2020) till the lockdown 5.0 which is an excellent control. As on 15 June 2020, there were 732 confirmed cases and 4555 cases on 30 June 2020. As on 15 July and 30 July, there were 22,944 and 55,544 cases respectively. As on 15 and 30 August, there were 87,680 and 91,864 cumulative cases respectively. As on 15 and 30 September there were 1,76,712 and 2,32,663 respectively. by 15 Oct 2020, the number of cumulative cases was 2,97,193 and it was 3,27,376 on 26 Sep 2020. The average case growth rate from 15 June to 26 Oct 2020 is 142%. The highest increase observed in June and July 2020, it was 522% and 404% respectively. Based on the forecasting, the number of cumulative cases may go up to 4623030 by 31 Dec 2020 and the number of death cases may up to 5645 in Bangalore.

City	No of cases on 26 Oct 2020(Current)	No of cases on 31 Dec 2020(Forecasted)
Bangalore	327376	462303
Kolkata	75916	112396
Chennai	195672	278909
Mumbai	251281	346724
Delhi	356656	504035

Table 1. Current and future cases of Bangalore.

From the trend analysis, we can understand that the unlocking played a vital role in increasing more cases in the garden city. Until lockdown 4.0, the number of cases was 358. As on 30 June 2020, until unlock 1.0, the number of cases increased to 4555. It was increased by 4 times (20569 confirmed cases on 14 July 2020) when the unlock 2.0 announced. Due to sudden surge, the lockdown 6.0 announced in the city on 19 July 2020 and there were 34943 cases on that particular day. Unexpectedly, the number of cases increased by 4 times on 31 August 2020, i.e 132092 when the unlock 3.0 announced. By

30 Sep 2020 (unlock 4.0), the number of confirmed cases were 237516 where we have observed 1.05 lakhs cases addition from 31 August to 30 Sep 2020. There were 327376 cases on 25 October 2020, with an increase of around 90k cases. The overall case growth from 1 June to 26 Oct 2020 (358 to 327376) is 999%.

Some of the possible reasons[15] for more COVID-19 cases are: Contact tracing was not that effective. Lack of preparedness and forecasting by the authorities. Lockdown was not the only option to control the spread. People have not followed proper social distancing and wearing masks. Backlog data could not reveal the actual situation in time. Also, testing backlog and late result lead to more COVID-19 spread. It is also important to note that Karnataka opened the borders early for other states people to enter compared to other states, this could be one of the major causes for more cases. By end of October, the growth rate of confirmed cases and the rate of death has come down compared to previous months. It may or may not continue in the same pattern in the forthcoming months. Being a silicon valley with more national and international travellers, higher chance of getting more positive cases at any point in time in the coming days.

CONCLUSION

As on 12 November 2020, there are 51848261 confirmed cases, 1280868 deaths across the world. There are 220 Countries[16], areas or territories affected by COVID-19 cases. The condition and situation of COVID-19 are temporal, and it can be changed at any point in time. When Italy[17] was doing bad, India and a few other nations were doing well. Now, when India is in bad condition and Italy is in good condition in terms of COVID-19 cases. However, it does not mean that Italy will be in good condition forever and the situation may change anytime unexpectedly with the more cases as the second wave is already started in most of the European nations . COVID-19 created a negative impact on the human community, educational sector[18], financial institutions[19] and however, there is also the positive impact on environment[20]. Pandemic management is important for any nation, state governments and major cities like Mumbai, Chennai, Delhi, Kolkata and Bangalore. Controlling the spread in rural areas may be easy but in urban areas, it is complicated because of the huge population, population density and many other reasons. Before June 2020, Bangalore was doing good with a smaller number of cases and after June till Oct 2020, the condition of Bangalore was bad with huge number of cases. Now again the severity is coming down, however, by considering the winter season, more upcoming festivals, any time the number of cases may go high in the city. The second wave of COVID-19 is started in the European counties already. The government of Karnataka and administrators of BBMP should learn the lessons from the World Health Organization, Other countries and states on how to mitigate the situation if again the situation goes bad. Conventional approach and following traditional organizational hierarchy would not help to deal with the pandemic. It is important to have experienced and knowledgeful disaster management experts who can analyse the situation proactively and plan accordingly.

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